

SECTION 07 84 00 – FIRESTOPPING FOR INSIDE PLANT

1.01 SUMMARY:

- A. ^{A16}**Scope:** Scope of work for firestops shall be in accordance with Paragraph 1.01 D. of Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), as required, for telecommunications wiring, electrical conduit and trays, plumbing pipes, air conditioning and vent ducts, and other crossings of floors and walls in the Works. This Section of the Employer's Requirements shall be read in conjunction with the Sections listed in Table 07 84 00-1.^{A16}
- B. **Related Sections:**

Table 07 84 00-1: Related Sections			
1.	Section 01 81 26	-	Communications, Control, Safety, and Security Systems.
2.	Section 01 81 36	-	Operations and Maintenance Buildings and Facilities – Program.
3.	Section 01 86 13	-	Plant – Mechanical Systems and Equipment (ref. plumbing).
4.	Section 26 20 00	-	Electrical Low Voltage Distribution Work.
5.	Section 27 05 28	-	Communications Pathways for Inside Plant.

1.02 REFERENCE:

- A. **Applicable Publications:** Refer to Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), Paragraph 1.02.

1.03 REQUIREMENTS:

- A. **General Requirements:**
1. The Contractor shall meet all applicable requirements of Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), Paragraph 1.03.
 2. All firestopping materials and systems shall be as recommended by the Contractor and reviewed by the Employer's Representative.
 3. Firestopping materials shall be field proven, durable, easy to install, easy to reenter, easy to maintain, and qualified appropriate for the substrate and level of protection required. As a minimum, fire stopping materials shall match the actual conditions that exist and shall maintain the integrity of penetrated items.
 4. Firestopping materials shall be UL 1479 classified, and UL FRD listed or FM FMRCAG approved for "F" and "T" ratings of 2.5 hours or at least equal to fire-

rating of fire wall or floor in which penetrated openings are to be protected, whichever is the longest, except that "F" and "T" ratings shall be 3 hours for firestopping in through-penetrations of 4-hour fire rated wall or floor. "F" rating shall be interpreted as the time a structure can withstand a fire in accordance with ASTM E119. Also, "T" rating shall be interpreted as the time a structure can retain its temperature at no less than 163°C (325°F) above ambient conditions on the non-fire side of the barrier.

5. Materials shall be suitable for the construction composition, dimensions, and type, type of penetration object (i.e., coaxial cable, copper wire, electrical non-metallic tubing, and optical fiber), nature of penetration items (i.e., cable, conduit, and pipe), and annular space requirements.
6. All fire stopping materials shall be from a single manufacturer listed in the *UL Fire Resistance Directory*. All trades shall use firestop products from the same manufacturer.
7. Unless otherwise specified, materials shall be re-sealable, water based or 100% solid, ductile cement or moldable putty compound, as well as endothermic, intumescent, or both.
8. Materials shall set up after a relatively short time to form a tight seal. When exposed to fire, such materials shall expand, harden, and seal off burning pipe and cables to inhibit fire penetration. The materials shall be suitable for sealing cable trays, draft and smoke seals, drywalls, ducts, electrical penetrations, and pipes.
9. Materials shall not tend to dry, crack, or disintegrate with aging. Grout and drywall compounds are unacceptable.
10. Materials shall contain no dangerous solvents, halogens, asbestos or fibers, and shall not produce toxic or harmful gases when heated.
11. Firestopping materials shall be UL classified under category XHCR or XHEZ for stopping fire and smoke.

B. Certification:

1. All materials shall be new and listed by the Underwriters Laboratories, Inc., wherever standards have been established by that agency.
2. Instead of the Underwriters Laboratories, Inc. listing, consideration will be given to certified test reports of an adequately equipped, recognized, independent testing laboratory competent to perform such testing, indicating conformance to the requirements of the applicable Underwriters Laboratories, Inc., standards.

C. Delivery: Materials shall be delivered in original, unopened packages or containers showing brand and manufacturer names.

