# GENERAL

## SUMMARY

### Through Penetration Firestop Systems for protection of penetrations through following fire resistance rated assemblies, including both blank openings and openings containing penetrating items:

#### Floor assemblies.

#### Roof assemblies.

#### Wall and partition assemblies.

#### Fire-rated smoke barrier assemblies.

#### Construction enclosing compartmentalized areas.

#### Existing, fire and smoke-rated assemblies.

### Section Includes:

#### Penetrations in fire-resistance-rated walls.

#### Penetrations in horizontal assemblies.

#### Penetrations in smoke barriers.

## DEFINITIONS

### Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in fire-rated wall and horizontal assemblies.

## ACTION SUBMITTALS

### Product Data: For each type of product indicated.

### LEED Submittals:

#### Product Data for Credit IEQ 4.1: For penetration firestopping sealants and sealant primers, documentation including printed statement of VOC content.

#### Laboratory Test Reports for Credit IEQ 4: For penetration firestopping sealants and sealant primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

### Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.

#### 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.

##### Provide Engineering Judgment or Equivalent Fire Resistance Rated Assembly (EFRRA) for submittal derived from similar UL system designs or other tests approved by local authorities having jurisdiction, prior to installation.

##### Engineering judgment drawings must follow requirements set forth by International Firestop Council.

## INFORMATIONAL SUBMITTALS

### Qualification Data: For qualified Installer.

### Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

### Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

## QUALITY ASSURANCE

### Provide firestop systems in compliance with following requirements:

#### Obtain firestop system for each type of penetration and construction condition from a single firestop systems manufacturer.

#### Firestop products and systems shall bear classification marking of qualified testing and inspection agency.

#### Firestopping tests, performed by qualified, testing and inspection agency.

##### UL or other agency, performing testing and follow-up inspection services for firestop systems, acceptable to local authorities having jurisdiction.

### Installer Qualifications:

#### Certified, licensed or approved by firestopping manufacturer, trained to install firestop products per specified requirements.

#### Licensed by State or local authority, where applicable.

#### Shown to have successfully completed not less than five (5) comparable scale projects.

### Fire Test Requirements:

#### Underwriters Laboratories, Inc. (UL):

##### UL 263, Fire Tests of Building Construction and Materials

##### UL 723, Surface Burning Characteristics of Building Materials

##### UL 1479, Fire Tests of Through Penetration Firestops

##### UL 2079, Tests for Fire Resistance of Building Joint Systems

#### ASTM International (ASTM):

##### ASTM E84 Surface Burning Characteristics of Building Materials

##### ASTM E119 Fire Tests of Building Construction and Materials

##### ASTM E136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750F

##### ASTM E814 Fire Tests of Through Penetration Fire Stops

##### ASTM E1399 Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems

##### ASTM E1966 Test Method for Fire Resistive Joint Systems

##### ASTM E2174 Standard Practice for On-site Inspection of Installed Fire Stops

##### ASTM E2307 Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA)

##### ASTM E2393 Standard Practice for On-site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers

### References:

#### Building Code as locally adopted and amended.

#### Underwriters Laboratories (UL) Fire Resistance Directory:

##### Through Penetration Firestop Systems (XHEZ).

##### Joint Systems (XHBN).

##### Fill, Void or Cavity Materials (XHHW).

##### Firestop Devices (XHJI).

##### Forming Materials (XHKU).

##### Wall Opening Protective Materials (CLIV).

#### National Fire Protection Association (NFPA):

##### NFPA 70: National Electrical Code

##### NFPA 101: Life Safety Code

##### NFPA 22: Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls

##### NFPA 251: Fire Tests of Building Construction and Materials

#### Firestop Contractors International Association (FCIA):

##### MOP – FCIA Firestop Manual of Practice

#### International Firestop Council, latest edition (IFC):

##### Ref. 1 Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments

##### Ref. 2 Inspectors Field Pocket Guide

### Identification Labels for Firestop Assemblies:

#### Follow guidelines set in Chapter 7 of International Building Code.

### Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:

#### Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.

#### Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:

##### Penetration firestopping products bear classification marking of qualified testing and inspecting agency.

##### Classification markings on penetration firestopping correspond to designations listed by the following:

###### UL in its "Fire Resistance Directory."

## PROJECT CONDITIONS

### 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.

### Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

### Install products within the time period of the manufacturer’s warranty. Note that some products have short warranty periods after purchase.

## COORDINATION

### Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

### Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

### Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

## WARRANTY

### Manufacturer Warranty:

#### Provide written warranty to Owner, guaranteeing performance of installed firestop material as designed and tested, for sustainable lifetime of structure; defect in material shall be replaced at no cost to Owner.

### Installer Warranty:

#### Provide written warranty to Owner guaranteeing quality of installation and meeting requirements of manufacturers written instructions and tested system, for a minimum of five (5) years. Deficiencies found in installed firestop shall be repaired or replaced at no cost to Owner.

