

SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Firestopping of through-penetrations and one-sided penetrations in fire-rated wall, floor/ceiling, roof, and roof/ceiling assemblies.
2. Joints, through-penetrations, and membrane penetrations in smoke barriers and smoke partitions.

1.2 DEFINITIONS

- A. F-rating (Flame Rating): The amount of time in minutes or hours that a barrier can withstand fire before being consumed, or before permitting the passage of flame through the opening per UL 1479 or ASTM E814.
- B. Intumescent Material: A characteristic of certain fire-barrier products in which the material expands or swells when exposed to heat, filling a void in the penetration. These materials expand at various rates to form a hard char to seal voids and provide the rated protection.
- C. L-rating: The amount of air that moves through an opening's area in cubic feet per minute per square foot (cfm/sf), at two temperature levels: ambient temperatures and 400 degrees F, which simulate cold and hot smoke moving in a building. An acceptable amount of air movement for a complete wall assembly has been established by NFPA 101 as 0.75 cfm/sf through opening area. Many firestop systems have L-ratings of less than one.
- D. Firestopping (Through-Penetration Protection System): A firestop system that seals the opening around penetrating items that pass through the entire fire-resistive-rated assembly.
- E. Firestopping (Membrane-Penetration Firestop System): A type of firestop protection system that seals the opening provided to accommodate one or more items that penetrate the membrane on only one side of the fire-resistance rated assembly.
- F. T-rating (Thermal Rating): A number, expressed in hours, that indicates the length of time that the temperature on the non-fire side of the penetration does not exceed **325 deg. F (163 deg. C)** above the ambient temperature.
- G. W-rating: The measured resistance of water by a firestop product in buildings. Developed to address concerns by building owners about the ability of a firestop system to resist the passage of water through floor assemblies, this rating offers a new quantifiable characteristic for a

firestop system. The test protocol simulates water on a firestop system for 72 hours, under a 3-foot head of water.

1.3 REFERENCE STANDARDS

A. ASTM International:

1. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings.
2. ASTM D5116 - Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products.
3. ASTM D6670 - Standard Practice for Full-Scale Chamber Determination of Volatile Organic Emissions from Indoor Materials/Products.
4. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
5. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
6. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
7. ASTM E1399 - Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.
8. ASTM E1725 - Standard Test Methods for Fire Tests of Fire-Resistive Barrier Systems for Electrical System Components.
9. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
10. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops.
11. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus.
12. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
13. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies.
14. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. Firestop Contractors International Association (FCIA):

1. FCIA Firestop Manual of Practice (MOP).
2. FCIA Recommended Professional Practice RPP-L-2018.1 - FCIA Recommended Practice for the Identification of Fire Resistance Rated and Smoke-Resistant Penetration and Joint Firestopping.

C. International Building Code (IBC):

1. Article 714.4.4 - Penetrations in Smoke Barriers.

D. UL:

1. UL - Fire Resistance Directory.
2. UL - Qualified Firestop Contractor Program.
3. UL 263 - Standard for Fire Tests of Building Construction and Materials.

4. UL 1479 - Standard for Fire Tests of Penetration Firestops.
5. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

E. ULC:

1. ULC-S115 - Standard Method of Fire Tests of Firestop Systems.

1.4 COORDINATION

- A. Coordinate firestopping Work with the Work of other trades to ensure that all pipes, conduit, cable, and other items that penetrate fire-resistance-rated construction have been permanently installed prior to installation of firestop assemblies.
- B. When penetrations through fire-rated construction include more than one trade, coordinate installation responsibilities between trades to ensure penetrations are sealed using products of the same manufacturer.
- C. Schedule firestopping Work to ensure that partitions and other Work that conceals firestopping are not erected prior to the installation of firestop and smoke seals.
- D. Do not cover firestopping until Owner's inspection agency and public authorities having jurisdiction (AHJ) have examined each installation.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's information regarding product characteristics, performance, and limitation criteria.