D. Engineering Judgments:

1. **Fundamental Guidelines:** Firestop system engineering judgments shall meet the following fundamental guidelines:
 - a. Be issued only by the firestop manufacturer's qualified technical personnel or in concert with the manufacturer, by a knowledgeable registered professional engineer, or fire protection engineer, or an independent testing agency that provides listing services for firestop systems.
 - b. Be based upon interpolations of previously tested firestop systems that are either sufficiently similar in nature or clearly bracket the conditions upon which the judgment is to be given.
 - c. Be based upon full knowledge of the elements of the construction to be protected and understanding of the probable behavior of that construction and the recommended firestop system protecting it, where they are to be subject to an UL 1479 (or other appropriate) fire test.
 - d. Be limited only to the specific conditions and configurations upon which the engineering judgment was rendered, and be based upon reasonable performance expectations for the recommended firestop system under those conditions.
 - e. Be issued only for a single specific job and location. Judgments should not be transferred to any other job or location without thorough and appropriate review of all aspects of the next job location's circumstances.
 - f. Be issued only in those places where local code enforcement jurisdictions permit their use as suitable for meeting building code requirements.
2. **Presentation Requirements:** Firestop system engineering judgments shall meet the following presentation requirements:
 - a. Be presented in appropriately descriptive format written form with or without detail drawings as may be deemed necessary.
 - b. Clearly indicate that the recommended firestop system is an engineering judgment, and not a listed system.
 - c. Identify the job, location, and fire rating conditions for which the recommendations are made.
 - d. Provide complete descriptions of all of the vital elements for the firestop system configuration, including products to be used, thicknesses, densities, and depths, types of penetrating items, annular spacing requirements, and type of assembly.

- e. Include clear directions for installing the recommended firestop system.
 - f. Bear dates of issue and authorization signatures, as well as the issuer's name, title, address, and telephone/fax numbers.
- E. **Examination:** In addition to the requirements of Section 01 81 26 (*Communications, Control, Safety, and Security Systems*),
 - 1. Before starting work, the Contractor shall examine areas under which work is to be performed, verify existing conditions and substrates, confirm compatibility of surfaces to receive sealant materials, verify that barrier penetrations are properly sized, verify that penetration elements are securely fixed and properly located, verify that surfaces of openings are sound, clean, dry, and ready to receive application of sealant, and identify conditions detrimental to proper or timely completion.
 - 2. After installation, the Contractor shall examine penetrating sealed areas to ensure proper installation before concealing or enclosing the areas. Areas of work shall be kept accessible until inspection by applicable code authorities is done.
- F. **Equipment and Materials:**
 - 1. **Cable Coatings:**
 - a. Coatings shall be thixotropic (can be applied up to 20 mils without drip or runoff which facilitates vertical and overhead application) heavy-bodied, water-based coating which dries to a durable rubber-like membrane, and designed to prevent flame spread along the jacketing of electrical (or other) cables.
 - b. Coatings shall provide a thermal barrier for protection against heat damage, and significant relief from damage caused by the instinctive, yet destructive, behavior of rats, other rodents and insects.
 - c. Product shall have an excellent resistance to weathering and aging, and shall remain flexible indefinitely allowing for cable movement and removal.
 - 2. **Caulks:**
 - a. Firestop caulks shall be a one-part, intumescent, latex elastomer capable of expanding a minimum of 3 times at 538°C (1,000°F).
 - b. The material shall be thixotropic and be applicable to overhead, vertical, and horizontal firestops.
 - c. Caulks shall be listed by independent test agencies such as UL or FM and be tested to, and pass the criteria of, ASTM E 814 Fire Test, tested under positive pressure.

- d. Caulks shall comply with the requirements of the NEC (NFPA-70), BOCA, ICBO, SBCCI, and NFPA Code #101.

3. **Composite Sheets:**

- a. Sheets shall be a one-part composite system, comprised of the following components: an organic/inorganic, fire-resistive, intumescent material core (sheet), with a bonded layer of 28 gauge (minimum) galvanized steel on one side, and the other side shall be reinforced with hexagonal shaped steel-wire mesh and covered with aluminum foil.
- b. This product shall be designed to seal larger penetrations through fire-rated walls and floors, also to shield cable trays, conduit, HVAC ductwork and vital process equipment from radiant heat, spread of flame and smoke.

4. **Fire Pillows:**

- a. Pillows shall be made of a self contained, highly intumescent firestop product.
- b. Pillows shall be designed to be used for firestopping blank openings up to 3483 cm² (540 in²), on gypsum drywalls, block walls, and concrete floors. It shall be used also to firestop one or two cable trays per penetration.

5. **Putty:**

- a. Putty shall be designed to stop fire in a wide variety of small through-penetrations, including electrical outlet boxes, cable conduit, insulated pipe and metal pipe, which penetrate fire-rated construction.
- b. Putty shall remain malleable for no less than 20 years or indefinitely, and easy to mold into any shape. It shall adhere or sticks well to most surfaces but not to the applicator's hands.

- G. **Storage:** Materials shall be stored off the ground, and shall be protected from damage and exposure to the environment.

H. **Installation:**

1. **General:**

- a. The Contractor shall install all necessary fire and smoke stopping materials for inside plant pathways, in accordance with the guidelines, recommendations, and rules of ^{A10}BICSI TDMM, NFPA 70, TIA 569, ^{A10}the manufacturer, the applicable UL system listing number, and *UL Fire Resistance Directory*.

