

SECTION 07 84 46 - FIRE RESISTIVE JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes firestopping systems for joints at perimeter and through smoke and fire-resistance-rated assemblies, and supplementary items necessary to complete their installation.
 - 1. Joints in or between fire-resistance-rated constructions.
 - 2. Joints at exterior curtainwall/floor intersections.
 - 3. Joints in smoke barriers.

1.2 ACTION SUBMITTALS

- A. Product Data: Manufacturer's technical literature for each product and system indicated.
 - 1. Include manufacturer's specifications for materials, finishes, construction details, installation instructions, and recommendations for maintenance.
- B. Sustainable Design Submittals:
 - 1. Building Product Disclosure and Optimization - Sourcing of Raw Materials:
 - a. Extended Producer Responsibility (EPR): Submit documentation indicating that manufacturers have a take back or recycling program for the product purchased.
 - b. Bio-based Materials: For bio-based products and materials other than wood, submit documentation of product data and testing results in compliance with LEED requirements.
 - c. Recycled Content: For products having recycled content, indicate percentages by weight of post-consumer and pre-consumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - d. Regional 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 or v1.2 2017, using the applicable exposure scenario.
 - a. Adhesives and Sealants: For wet applied on-site products, submit printed statement showing compliance with the applicable chemical content requirements of SCAQMD Rule 1168, effective July 1, 2005, and rule amendment date of January 7, 2005.

- C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
1. 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, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Project Acceptance Document: Certification by the manufacturer that its product(s) are approved, acceptable, suitable for use in specific locations, for specific details, and for applications indicated, specified, or required, and that a warranty will be issued.
- B. Field Quality Control Reports: Written report of testing and inspection required by "Field Quality Control".
- C. 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.

1.4 CLOSEOUT SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
1. Experience: Installer's personnel with not less than 5 years of experience in the successful performance of Work similar to scope of this Project.
 2. Supervision: Installer shall maintain a competent supervisor at Project while the Work is in progress, and who has not less than 5 years of experience installing products and systems similar to scope of this Project.
 3. Manufacturer Acceptance: Installer shall be certified, approved, licensed, or acceptable to manufacturer to install products.
- 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."
- C. Compatibility and Adhesion Testing: Manufacturer of fire stopping material shall be responsible for testing samples of materials that will contact or affect firestopping materials.
1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of fill materials to joint substrates.
 2. Perform tests under environmental conditions replicating those that will exist during installation.
 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 4. For materials failing tests, obtain fire-resistant joint sealants manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

1.6 PRE-INSTALLATION CONFERENCE

- A. Pre-Installation Conference: Before Work begins, conduct conference at Project site.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Where products and systems are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication.

- B. Environmental Limitations: Do not install firestopping systems when ambient or substrate temperatures are outside limits permitted by firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- C. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate installation of products and systems with interfacing and adjoining construction to provide a successful installation without failure.
- B. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- C. Coordinate sizing of joints to accommodate joint firestopping systems.
- D. Notify Owner's inspecting agency at least seven days in advance of firestopping system installations; confirm dates and times on days preceding each series of installations.
- E. Do not cover up firestopping system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 FIRESTOPPING, GENERAL

- A. Acceptable Manufacturers: Manufacturer is "acceptable" if firestopping system has been tested and listed by UL or other testing and inspection agency acceptable to authorities having jurisdiction and manufacturer can evidence product compliance with requirements of the Contract Documents.
 - 1. FM Global: Manufacturer to provide firestopping products in compliance with FM Global requirements as indicated in "Quality Assurance" Article.
- B. Compatibility: Provide firestopping systems that are compatible with one another and the substrates forming openings, under conditions of service and application, as demonstrated by firestopping system manufacturer based on testing and field experience.
- C. Single Source Responsibility: Furnish each type of product from single manufacturer. Provide secondary materials only as recommended by manufacturer of primary materials. Use only components specified by firestopping system manufacturer and approved by the qualified testing and inspecting agency for firestopping systems indicated.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Provide firestopping 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 in which firestopping systems are installed. Joint

firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gasses.

B. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory.
 - 2) Intertek Group in its Directory of Listed Building Products.
 - 3) FM Global in its "Building Materials Approval Guide.

C. Low-Emitting Materials:

1. Architectural paints and coatings wet-applied inside the weather-proofing system must meet the VOC general emissions testing criteria of CDPH Standard Method v1.2.
2. All paints and coatings 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 "Sustainable Design Requirements - LEED v4 BD+C."
3. Adhesives and Sealants wet-applied inside the weather-proofing system must meet the VOC general emissions testing criteria of CDPH Standard Method v1.2.
4. 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."

2.3 JOINT FIRESTOPPING SYSTEMS.

- A. Joints in or between Fire-Resistance-Rated Construction:** Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
1. F-Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- B. Joints at Exterior Curtainwall/Floor Intersections:** Provide joint firestopping systems with rating determined per ASTM E 2307.
1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- C. Joints in Smoke Barriers:** Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
1. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.
- D. Exposed Joint Firestopping Systems:** Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

- E. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.
- F. Joints, required for control of movement, at intersection between Rated Wall Assemblies and Nonrated Horizontal Assemblies: Provide joint firestopping with ratings determined by ASTM E 2837.
- G. Perimeter Fire Containment System: Provide systems for establishment of a fire resistive barrier at the portion of perimeter exterior wall (spandrel) that is adjacent to edge of structural floor or roof slabs, which provides and maintains a resistance to the passage of fire from one floor to the floor above. Provide fire resistive rating with movement capabilities equaling or exceeding the rating of the adjacent floor or roof assembly, as determined by ASTM E 2307.
 - 1. Integrity Rating: Measure of system's ability to withstand fire exposure without permitting passage of flame through openings or occurrence of flaming on any element of the unexposed surface of the fill material or floor or on the interior surface of the wall above the fill material.
 - 2. Expansion and Contraction: Perimeter fire containment systems shall accommodate movement of the exterior wall due to thermal expansion and contraction.

2.4 TOP-OF-WALL JOINT FIRESTOPPING

- A. Safing Insulation: Semi rigid board insulation produced by combining slag-wool fibers with thermosetting resin binders and complying with the following:
 - 1. ASTM C 612, Type 1A and 1B.
 - 2. Nominal density of 4 lb/cu. ft.
 - 3. ASTM E119 Fire rating indicated, but not less than 2 hours.
- B. Coating Material: Manufacturers standard fill material or spray applied product for sealing surface of safing insulation and adjacent construction against penetration of fire and smoke.
- C. Fire Resistive Sealants: Intumescent single-component, water based, high solids, elastomeric sealants. Nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant.

2.5 PERIMETER FIRE CONTAINMENT SYSTEM - EDGE OF SLAB

- A. Safing Insulation: Semi rigid board insulation produced by combining slag-wool fibers with thermosetting resin binders and complying with the following:
 - 1. ASTM C 612, Type 1A and 1B.
 - 2. Nominal density of 4 lb/cu. ft.
 - 3. ASTM E119 Fire rating indicated, but not less than 2 hours.
- B. Coating Material: Manufacturers standard fill material or spray applied product for sealing surface of safing insulation and adjacent construction against penetration of fire and smoke.

2.6 PERIMETER FIRE CONTAINMENT SYSTEM - GLAZED ALUMINUM FRAMING SYSTEMS

- A. Curtainwall Insulation and Mullion Cover: Semi-rigid board insulation produced by combining slag-wool or rock-wool fibers with thermosetting resin binders, aluminum foil scrim backing, and complying with the following:
 - 1. ASTM C 612, Type 3.
 - 2. Nominal density of 8 and 4 lb/cu. ft. as required by test assembly.
 - 3. ASTM E 119 fire rating as indicated, but not less than 2 hours.
- B. Safing Material: Semi-rigid board insulation produced by combining slag-wool fibers with thermosetting resin binders, unfaced, and complying with the following:
 - 1. ASTM C 612, Type IA and IB.
 - 2. Nominal density of 4 lb/cu. ft.
 - 3. ASTM E 119 fire rating as indicated, but not less than 2 hours.
- C. Coating Material: Manufacturer's standard fill material or spray applied product for sealing top of safing material.
- D. Impaling Pins: 12 gage steel pins swaged to galvanized steel angles for screw attachment to glazed aluminum wall system aluminum framing.
- E. Reinforcing Angles: Galvanized steel angles of size, thickness, and finish suitable for application.
- F. Curtainwall Insulation Tape: Manufacturer's standard pressure sensitive aluminum foil faced tape product for taping curtainwall insulation joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions

3.2 PREPARATION

- A. General: Comply with manufacturer's instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.
- B. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove foreign materials from surfaces of joints that could interfere with adhesion of firestopping.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form release agents from concrete.

- C. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- D. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing firestopping's seal with substrates.

3.3 INSTALLATION - GENERAL

- A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:
 - 1. Respective manufacturer written installation instructions.
 - 2. Accepted submittals.
 - 3. Contract Documents.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by isolating metals and other materials from direct contact with incompatible materials.

3.4 INSTALLATION OF FIRE-RESISTANT JOINT SEALANTS

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 INSTALLATION OF FIRE SAFING PROTECTION

- A. Top of Wall: Install safing insulation to fill gap between top of wall and floor slab above. Cut safing insulation 50 percent wider than gap to be filled to ensure compression fit.

3.6 INSTALLATION OF PERIMETER FIRE CONTAINMENT SYSTEM

A. Edge of Slab:

1. Edge of Slab: Install safing insulation to fill gap between edge of structural floor/roof slab and back of exterior wall on safing clips spaced as needed to support insulation but not further apart than 24 in (600 mm) o.c. unless not required by tested system. Cut safing insulation 50 percent wider than gap to be filled to ensure compression fit or install vertically as required by tested assembly.
2. Install coating material or smoke seal compound to cover fill material and seal opening.

B. Glazed Aluminum Framing Systems:

1. Install system to extend the required vertical distance above and below the structural floor/roof slab but not less than to next horizontal mullion.
2. Attach impaling pins to glazed aluminum wall framing, using screws, at corners and around perimeter of glazed unit. Install curtainwall insulation material over impaling pins so that the edges are tight fitting against the aluminum frame and the face of material will be flush with the aluminum frame. Secure units with clinch shields over impaling pins. Locate horizontal seams in the curtainwall insulation material, 6 in (150 mm) from top of joint and provide supporting angles as required.
3. Install safing material in the joint between the interior face of aluminum frame (and face of curtainwall insulation material) and the edge of the structural floor or roof slab. Compression fit safing material 50 percent, or as required by tested assembly, into spaces between floor slab and mounting angles. Provide safing clips to support safing material if required by tested system. Install coating material or smoke seal over safing material flush with top of floor/roof slab.
4. Install mullion covers centered over horizontal and vertical aluminum frames within barrier area using the same impaling pins as used to attach the curtainwall insulation material. Secure covers with clinch shields over impaling pins.
5. Install curtainwall insulation tape to seal all meeting edges of insulation with tape centered over the junction of adjacent insulation and all meeting edges of insulation and framing members so that approximately 2 in (50 mm) of tape covers each edge of the adjacent material.

3.7 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. 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 - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Tested System or Engineered Judgment Number.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.8 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Manufacturer's qualified technical representative shall periodically inspect Work to ensure installation is proceeding in accordance with manufacturer's designs,

recommendations, instructions, and warranty requirements. Representative shall submit written reports of each visit indicating observations, findings, and conclusions of inspection.

1. Manufacturer's Technical Representative Qualifications: Direct employee of technical services department of manufacturer with experience in providing recommendations, observations, evaluations, and problem diagnostics.
- B. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.
- C. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
 1. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractors expense.
- D. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.
- E. Where required, inspection of fire resistive joint firestopping shall be performed in accordance with ASTM E 2393, "Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers" or another recognized standard.

3.9 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping system products and of products in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION