SECTION  – penetration firestopping

1. General
   1. summary
      1. Section includes through-penetration firestop systems for penetrations through the following fire-resistance-rated assemblies, including both empty openings and openings containing penetrating items:
         1. Floors.
         2. Roofs.
         3. Walls and partitions.
         4. Smoke barriers.
      2. Related Requirements:
         1. Section 04 20 00 – Unit Masonry.
         2. Section 07 81 00 – Applied Fireproofing.
         3. Section 07 81 23 – Intumescent Fireproofing.
         4. Section 07 84 43 – Joint Firestopping.
         5. Section 07 92 00 – Joint Sealants.
         6. Section 09 22 16 – Non-Structural Metal Framing.
         7. Section 09 29 00 – Gypsum Board.
   2. REFERENCE Standards
      1. Underwriters Laboratories of Canada (ULC):
         1. CAN/ULC S115-11, Standard Method of Fire Tests and Firestop Systems
   3. ACTiON SUBMITTALS
      1. Product Data: Submit product data for each type of through penetration firestop system product indicated.
   4. INFORMATIONAL SUBMITTALS
      1. Through-Penetration Firestopping Schedule: Submit, for information only, a Through-Penetration Firestopping Schedule indicating the type of through-penetration firestop system to be installed for each penetration. Indicate each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of testing and inspection agency acceptable to the authorities having jurisdiction that evidence compliance with requirements for each condition indicated and listed in the "Through Penetration Firestopping Schedule" at the end of Part 3 of this Section.
         1. Submit documentation, including illustrations, from Underwriters Laboratories applicable to each through-penetration firestop.
         2. 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.
      2. Product Certificates: Signed by manufacturers of through-penetration firestop system products certifying that products furnished comply with requirements.
      3. At Project Closeout, submit a Record Schedule, signed by the Installer, of systems installed, the UL design designations, and the location of each system. The submittal must have the Installer's signature.
   5. QUALITY ASSURANCE
      1. Installer Qualifications: A firm or individual certified or licensed, by firestop system manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its firestop system materials to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
      2. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, from a single manufacturer.
      3. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in "Performance Requirements" Article:
         1. Firestop tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL, ITS, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
   6. DELIVERY, STORAGE, HANDLING AND PROTECTION
      1. 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 multi-component materials.
      2. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
   7. FIELD CONDITIONS
      1. 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.
      2. Ventilate through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.
   8. COORDINATION
      1. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
      2. Coordinate sizing and provide through-penetration firestop systems to accommodate sizes of sleeves, openings, core-drilled holes, or cut openings.
      3. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
      4. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until Architect, Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.
2. Products
   1. PERFORMANCE REQUIREMENTS
      1. 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 non-load-bearing walls, including partitions, with fire-protection-rated openings.
         2. Fire-resistance-rated floor assemblies.
         3. Fire-resistance-rated roof assemblies.
      2. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, as determined per UL 1479, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
      3. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:

Delete any requirements below that do not apply to through-penetration firestop systems required for Project.

* + - 1. Floor penetrations located outside wall cavities.
      2. Floor 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 square inch (10,323 square mm) in overall cross-sectional area.
      5. Provide T-rating not less than the required rating of the element penetrated, but not less than 1 hour, minimum.
    1. 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.
    2. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
  1. manufacturers
     1. Manufacturers: Subject to compliance with requirements, provide through-penetration firestop systems that are UL, ULC or Warnock Hersey listed for the penetrations listed in UL-Classified Through Penetration Fire Stopping Assemblies in the Schedule at the end of Part 3 of this Section, and in compliance with CAN/ULC S115.
  2. firestopping, general

If your project requires a firestopping schedule, use the prefix FS- for each generic firestopping system. Coordinate schedule with other specification Sections that include firestopping systems.