- b. The Contractor shall apply approved fire stopping materials by packing them solidly around penetrations to fill and seal all unused portions of openings for old and new communications wiring only after penetration of substrates, wiring, and applicable brackets have been installed. Locations shall include, but not be limited to, the following:
 - 1) Around duct, cable, conduit, piping, and their supports that penetrate fire-rated above grade floor slabs, interior partitions, and exterior walls.
 - 2) Around openings and penetrations through firewalls and fire-rated floor/ceiling assemblies.
 - 3) Around penetration of vertical fire-rated service shafts.
 - 4) Around openings and penetrations through fire-rated enclosures and electrical boxes.
 - c. Sealant shall be applied in thickness required to achieve required rating. The Contractor shall neatly cut and trim materials as required. Holes and voids made by penetrations shall be sealed to ensure an effective smoke barrier.
 - d. Cable holes opened shall be temporarily closed at the end of each working day, or whenever it is anticipated that no additional cables will run that same day.
 - e. Water based caulks and other water soluble materials shall not be used close to sprinklers.
 - f. ^{A16}Items shall be located to avoid interference with mechanical or structural features without deviating from the Employer's Requirements.
_{A16}
- 2. **Caulks:** Self-leveling caulks shall be used for horizontal surfaces such as floors. Non-sag type caulks shall be used for vertical surfaces such as walls.
 - 3. **Cementitious Materials:** Cementitious or better materials shall be used for penetrations larger than 193,550 mm² (300 in²), unless structural integrity is required.
 - 4. **Cleaning:**
 - a. Before proceeding with installation, the Contractor shall clean all surfaces to be in contact with penetration seal materials, of dirt, dust, grease, loose materials, oil, rust, or other substances that may affect proper adhesion, fitting, or the required fire resistance.
 - b. The Contractor shall clean up spills of liquid components, and remove droppings, equipment, excess materials, and debris, leaving the area in undamaged, clean condition.

- c. The Contractor shall remove damming materials if required after appropriate drying time.
5. **Composite Sheets:** Sheets or better material shall be used for large penetrations and shall be used in conjunction with approved putty. However, mechanical systems are preferable due to sheet's possible mechanical abrasion or cutting of cables pulled through opening, lack of cable management capability, and lack of vertical cable support.
6. **Environmental Requirements:** The Contractor shall maintain sealant at a temperature as recommended by the manufacturer for best workability, and shall not apply sealants whenever temperature of substrate material and surrounding air is beyond the allowable temperature range.
7. **Filling Voids:** Completely fill voids flush with the surface; the depth of material shall be in accordance with UL FRD or FM FMRCAG. Firestopping for filling voids in floors in which smallest dimension of a void is 100 mm or more shall support the floor design load or be protected by a permanent barrier.
8. **Fire Stopping for Cable Trays:** The Contractor shall close all unused portions of openings with firestopping material approved for the application.
9. **Fire Stopping for Conduits:** Shall include approved plastic pipe collars at the ceiling end of vertical conduit penetrations.
10. **Fire Stopping for Floor/Ceiling Assemblies:**
 - a. Firestops shall include all independent penetrations. Materials on surfaces subject to traffic shall be protected from damage as required.
 - b. Where floor openings without penetrating items are more than 100 mm (4") in width and subject to traffic or loading, the Contractor shall install firestopping materials capable of supporting the same loading as the floor.
11. **Fire Stopping for Walls:**
 - a. Where rated walls are constructed with horizontally continuous air space, double width masonry, or double stud frame construction, the Contractor shall provide vertical, 300 mm (12") wide fiber dams for full thickness and height of air cavity at maximum 4,570 mm (15') intervals.
 - b. Fire stopping in gypsum board walls shall be installed symmetrically on both sides of the applicable walls.
12. **Patching and Repairing:** The Contractor shall perform patching and repairing of firestopping caused by cutting or penetration by other trades. Damaged, disrupted, or removed firestopplings shall be replaced with new firestopplings as specified in this Section.

13. **Preparation:** Before proceeding with installation, the Contractor shall do the following:
 - a. Examine areas to be firestopped, remove incompatible materials which affect bond by scraping, brushing, water or solvent cleaning, or sand blasting.
 - b. Report and make corrections to unsatisfactory conditions found during site examination.
14. **Protection:**
 - a. The Contractor shall comply with manufacturer's recommendations for temperature and humidity conditions before, during, and after installation of firestops. The Contractor shall also store materials in clean, dry, ventilated location(s), and shall protect them from abuse, soiling, and moisture.
 - b. Before proceeding with installation, the Contractor shall protect adjacent surfaces and equipment from damage.
 - c. The Contractor shall furnish forced air ventilation during installation of firestops if required by the manufacturer, and shall provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.
 - d. The Contractor shall protect applied sealant from damage.
15. **Putty:** Shall be used in conjunction with other material(s) to create effective firestops.