1.6 QUALITY ASSURANCE

- A. Provide systems that are acceptable to AHJ and are listed by at least one of the following nationally recognized testing agencies:
 1. UL's "Fire Resistance Directory."
 2. Intertek Testing Service (ITS) (includes agency formerly known as Omega Point Laboratories), in "Directory of Listed Products."
 3. FM Approvals - a division of FM Global.
 4. Southwest Research Institute (SWRI); testing of firestop systems and follow-up inspections of (approved) manufacturers.
 5. Electrical Testing Laboratories (ETL).
 6. Any other qualified independent testing and inspection agency that conducts periodic follow-up inspections and is acceptable to AHJ.
- B. Source Limitations and Responsibility:
 1. Obtain from a single primary firestop systems manufacturer firestop systems for each indicated penetration type and construction condition.

2. Do not intermix materials of different manufacture than allowed by the tested and listed system within the same firestop system or opening.
3. Use tested and listed firestop systems before installing an EJ or EFRA.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials according to manufacturer instructions.
- B. Protection:
 1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
 2. Provide additional protection according to manufacturer instructions.

1.8 AMBIENT CONDITIONS

- A. Minimum Conditions: Do not apply materials if temperature of substrate material and ambient air is below 40 deg. F.
 1. Apply silicone-based sealants within temperature range of 20 deg. F (6.667 deg. C) to 120 deg. F (48.9 deg. C).
- B. Subsequent Conditions: Maintain above minimum temperature before, during, and for minimum three days after installation of materials.
- C. Provide ventilation in areas receiving solvent-cured materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers:
 1. 3M Fire Protection Products.
 2. A/D Fire Protection Systems Inc.
 3. Hilti, Inc.
 4. HoldRite; Reliance Worldwide Company.
 5. Johns Manville; a Berkshire Hathaway company.
 6. Nelson; Emerson Electric Co., Automation Solutions.
 7. NUCO Inc.
 8. Passive Fire Protection Partners.
 9. RectorSeal HVAC; a CSW Industrials Company.
 10. Specified Technologies, Inc.
 11. Tremco, Inc.
- B. Substitutions: Approved equal.

2.2 FIRESTOPPING

- A. Provide firestopping composed of components that are compatible with each other, substrates forming openings, and items, if any, penetrating firestopping under conditions of service and application, as demonstrated by firestopping manufacturer and based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.

2.3 PERFORMANCE REQUIREMENTS

- A. Provide products that, upon curing, do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating of pipes, ponding water, or other forms of moisture during and after construction.
- B. Provide firestop products that are flexible enough to allow for pipe vibration, water hammer, thermal expansion, and other building movement without damaging seal.
- C. Do not remove, cut away, or otherwise interrupt pipe insulation at through-wall or floor openings. Provide products appropriately tested for the thickness and type of insulation used.
- D. Provide products that are compatible with each other, with substrates forming openings, and with items, if any, penetrating firestopping under the conditions represented on this Project, based on testing and field performance demonstrated by manufacturer.
- E. Provide products that meet the intent of the L-rating classification for the movement of smoke per ANSI/UL 1479 for through-penetrations.
- F. Through-Penetration Firestopping of Fire-Rated Assemblies:
 - 1. Comply with UL 1479 or ASTM E814.
 - 2. Minimum Positive Pressure Differential: 0.10 inch wg (24.9 Pa).
 - 3. Fire F-ratings and Temperature T-ratings: As indicated, but not less than 1 hour.
 - 4. Wall Penetrations: Fire F-ratings as indicated, but not less than 1 hour.
 - 5. Roof Penetrations:
- G. Through-Penetration Firestopping of Non-Fire-Rated and Roof Assemblies:
 - 1. Non-Fire-Resistance-Rated Assemblies: Penetrations of non-fire-resistance-rated floor or floor/ceiling assemblies, or ceiling membrane of non-fire-resistance-rated roof/ceiling assemblies, are required to meet the following requirements:
 - a. Noncombustible Penetrating Items:
 - 2. Permit items that connect not more than five stories, if the annular space is filled with an approved noncombustible material, or with a void or cavity material that is tested and

classified for use in through-penetration firestop systems, to resist free passage of flame and products of combustion.

a. Penetrating Items:

3. Permit items that connect not more than two stories, if the annular space is filled with an approved material to resist free passage of flame and products of combustion.

