

F M O C

Specification Section 07270 Firestopping

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**Sandia
National
Laboratories**



U.S. DEPARTMENT OF
ENERGY



CONSTRUCTION STANDARD SPECIFICATION

SECTION 07270

FIRESTOPPING

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CONSTRUCTION STANDARD SPECIFICATION

SECTION 07270

FIRESTOPPING

PART 1 - GENERAL

1.00 RELATED DOCUMENTS

- A. The bidding requirements, contracting requirements, and applicable parts of the contract's DIVISION 1 – GENERAL REQUIREMENTS shall be included in and made part of this Section.

1.01 SUMMARY

- A. Provide firestop systems consisting of a material or combination of materials installed to retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and/or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to fire-rated construction in accordance with the requirements of the International Building Code, Sections 712 and 713.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire-resistance-rated wall assemblies including both empty openings and openings that contain penetrations.
 - 2. Penetrations through fire-resistance-rated floor and roof assemblies requiring protected openings including both empty openings and openings that contain penetrations.
 - 3. Membrane penetrations in fire-resistance-rated wall assemblies where items penetrate one side of the assembly.
 - 4. Joints in fire-resistance-rated assemblies to allow independent movement.
 - 5. Perimeter Fire Barrier System between a rated floor/roof and an exterior wall assembly.
 - 6. Joints through penetrations and membrane penetrations in smoke barriers and smoke partitions.

1.02 RELATED WORK

- A. Examine Contract Documents for requirements that affect Work of this Section. Other Specification Sections that relate directly to Work of this Section include, but are not limited to:
1. Division 3 – CONCRETE
 2. Division 4 – MASONRY
 3. Division 5 – METALS
 4. Division 7 – THERMAL AND MOISTURE PROTECTION
 5. Division 8 – DOORS AND WINDOWS
 6. Division 9 – FINISHES
 7. Division 15 – MECHANICAL
 8. Division 16 – ELECTRICAL

1.03 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive requirement shall govern.

1. American Society for Testing and Materials (ASTM):

- a) E 84 Test Method for Surface Burning Characteristics of Building Materials
- b) E 119 Test Method for Fire Tests of Building Construction and Materials
- c) E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°F
- d) E 814 Fire Tests of Through-Penetration Fire Stops
- e) E 1399 Cyclic Movement and Measuring Minimum and Maximum Joint Widths
- f) E 1966 Test Method for Resistance of Building Joint
- g) E 2174 Standard Practice for On-Site Inspection of Installed Fire Stops
- h) E 2393 Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems
- i) E 2307 Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA)

2. Factory Mutual (FM) Global Approval Guide:

- a) FM Approval Standard of Firestop Contractors – Class 4991

3. Firestop Contractors International Association (FCIA):

- a) M. O. P. Manual of Practice

4. International Firestop Council[®] (IFC):
 - a) Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments (April 2001)
 - b) Sandia Construction Observers Field Pocket Guide
5. International Building Code
6. National Fire Protection Association[®] (NFPA) as referenced in the International Building Code (IBC)
7. Underwriter's Laboratories, Inc. (UL):
 - a) UL Fire Resistance Directory
 - b) UL Qualified Firestop Contractor Program
 - c) UL 263 Fire Tests of Building Construction and Materials
 - d) UL 723 Surface Burning Characteristics of Building Materials
 - e) UL 1479 Fire-Tests of Through-Penetration Fire Stops
 - f) UL 2079 Tests for Fire Resistance of Building Joint Systems

1.04 SYSTEM PERFORMANCE REQUIREMENTS

- A. Penetrations: Provide and install firestopping systems that are produced to resist the spread of fire and the passage of smoke and other gases according to the requirements indicated, including but not limited to the following:
 1. Firestop all penetrations passing through fire resistance rated wall and floor assemblies and other locations as indicated on the drawings.
 2. Provide and install complete penetration firestopping systems tested and approved by a third party testing agency.
 3. F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated as determined by ASTM E 814 but not less than one hour or the fire-resistance rating of the construction being penetrated.
 4. T-Rated Through-Penetration Firestop System: Provide firestop systems with T ratings in addition to F ratings, as determined by ASTM E 814 where indicated by the International Building Code.
 5. L-Rated Through Penetration Firestop Systems: Provide firestop systems with L ratings, in addition to F and T ratings as determined by UL 1479, where indicated by the International Building Code.
 6. W-Rated Through Penetration Firestop Systems: Provide firestop systems with W Water Resistance ratings, in addition to F, T, and L ratings as determined by UL 1479, where indicated.

