

## PART 1 - GENERAL

### 1.1 SUMMARY

1. Section Includes:
  1. Penetrations in fire-resistance-rated walls.
  2. Penetrations in horizontal assemblies.
  3. Penetrations in non-rated fire separations.
  4. Identification of vertical fire separations.
2. Related Work:
  1. Division 07 Section *Fire-Resistive Joint Systems* for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in non-rated fire separations.

### 1.2 ACTION SUBMITTALS

1. Product Data: For each type of product indicated.
2. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
  1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

### 1.3 INFORMATIONAL SUBMITTALS

1. Qualification Data: For qualified Installer.
2. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
3. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

### 1.4 QUALITY ASSURANCE

1. Installer Limitations: Have penetration fire stopping systems installed by single installer for entire project.
2. Source Limitations: Obtain primary penetration firestopping materials from single source from single manufacturer. Provide secondary materials, including safing insulation, from source recommended by manufacturer of primary materials.
3. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
4. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in *Penetration Firestopping* Article. Provide rated systems complying with the following requirements:
  1. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
  3. For those firestop applications that exist for which no ULC or cUL tested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineer judgment drawings must follow requirements set forth by the International Firestop Council (September 7, 1994, as may be amended from time to time).
5. Preinstallation Conference: Conduct conference at Project site.

#### 1.5 PROJECT CONDITIONS

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

#### 1.6 COORDINATION

1. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
2. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
3. Notify Public Works testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Hilti, Inc.
  2. 3M Fire Protection Products.
  3. Tremco, Inc.; Tremco Fire Protection Systems Group.

#### 2.2 PENETRATION FIRESTOPPING

1. Provide penetration firestopping that is 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 construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
2. Provide penetration firestopping with ratings determined per CAN/ULC-S115, *Fire Tests of Firestop Systems*.

3. Firestopping of Penetrations in non-rated Fire Separations
  1. Firestop sealant to CAN/ULC-S115.
4. Firestopping of Penetrations in Firewalls or Horizontal Fire Separations
  1. Provide firestopping for a penetration in a firewall or a horizontal fire separation having a FT Rating not less than the fire-resistance rating of construction penetrated.
5. Firestopping of Penetrations in Fire Separations for Combustible Drain, Waste, and Vent Piping:
  1. Provide firestopping of a penetration containing a combustible drain, waste and vent piping is by a fire stop system that has an F rating not less than the fire-resistance rating required for the fire separation when subjected to the fire test method in CAN/ULC-S115, *Fire Tests of Firestop Systems*, with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side, and the piping is not located in a vertical shaft.
6. Firestopping of Other Penetrations in Fire Separations:
  1. Provide firestopping for a penetration in a fire separation or a membrane forming part of an assembly required to have a fire-resistance rating that is not a firewall or a horizontal fire separation having a F-Rating not less than the following for the fire resistance rating of constructed penetrated.

Fire-Resistance Rating of Fire Separation	F Rating
45 min	45
1 h	45
1.5 h	1
2 h	1.5
3 h	2
4 h	3

7. Exposed Penetration Firestopping: Provide products with flame-spread index of less than 25, as determined CAN/ULC-S102, *Test for Surface Burning Characteristics of Building Materials and Assemblies*.
8. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  1. Sealants: 250 g/L.
  2. Sealant Primers for Nonporous Substrates: 250 g/L.
  3. Sealant Primers for Porous Substrates: 775 g/L.
9. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
  1. Permanent forming/damming/backing materials, including the following:
    1. Slag-wool-fibre or rock-wool-fibre 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.

## 2.3 FILL MATERIALS

1. 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.
2. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
3. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
4. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
5. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibres, or silicone compounds.
6. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
7. 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 non-shrinking, homogeneous mortar.
8. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fibre cloth cases filled with a combination of mineral-fibre, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
9. Silicone Foams: Multi-component, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
10. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  1. Grade: Pourable (self-levelling) formulation for openings in floors and other horizontal surfaces, and non-sag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of non-sag grade for both opening conditions.

## 2.4 MIXING

1. For those products requiring mixing before application, comply with penetration firestopping 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.

## 2.5 VERTICAL FIRE SEPARATION IDENTIFICATION

1. Vertical fire separations: conventional latex spray paint, bright red colour.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

1. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

1. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
  1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
  2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. 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 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 penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

### 3.3 INSTALLATION

1. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
2. Install forming 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 and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
3. Install fill materials for firestopping 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 the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 IDENTIFICATION OF PENETRATION FIRESTOPPING

1. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 150 mm of firestopping edge so labels will be visible to anyone seeking to remove

penetrating items or firestopping. 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 - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage.*
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

### 3.5 IDENTIFICATION OF VERTICAL FIRE SEPARATIONS

1. Identify all vertical fire separations using spray paint and 25 mm stencilled lettering.
2. Wording:
  1. For non-rated fire separations *This partition designed as a non-rated fire separation.*
  2. For ¾ hour rated fire separations *This partition designed as a ¾ hour fire separation.*
  3. For 1 hour rated fire separations *This partition designed as a 1 hour fire separation.*
  4. For 2 hour rated fire separations *This partition designed as a 2 hour fire separation.*
3. Placement:
  1. Rooms with finished ceilings: Place label above finished ceiling within 50 mm of where the wall intersects the floor/roof deck above.
  2. M&E, storage, and industrial rooms with no finished ceilings: Place label within 50 mm of where the wall intersect the floor/roof deck above.
  3. Finished spaces with no ceilings; Review with Public Works Representative for location of labelling prior to starting work.
4. Spray lettering on either side of vertical fire separation. Repeat lettering every 10 metres on each side of separation, with a minimum of one set of labelling for every wall segment. Insure lettering is level and in alignment with each other.

### 3.6 FIELD QUALITY CONTROL

1. Public Works Representative may engage a qualified testing agency to perform tests and inspections.
2. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
3. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

### 3.7 CLEANING AND PROTECTION

1. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
2. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection,

damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

### 3.8 PENETRATION FIRESTOPPING SCHEDULE

1. Use firestopping materials as required to achieve the required rating for the following locations:
  1. Firestopping with No Penetrating Items
  2. Firestopping for Metallic Pipes, Conduit, or Tubing
  3. Firestopping for Nonmetallic Pipe, Conduit, or Tubing
  4. Firestopping for Electrical Cables
  5. Firestopping for Insulated Pipes
  6. Firestopping for Miscellaneous Electrical Penetrants
  7. Firestopping for Miscellaneous Mechanical Penetrants
  8. Firestopping for Groupings of Penetrants
  
2. Use firestopping material that is removable and reusable as required to achieve the required rating for the following locations:
  1. Firestopping for Cable Trays with Electric Cables:

**END OF SECTION**