H. Fire-Resistive Joints in Fire-Rated Floor, Roof, and Wall Assemblies:

1. Comply with ASTM E1966 or UL 2079 to achieve fire-resistive rating as indicated for installed joint assembly.
2. Smoke Barrier Joints Air Leakage: Maximum 5 cfm/ft. (0.00775 cms/m) at 0.30-inch wg (7.47-Pa) pressure differential.

I. Surface-Burning Characteristics:

1. Maximum Flame-Spread/Smoke-Developed Index: 25/450 per ASTM E84.

2.4 MATERIALS

- A. Use only firestop products that have been tested according to UL 1479, ASTM E814, or UL 2079 for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire rating involved for each separate instance.

B. Through-Penetration Firestop Products/Systems:

1. Intumescent Firestop Sealant: Water-based, flexible, highly intumescent sealant designed for use on metal, insulated fiberglass, and plastic pipes, as well as top of the wall construction joints and power and telephone cables. Sound Transmission Class (STC) rating 62.
2. Firestop Silicone Sealant: For exterior or interior applications that require a silicone-based firestop. Designed for use with PVC pipe on closed (pressure) systems, electrical metallic tubing (EMT), insulated and uninsulated steel pipe, construction and control joints, and interior expansion joints.
3. Foam Firestopping Joint Products: Single-intumescent compressible foam used to firestop head of gypsum wall joint applications, both dynamic and static.
4. Cast-In-Place Device: Single component device, installed prior to concrete pour, and approved for use with a multitude of penetrating items to prevent the spread of fire from through-penetration services in concrete floors. Casts directly into concrete to form an embedded intumescent service supply.
5. Firestop Collars: Prefabricated firestop systems for through-penetrations using PVC, CPVC, ABS, PVC foam core, ABS foam core, fiberglass-reinforced plastic pipe (FRPP), crosslinked polyethylene (PEX) pipe, and electrical cable. UL classified for both open and closed systems.
6. Intumescent Sleeve: Firestop seal for PVC, cc-PVC, CPVC, FRPP, PP, and ABS pipe and rigid nonmetallic conduit installations. Installed without modifications, steel bolts, or

- fasteners, it is intended to firestop combustible pipes penetrating the uneven contours of a fluted concrete deck assembly.
7. Fiber Stuffing and Sealant Firestopping: Composed of mineral with silicone elastomer for smoke stoppage. Insulation density of 4.0 pcf or greater, unfaced.
 8. Intumescent Firestopping: Putty compound that expands when exposed to surface heat gain.
 - a. Fire-Rated Putty Stick: Seal around penetrating items through fire-rated walls, floors, and within blank openings. Used with electrical cables, conduit, and metal pipes. Hand moldable with no curing time required.
 - b. Fire-Rated Putty Pads: Maintain the hourly rating of fire-rated walls containing electrical outlet boxes and reduce sound transmission.
 9. Firestop Pillows: Reusable heat-expanding pillows or bags consisting of glass-fiber cloth cases filled with intumescent material. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows or bags from being easily removed.
 10. Fire-Rated Mortar for Large Openings:
 - a. Rapid-setting, load-bearing gypsum cement compound. Sets without shrinking and can form a rigid, gas-tight, fire-resistive seal. Easily cut or drilled and resealed if future penetrants are needed.
 - b. Complies with ASTM E814 or UL 1479 and ULC-S115 test standards.
 11. Firestop Sprays:
 - a. Firestop Mastic: Single-component, highly elastomeric, water-based firestop mastic for construction joints; top of wall. Tested to ASTM E1966 or UL 2079, CAN/ULC-S115, ASTM E814, UL 1479, and ASTM E1399.
 - b. Elastomeric, silicone-based firestop sealant suitable for areas of significant movement. Meets Type S, Grade P, Class 25; use NT, M, G, A, O.
 - c. Industrial Cable Coating: Heavy duty, acrylic, latex-based coating used to prevent flame spread on power and communication cables.
 12. Wall Opening Protective Materials:
 - a. Cover Guard Gasket: Single-component fire-rated gasket for use with steel electrical box penetrations in fire-rated assemblies, or for its labeled use.
 - b. Firestop Putty Pad: Highly intumescent, fire-rated pad for use in electrical boxes, or for its labeled use.
 13. Color: Red.