- B. Perimeter Fire Containment Systems: Provide interior perimeter joint systems with fire-resistance ratings indicated as determined per ASTM E 2307 but not less than the fire-resistance rating of the floor construction.
- C. Fire-Resistive Joints: Provide joint systems with fire-resistance ratings indicated as determined per UL 2079 but not less than the fire-resistance rating of the construction in which the joint occurs.
- D. All nonfire-resistance-rated floor penetrations shall be firestopped.
- E. Provide appropriate firestop systems for firestopping exposed to view, traffic, moisture, and physical damage.
- F. Where there is no specific third party tested and classified firestop system available for a particular firestop configuration the firestopping contractor shall obtain from the firestop manufacturer an Engineering Judgment (EJ) or Equivalent Rated Assembly (EFRA) for submittal.

1.05 SUBMITTALS

- A. Submit Manufacturers Product Data Sheets for each type of product selected. Certify that Firestop Material is free of asbestos and lead paint, and complies with local regulations.
 - 1. Certification by firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.
- B. For each and every proposed firestopping assembly, system, and firestopped penetration provide the listing agency's details, including illustrations, identifying intended products and applicable UL system number or UL classified devices.

Where there is no specific third party tested and classified Firestop System available for a particular firestop configuration the firestopping contractor shall obtain from the firestop manufacturer an EJ or EFRA for submittal.

- C. Submit Material Safety Data Sheets for each product supplied.
- D. Submit FM or UL certification for each product supplied.
- E. Submit complete maintenance material and detailed instructions for repair/modifications for each product supplied.
- F. Submit contractor qualifications as noted in "Quality Assurance" Section 1.06
- G. Submit Field Quality Control Test Reports

1.06 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide firestopping System Design Listing by a testing and inspection agency in accordance with the appropriate ASTM Standard(s) per Section 1.04. A qualified testing and inspection agency may be UL or FM Research.
- B. Contractor Qualifications: Acceptable installer firms shall be:
 - 1. FM Approved in accordance with FM Standard 4991, Approval of Firestop Contractors
 - 2. UL Qualified Firestop Contractor
 - 3. Firestop Contractors International Association Contractor Member in good standing.
 - 4. Licensed by the State of New Mexico or local authority where applicable.
 - 5. Shown to have successfully completed not less than five comparable scale projects.
- C. Alternative Contractor Qualifications: Construction contractors involving single trade activities can self-perform firestopping provided that all installers are trained and accredited by the manufacturer of the firestopping products used.
- D. Single Source Responsibility: Obtain firestop systems for each kind of penetration and construction condition indicated from a single primary firestop systems manufacturer.
 - 1. Materials of a different manufacturer shall not be mixed in the same firestop system or opening.
 - 2. Tested and listed firestop systems are to be used before an EFRA is installed.
 - 3. All firestop systems and material used on the project shall be installed by a single firestop contractor to maintain consistency and accountability.
- E. Field Constructed Mockup: Prior to installing firestopping erect mockups for each different firestop system indicated to verify selections made and to demonstrate qualities of materials and execution. Build mockups to comply with the following requirements using materials indicated for final installations.
 - 1. Locate mockups on site in locations indicated or, if not indicated, as directed by Sandia Construction Observer. Include mockup for each type of system.
 - 2. Notify Sandia Construction Observer in advance of the dates and times when mockups will be installed.
 - 3. Obtain Sandia Construction Observer's acceptance of mockups before start of Work.
 - 4. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging completed unit of Work. Accepted mockups in an

undisturbed condition at time of Substantial Completion may become part of completed unit of Work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping products to the Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying the product and manufacturer.
- B. Store and handle firestopping materials in accordance with manufacturers' written instructions and the applicable Material Safety Data Sheet (MSDSs).

1.08 PROJECT CONDITIONS

- A. Environmental Conditions: Install firestopping in accordance with manufacturers' written instructions.
- B. Ventilation: Ventilate per manufacturers' instructions and MSDSs.

1.09 SEQUENCING AND SCHEDULING

- A. Project coordination is essential to inform and educate all the parties involved with the firestopping process of their roles and how they can affect firestopping on the project. A pre-construction meeting shall be scheduled and required for all parties involved prior to the start of construction.
- B. Do not cover up firestopping installations until the Sandia Construction Observer has examined each installation.