# PRODUCTS

## MANUFACTURERS

### Manufacturers: Subject to compliance with requirements, provide products by one of the following:

#### Hilti, Inc.

#### 3M Fire Protection Products.

#### Or equivalent manufacturers of UL listed systems, listed in UL Building Materials Directory.

### All firestopping for Div. 21, 22, and 23 shall be provided by a single manufacturer.

## PENETRATION FIRESTOPPING

### 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.

### Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

#### Fire-resistance-rated walls include fire walls, fire-barrier walls, smoke-barrier walls, and fire partitions. See code plan drawing for locations.

#### F-Rating: Not less than the fire-resistance rating of constructions penetrated.

### Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

#### Horizontal assemblies include floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies. See code plan for locations.

#### F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.

#### T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

### Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.

#### Smoke barriers include smoke-barrier walls and smoke-barrier floors. See code plan drawing for locations.

#### F-Rating: Not less than the fire-resistance rating of constructions penetrated.

#### L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

### W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

### Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

### 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):

#### Sealants: 250 g/L.

#### Sealant Primers for Nonporous Substrates: 250 g/L.

#### Sealant Primers for Porous Substrates: 775 g/L.

### Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

### 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.

#### Permanent forming/damming/backing materials, including the following:

##### Slag-wool-fiber or rock-wool-fiber insulation.

##### Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.

##### Fire-rated form board.

##### Fillers for sealants.

#### Temporary forming materials.

#### Substrate primers.

#### Collars.

#### Steel sleeves.

## PENETRATION SEALING

### Provide penetration sealing that is produced and installed to resist spread of smoke and air according to requirements indicated. Penetration sealing systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

### Penetrations in Smoke Partitions: Provide penetration sealing meeting requirements of IBC, Chapter 7.

#### Smoke partitions include smoke-partition walls. See code plan drawing for locations.

#### Material/system shall be approved to limit the free passage of smoke at 400° F.

### Penetrations in Non-Rated Walls Serving Pressurized Spaces: Provide penetration sealing of all openings.

#### See drawings for locations of wall serving pressurized areas.

### Penetrations in Sound-Rated Walls: Provide penetration sealing of all openings.

#### See drawings and specifications for locations of sound-rated walls.

#### Material/system shall have the same overall STC rating as the wall assembly.

### Penetrations in Floors: Provide penetration sealing meeting requirements of IBC, Chapter 7.

#### Material/system shall be approved to limit the free passage of flame and products of combustion.

### Exposed Penetration Sealing: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

### VOC Content: Penetration 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):

#### Sealants: 250 g/L.

#### Sealant Primers for Nonporous Substrates: 250 g/L.

#### Sealant Primers for Porous Substrates: 775 g/L.

### Low-Emitting Materials: Penetration sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

### Accessories: Provide components for each penetration sealing system that are needed to install fill materials and to maintain performance required. Use only those components specified by penetration sealing manufacturer and approved by qualified testing and inspecting agency for sealing indicated.

#### Permanent forming/damming/backing materials, including the following:

##### Slag-wool-fiber or rock-wool-fiber insulation.

##### Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.

##### Fire-rated form board.

##### Fillers for sealants.

#### Temporary forming materials.

#### Substrate primers.

#### Collars.

#### Steel sleeves.

## FILL MATERIALS

### 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.

### Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

### Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

### Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.

### Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

### Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

### 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.

### 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. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

### Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

### Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

#### Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

## MIXING

### 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.

# EXECUTION

## EXAMINATION

### 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.

### Proceed with installation only after unsatisfactory conditions have been corrected.

## PREPARATION

### Surface Cleaning: Clean out openings immediately before installing penetration firestopping and/or sealing to comply with manufacturer's written instructions and with the following requirements:

#### Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping and/or sealing.

#### Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping and/or sealing. Remove loose particles remaining from cleaning operation.

#### Remove laitance and form-release agents from concrete.

### 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.

### Masking Tape: Use masking tape to prevent penetration firestopping and/or sealing 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 and/or sealant’s seal with substrates.

## INSTALLATION

### General: Install penetration firestopping and/or sealing to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

### 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 and/or performance indicated.

#### After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping or sealant.

### Install fill materials for firestopping and/or sealing by proven techniques to produce the following results:

#### Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

#### Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

#### For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings.

#### Provide products appropriately tested for the thickness and type of insulation utilized.

## IDENTIFICATION

### Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches 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:

#### The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

#### Contractor's name, address, and phone number.

#### Designation of applicable testing and inspecting agency.

#### Date of installation.

#### Manufacturer's name.

#### Installer's name.

## FIELD QUALITY CONTROL

### Owner will engage a qualified testing agency to perform tests and inspections of firestopping.

### Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

### Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

## CLEANING AND PROTECTION

### 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 and/or sealant manufacturers and that do not damage materials in which openings occur.

### Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping and/or sealing 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/or sealant and install new materials to produce systems complying with specified requirements.

## PENETRATION FIRESTOPPING SCHEDULE

### General:

#### Schedules below identify requirements for acceptable through penetration firestop systems based on barrier type, fire-resistive rating, and penetrant type. Each system must comply with building code and fire code as locally adopted and amended.