2.5 ACCESSORIES

- A. Primer: Type as recommended by firestopping manufacturer for specific substrate surfaces and as suitable for required fire ratings.
 1. Permanent Dam Material: Mineral fiberboard.

- B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices as required to position and retain materials in place.

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. Clean substrate surfaces free of dirt, dust, grease, oil, loose material, or other matter potentially affecting bond of firestopping material.
- B. Remove incompatible materials potentially affecting bond.
- C. Install damming materials to arrest liquid mortar material leakage.
- D. Install all penetrating items prior to firestop installation.
- E. Ensure substrate is free of frost and, when applicable, dry.

3.3 INSTALLATION

- A. Install material at fire-rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit, and other items requiring firestopping.
- B. Apply primer where recommended by manufacturer based on type of firestopping material and substrate involved, and as required for compliance with fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating and to uniform density and texture.
- D. Fibered Material: Compress to maximum 40 percent of its uncompressed size per manufacturer's written instructions.
- E. Foamed Material:
 - 1. Place in layers to ensure homogenous density, and fill cavities and spaces.
 - 2. Place sealant to seal junctions with adjacent dissimilar materials.
- F. Intumescent Coating: Place in sufficient coats to achieve required rating.

G. Dam Construction:

1. Install dams when required to contain firestopping materials within openings and as required to achieve required fire-resistance rating. Combustible damming material must be removed after appropriate curing. Incombustible damming material may be left as a permanent component of the firestop system.
2. Place dams to not interfere with function or adversely affect the appearance of adjacent construction.

H. Cover Guard Gaskets and Fire-Resistive Putty Pads:

1. Comply with IBC 714.4.4 exception 1.1 for box separation on opposite walls, the "24-inch rule," by adhering to following instructions:
 - a. Cover Guard Gaskets: Mount on the inside of the cover plate and install at the same time as the cover plate.
 - b. Fire-Resistive Putty Pads: Insert on the inside back wall of an electrical box.

I. Coordinate with plumbing, mechanical, electrical, and other trades to ensure that all pipe, conduit, cable, and other items penetrating fire-rated construction have been permanently installed prior to installation of firestops.

1. Schedule and sequence the Work to ensure that partitions and other construction to conceal penetrations are not erected prior to firestop installation.

3.4 FIELD QUALITY CONTROL

- A. Testing: The Owner reserves the right to employ an independent testing agency to conduct material evaluation and application tests. Cooperate fully and, when requested, permit samples of materials to be taken from containers as the materials are applied to building surfaces.
- B. Cost of Testing: If tests indicate that materials or Work does not comply with requirements, pay for tests performed, all retesting, and remove and replace noncompliant Work.
- C. Inspect installed firestopping for compliance with Specifications and submitted schedule.
- D. Acceptance: Adjust, repair, modify, or replace components failing to perform as specified and re-inspect.

3.5 CLEANING

- A. Clean off excess fill materials adjacent to openings as 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 openings.

3.6 PROTECTION

- A. 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.

END OF SECTION