* + 1. 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.
    2. Provide firestop and smoke sealing systems in accordance with CAN/ULC-S115 and shall also conform to special requirements in part 3.5 of the Building Code.
    3. Fire-resistant rating of firestop material assemblies must meet or exceed the fire-resistance rating of the floor or wall section being penetrated.
    4. Firestop and smoke seals at openings around penetrations for pipes, ductwork and other mechanical items requiring sound and vibration control shall be elastomeric seal type. Do not use a cementitious, or rigid seal at such locations.
    5. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
       1. Architectural Sealants: 250 g/L.
       2. Sealant Primers for Nonporous Substrates: 250 g/L.
       3. Sealant Primers for Porous Substrates: 775 g/L.
       4. Plastic Foam Adhesives: 50 g/L.
       5. Adhesives for Porous Materials (Except Wood): 50 g/L.
       6. Fiberglass Adhesives: 80 g/L.
       7. Primers, Sealers and Undercoaters: 200 g/L.
    6. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
       1. Sealants for vertical joints, shall be non-sagging type.
    7. Primers shall be to manufacturer's recommendation for specific material, substrate, and end use.
    8. Accessories: Provide components for each through-penetration firestop system 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:
          1. Slag-/rock-wool-fiber insulation.
          2. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
          3. Fire-rated form board.
          4. Fillers for sealants.
       2. Temporary forming materials.
       3. Substrate primers.
       4. Collars.
       5. Steel sleeves.
    9. Gypsum Products: The use of gypsum products for through-penetration firestopping is strictly prohibited.
    10. Acoustical Performance: Provide non-hardening resilient firestop material at penetrations, sleeves and passthroughs in acoustic construction assemblies.
        1. Acceptable Products:
           1. Specified Technologies, Inc. Elastomeric Sealant ES100.
           2. Johns Manville Firetemp CI Caulk.
           3. 3M Fire Barrier 2001 Silicone RTV Foam.
           4. Hilti Flexible Firestop Sealant CP 606.
  1. fill materials
     1. General: Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
     2. Fire Rated Cable Management Devices: Factory-assembled round metallic sleeve device for use with cable penetrations, containing an integrated smoke seal fabric membrane that can be opened and closed for re-penetration.
     3. Blocks/Plugs: Intumescent flexible block/plug suitable for reuse in re-penetration of openings. Blocks shall allow up to 12 inches (305 mm) of unreinforced annular space.
     4. Drop-In Firestop Devices: Factory-assembled devices for use with combustible or noncombustible penetrants in cored holes within concrete floors. Device shall consist of galvanized steel sleeve lined with an intumescent strip, an extended rectangular flange attached to one end of the sleeve for fastening to concrete floor, and neoprene gasket.
     5. Tub Box Kit: Cast-in place pre-formed plastic tub box kit with three support legs for use with drain piping assembly associated with bathtub installations.
     6. 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.
     7. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
     8. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
     9. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
     10. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
     11. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
     12. 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.
     13. 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.
     14. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
     15. 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.
  2. MIXING
     1. 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.

1. Execution
   1. examination
      1. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance.
      2. Proceed with installation only after unsatisfactory conditions have been corrected.
   2. PREPARATION
      1. 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.
      2. 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.
      3. 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 damaging substrate or disturbing firestop system's seal with substrates.
   3. THROUGH-PENETRATION FIRESTOP SYSTEM INSTALLATION
      1. 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.
      2. 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.
      3. 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.
      4. Consult with Mechanical Engineer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
      5. Apply to mechanical and electrical service through-penetrations, to formed, sleeved, or cored openings in smoke and fire rated masonry, or gypsum wallboard stud walls and structural floors and ceilings.
         1. Coordinate with plumbing, HVAC, and electrical contractors to ensure proper firestopping application, providing smokeseals around penetrations through fire rated assemblies. Ensure that end joints between lengths of firestopping material have been properly sealed.
      6. Apply firestop and smokeseals materials in accordance with manufacturer's directions, with sufficient pressure to properly fill and seal openings.
      7. Tool or trowel exposed surfaces.
      8. Remove excess compounds promptly as work of this Section progresses and upon completion of work of this Section.
   4. CURING
      1. Cure materials in accordance with manufacturer's instructions.
      2. Do not cover up materials until proper curing has taken place.
   5. FIELD QUALITY CONTROL
      1. Inspecting Agency: Owner may engage a qualified independent inspecting agency to inspect through-penetration firestop systems and to prepare test reports.
         1. Inspecting agency will state in each report whether inspected through-penetration firestop systems comply with or deviate from requirements.
      2. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued.
      3. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
   6. IDENTIFICATION
      1. 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.
      2. Identify fire-resistance-rated construction (including walls, shaft enclosures, partitions, and smoke barriers) with signs or stenciling permanently installed above suspended ceilings or in other concealed spaces. The lettering shall be 3 inches (75 mm) in height and spaced 12 feet (3658 mm) on center:
         1. The words \_\_\_\_-HOUR FIRE AND SMOKE WALL - PROTECT ALL PENETRATIONS."
            1. Replace blank with actual fire-resistance rating.
   7. CLEANing AND protection
      1. 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.
      2. 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