#### Requirements for single-membrane penetrations and through penetration firestops are identical. Unless otherwise noted, penetrants which pass through a single membrane, shall be treated the same as if it passed through the entire fire-resistive assembly.

#### Select each firestop system based on actual field conditions, including penetration type, shape, size, quantities and physical position within opening.

##### If the actual conditions do not match a manufacturer’s standard firestopping condition, provide an Engineering Judgment or Equivalent Fire Resistance Rated Assembly (EFRRA) for submittal derived from similar UL system designs or other tests approved by local authorities having jurisdiction, prior to installation.

#### Refer to plans for indication of the required ratings of wall, floor, and roof assemblies.

#### Indicated ratings are minimum and may be exceeded.

### Firestop Assemblies at Fire-Rated Walls:

##### The minimum Fire (F) Rating for Firestop assemblies in walls shall equal that of the wall, but not less than 1-HR.

##### The minimum Temperature (T) Rating of Firestop assemblies in walls may equal zero.

##### Smoke Barrier: In addition to (F) Rating, (L) Rating of maximum 5 CFM per SF.

##### Non-rated walls and Smoke-Partitions with no fire-resistive requirement: Assembly with (L) rating.

### Firestop Assemblies at Fire-Rated Floors and Roofs:

##### Minimum Fire (F) and Temperature (T) Ratings of Firestop assemblies used in floors or roof shall equal hourly rating of floor or roof being penetrated, but not less than 1-HR.

###### Exception 1: The T-rating may equal zero when portion of penetration, above or below floor, is contained within a wall.

###### Exception 2: Firestops are not required for floor penetrations within a 2-hour rated shaft enclosure.

### Voids in Wall with No Penetrations:

#### Fill with approved through penetration firestopping system.

#### Contractor’s option: Patch void in wall with like construction.

### Penetrating Ducts with Dampers:

#### Utilize only firestop materials which are included in damper’s classification.

#### Do not install firestop systems that hamper performance of fire dampers.

### Cable Trays and Similar Devices:

#### Provide re-enterable products specifically designed for removal and re-installation at openings within walls and floors designed to accommodate voice, data and video cabling.

#### Where cable trays are used:

##### Utilize re-enterable products (e.g. removable intumescent pillows) specifically designed for retrofit.

#### Where cable trays are not used:

##### Utilize fire-rated cable pathway devices.

##### Where not practical, re-enterable products designed for retrofit may be used.

### Panels, Devices, Medical Gas Outlets, Valve Boxes, and Other Items Recessed into Face of Rated Walls:

#### Where devices are placed on opposite sides of wall, and are less than 24 IN apart measured horizontally, install intumescent pads over back of devices in approved manner or maintain continuity of rated barrier within wall cavity surrounding recessed item.

## PENETRATION SEALING SCHEDULE

### General:

#### Schedules below identify requirements for acceptable penetration sealing systems based on assembly type and penetrant type. Each system must comply with building code and fire code as locally adopted and amended.

#### Requirements for single-membrane penetrations and penetration sealants are identical. Unless otherwise noted, penetrants which pass through a single membrane, shall be treated the same as if it passed through the entire assembly.

#### Select each sealing system based on actual field conditions, including penetration type, shape, size, quantities and physical position within opening.

### Sealing Assemblies at Walls:

#### Smoke-Partitions with no fire-resistive requirement: Assembly with (L) rating of maximum 5 CFM per SF.

#### Walls Separating Pressurized Areas: Non-hardening silicone sealant throughout all openings.

#### Sound-Rated Walls: Fiberglass insulation stuffed in all openings and sealed on both sides with non-hardening silicone sealant.

### Sealing Assemblies at Floors and Roofs:

#### Walls Separating Pressurized Areas: Non-hardening silicone sealant throughout all openings.

#### Sound-Rated Walls: Fiberglass insulation stuffed in all openings and sealed on both sides with non-hardening silicone sealant.

### Voids in Wall with No Penetrations:

#### Fill with approved through penetration firestopping system.

#### Contractor’s option: Patch void in wall with like construction.

### Penetrating Ducts with Dampers:

#### Utilize only firestop materials which are included in damper’s classification.

#### Do not install firestop systems that hamper performance of fire dampers.

### Cable Trays and similar devices:

#### Provide re-enterable products specifically designed for removal and re-installation at openings within walls and floors designed to accommodate voice, data and video cabling.

#### Where cable trays are used:

##### Utilize re-enterable products (e.g. removable intumescent pillows) specifically designed for retrofit.

#### Where cable trays are not used:

##### Utilize fire-rated cable pathway devices.

##### Where not practical, re-enterable products designed for retrofit may be used.

### Panels, devices, medical gas outlets, valve boxes, and other items recessed in to face of rated walls:

#### Where devices are placed on opposite sides of wall, and are less than 24 IN apart measured horizontally, install intumescent pads over back of devices in approved manner or maintain continuity of rated barrier within wall cavity surrounding recessed item.

END OF SECTION 23 05 30