1.04 DESIGN CRITERIA/SYSTEM PERFORMANCE:

A. General:

1. **Problem to be Solved:** Firestopping systems shall solve the following business needs:
 - a. Protect buildings, equipment, and cabling by delaying spread of fires near cable, duct, and pipe crossings in floor slabs and walls.
2. **Restrictions to be Considered:** (reserved)

B. Design Criteria: Firestops shall meet all applicable requirements of NFPA 70, NFPA 76, NFPA 101, and NFPA 251.

C. System Performance:

1. Firestopping material shall stop fire for no less than two (2) hours.

2. As to fire hazard classification, materials having a flame spread of 25 or less, a smoke developed rating of 50 or less, and a fuel contribution of 50 or less when tested in accordance with UL 723 or UL listed and accepted.

1.05 SUBMITTALS: The following shall be submitted for substantiation purposes:

- A. **Design:** The following shall be in accordance with Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), ^{A10}Subparagraph 1.05 D.: ^{A10}
 1. Certification from the International Code Council (ICC) that the offered materials meet or exceed specified requirements.
 2. CPM diagram, with monthly updates.
 3. Descriptive literature and combustion rate information for review of the following, as applicable:
 - a. Cable coatings.
 - b. Caulks.
 - c. Composite sheets.
 - d. Fiber dams.
 - e. Fire barriers.
 - f. Fire pillows.
 - g. Fire rated vertical shafts.
 - h. Mineral wool packing.
 - i. Modular transit barrier systems (for ducts).
 - j. Putties.
 - k. Sealing plugs.
 4. Drawings.
 5. **Engineering Judgments:** The Contractor shall submit firestop system engineering judgments for one or all of the following reasons:
 - a. When listed firestop systems need to be broadened within the context of their originally tested and rated conditions.
 - b. When there is a need for a means to properly address unanticipated construction configurations that fall outside of the envelope of tested systems.

6. **Installation Plan:**
 - a. **Tentative Plan:** The Contractor shall submit a tentative installation plan for evaluation. The plan shall include, but not be limited to, the following:
 - 1) Details on regular installation practices.
 - 2) Manufacturer installation instructions.
 - b. **Definitive Plan:** The Contractor shall furnish a detailed definitive plan of installation for review. This shall include, but not be limited to, the following:
 - 1) A revised version of the tentative plan, considering comments (if any), corrections, and additions.
 - 2) Detailed description of methods of installation.
 - 3) Any other relevant details specific to the project.
7. Material Safety Data Sheets (MSDSs).
8. Report from independent certified laboratory indicating flame spread and smoke contribution tested to UL 723 (ASTM E84).
9. **Safety Warnings:** The offerors shall submit all necessary safety warnings for evaluation, i.e., potential shock hazard due to electrically conductive caulk during installation.
10. **Samples:** The Contractor shall submit a minimum of two samples of each type of device for evaluation whenever possible.
11. Specifications.
12. Toxicity report from independent certified laboratory.
13. Any other data required for review.
- B. **Re-submittals Just Prior to Purchasing Materials:** All items in A. above that have changed from original submittal shall be resubmitted in a Design Conference in accordance with Section 01 81 26 (*Communications, Control, Safety, and Security Systems*), Paragraph 1.05.
- C. **Upon Receipt of Shipped Items in Panama:**
 1. Instruction manuals for installation and maintenance.
 2. Packing lists.
- D. **Prior to Issuance of Taking Over Certificate:**
 1. As-built drawings.
 2. Examination Report instead of FFIT to avoid destruction.

1.06 QUALITY ASSURANCE: Shall include the following in accordance with Paragraph 1.06 of Section 01 81 26 (*Communications, Control, Safety, and Security Systems*):

- A. Certifications of compliance with the required standards for the model numbers offered.
- B. Factory Quality Control Tests (FQCT).
- C. Test reports from independent laboratory verifying compliance for the model numbers offered.
- D. Spare parts, as recommended by the designer/integrator and systems manufacturer.
- E. **Warranty:** The Contractor shall submit copies of written warranty agreeing to repair or replace joint sealers which fail in joint adhesion, co-adhesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability, or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure.

END OF SECTION

THIS PAGE NOT USED