1.10 ENVIRONMENTAL REGULATIONS

- A. All materials shall be free of asbestos and lead paint and comply with local VOC Regulations.
- B. If required, hazardous disposal of firestop materials shall be strictly observed as noted on the individual MSDS.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. All firestop systems and materials shall be UL Listed or FM Approved and conform to the construction type, penetrant type, annular space requirements, and fire rating involved in each separate instance.
- B. It is the contractor's responsibility to ensure that products from only one manufacturer are installed throughout the facility to maintain consistency.
- C. UL Joint and Perimeter Fire Containment Systems Numbering System

Alpha Characters	Description of Joint System
FF	Floor-to-Floor
WW	Wall-to-Wall
FW	Floor-to-Wall
HW	Head-of-Wall
BW	Bottom-of-Wall
CG	Wall-to-Wall Joints Intended for Use as Corner Guards
CW	Perimeter fire containment system (for use at the interface of a fire rated floor and a nonfire-rated exterior curtain wall
The third alpha character is movement capability (S or D)	S - joint or perimeter fire containment systems that do not have movement capabilities. D - joint or perimeter fire containment systems that do have movement capabilities.
Number Range	Nominal Joint Width or Max. Clearance Distance Between Curtain Wall & Perimeter of Floor
0000-0999	Less than or equal to 2 inches
1000-1999	Greater than 2 inches and less than or equal to 6 inches ..
2000-2999	Greater than 6 inches and less than or equal to 12 inches
3000-3999	Greater than 12 inches and less than or equal to 24 inches
4000-4999	Greater than 24 inches

2.02 MATERIALS

- A. Provide firestop systems composed of components compatible with each other, compatible with the substrates forming the annular spaces and joints, and compatible with the penetrating items under conditions of service and application.
- B. Provide firestop systems with fire-resistance ratings determined by testing in the configurations required and that have fire-resistance ratings at least as high as that of the fire-resistance-rated assembly in which they are to be installed.
 1. Provide products which:
 - a. Allow normal expansion and contraction movement of the penetrating item without failure of the penetration seal.
 - b. Emit no hazardous, combustible, or irritating by-products during the installation or curing period.
 - c. Do not require special tools for installation.
- C. Smoke partition penetration/joint protection sealants shall be any gunnable or pourable sealants suitable for the application. Use only fully curing types where accessible in the finished work. Provide products which:
 1. Allow normal expansion and contraction movement of the penetrating item without failure of the penetration seal.

2. Emit no hazardous, combustible, or irritating by-products during installation or curing period.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify all penetrating elements and supporting devices have been installed and all temporary removed.
- B. Examine substrates and conditions with Installer present for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting firestopping performance. Notify the responsible party or parties of any unsatisfactory conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturers' recommended products and methods. Confine primers to areas of bond. Do not allow spillage and migration onto exposed surfaces.
- B. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work. Remove tape as soon as it is possible to do so without disturbing the firestopping seal with substrates.
- C. Verify system components are clean, dry, and ready for installation.
- D. Verify field dimensions are as shown on the Drawings and as recommended by the manufacturer.

3.03 INSTALLING PENETRATION FIRESTOPS

- A. General: Comply with the "System Performance Requirements" article in Section 1 and the through-penetration firestop manufacturers' installation instructions and drawings pertaining to products and applications indicated.
 1. Coordinate with other trades to assure that all pipes, conduit, cable, and other items that penetrate fire-resistance-rated construction have been permanently installed prior to installation of firestop assemblies.
 2. Schedule work to assure that partitions and all other construction that conceals penetrations are not erected prior to the installation of firestop and smoke seals.
- B. Install forming/damming materials and other accessories in accordance with manufacturers' written instructions.

- C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 2. Install 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.
- D. Ensure membrane penetrations (e.g., electrical boxes) comply with the Fire-Resistance-Rated Construction Penetrations section of the International Building Code. For clarification, membrane penetrations of maximum two-hour fire-resistance-rated walls and partitions by steel electrical boxes that do not exceed 16 square inches (0.0103 m²) in area are allowed provided the aggregate area of the openings through the membrane does not exceed 100 square inches (0.0645 m²) in any 100 square feet (9.29m²) of wall area. Any membrane penetration over and above the 100 square inches in the same 100 square feet shall be protected such that the required fire resistance of the wall will not be reduced (i.e., use putty pads). For example, if there are six electrical boxes (each 4-inch by 4-inch) existing in a 100 square foot wall area the seventh electrical box (and all additional penetrations) in the same 100 square feet shall be protected with putty pads. The annular space between the wall membrane and the box shall not exceed 1/8-inch (3.1 mm).

3.04 INSTALLING FIRESTOP JOINT SYSTEMS

- A. General: Comply with the "System Performance Requirements" article in Section 1 and with the firestop manufacturers' installation instructions and drawings pertaining to products and applications indicated.
1. Install joint fillers to provide support of firestop materials during application and at the position required to produce the cross-sectional shapes and depths of installed firestop material relative to joint widths that allow optimum sealant movement capability and develop the fire-resistance rating required.
- B. Install systems by proven techniques that result in firestop materials:
1. Directly contacting and fully wetting joint substrates.
 2. Completely filling recesses provided for each joint configuration
 3. Providing uniform, cross-sectional shapes and depths relative to joint width that optimize movement capability.
- C. Tool non-sag firestop materials immediately after their application and prior to skin formation. Form smooth, uniform beads or configuration indicated or required to:

3.05 PRODUCE FIRE-RESISTANCE RATING

1. Eliminate air pockets
2. Ensure contact and adhesion with sides of joint

3.06 INSTALLING PERIMETER FIRE BARRIER SYSTEMS

- A. General: Comply with “System Performance Requirements” article in Section 1 and with the firestop manufacturers’ installation and drawings pertaining to products and applications indicated.
- B. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and firestop materials as applicable within the system design.

3.07 PERMANENT IDENTIFICATION OF FIRE WALLS AND PENETRATIONS

- A. All fire-resistance-rated walls and smoke partitions shall be stenciled in red with 3-inch-high lettering to indicate that the wall is either fire-resistance-rated or is a smoke partition. If the wall is fire-resistance rated indicate “FIRE RATED – X HOURS” and the applicable fire-resistance rating (one, two, three, or four-hours). If the wall is a smoke partition indicate “SMOKE PARTITION” (no fire-resistance rating is required to be stenciled on the wall). The stenciling shall be located on the fire-resistance-rated wall or smoke partition above ceilings and at exposed areas (such as Mechanical and Electrical Equipment Rooms and IDR Rooms) at 10-foot intervals, as high as possible, and still visible from the finished floor. Areas of fire-resistance-rated walls and smoke partitions exposed to viewing by the public shall be exempt from stenciling.
- B. All firestop systems shall be labeled with permanent self-adhesive or wired-on labels. Each label shall be a minimum of 3-inches x 5-inches, be made of a durable material, indicate it is a “Fire-Resistance-Rated Assembly” or “Smoke Partition,” and include the following information as a minimum:

<ul style="list-style-type: none">• System Manufacturer• Product• Hour Rating• UL System	<ul style="list-style-type: none">• Installation Date• Location• Installation Contractor• Installer
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Since smoke partitions are not fire-resistance-rated the hour rating for the smoke sealant is not required on the label.

3.08 REPAIRS AND MODIFICATIONS

- A. All repairs and modifications shall be made using the same manufacturers' products as the original system.
- B. Identify damaged or disturbed seals requiring a repair or modification.
- C. Remove loose or damaged materials.
- D. If penetrating items are to be added remove enough material to insert new items, being careful not to cause damage to the balance of the firestop system. Re-seal voids in the penetration.
- E. Ensure that surfaces to be sealed are clean and dry.
- F. All repaired and modified firestop systems shall be labeled as per Section 3.06.

3.09 FIELD QUALITY CONTROL

- A. Inspection – Sandia Construction Observer will examine penetration firestopping in accordance with ASTM E – 2174, *Standard Practice for On-Site Inspection of Installed Fire Stops* and ASTM E-2393, *Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems*. The Sandia Construction Observer will examine firestopping and will determine, in general, that firestopping has been installed in compliance with requirements of tested and listed firestop system and installation process conforms to FM 4991. *Standard for Approval of Firestop Contractors* or the UL Qualified Firestop Contractor Program.
 - 1. A minimum of 10% of each fire stopping installed shall be witnessed by the SDR along with 5% of all linear feet of each type of fire resistive joint system.
 - 2. Sandia Construction Observer (Inspector) shall complete the "Fire Stop Inspection Form" for all inspected fire stops. This form (FRM-215) is accessible via FileNet.
- B. The Sandia Construction Observer shall advise the contractor of any deficiencies noted within one working day.
- C. Do not proceed to enclose firestopping with other construction until the Sandia Construction Observer has verified that the firestop installation complies with the requirements.
- D. Where deficiencies are found repair or replace the firestopping so that it complies with requirements of tested and listed system design.

3.10 CLEANING

- A. Remove excess fill materials and sealants adjacent to openings and joints as work progresses. Use methods and cleaning materials approved by manufacturers of firestopping products and assemblies in which openings and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances. If damage is caused by others, owner and general contractor to instruct firestop contractor to make appropriate repairs and charge to appropriate trades.

3.11 PROTECTION

- A. Protect installed work during curing period.
- B. Protect installed work from damage from construction operations using substantial barriers if necessary.
- C. Repair damaged installed work in accordance with manufacturers' instructions.

- END OF SECTION -