SECTION 22 05 30 - THROUGH PENETRATION FIRESTOPPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
1. Penetrations through fire-resistance-rated vertical assemblies.
2. Penetrations through fire-resistance-rated horizontal assemblies.
3. Penetrations through smoke barriers and smoke partitions.

B. Related Sections
4. Division 1 – General Requirements.
5. Division 3 – Concrete.
6. Division 4 – Masonry.
7. Division 7 – Thermal and Moisture Protection.
8. Division 9 – Finishes.
9. Division 22 – Plumbing.
10. Division 23 – Heating Ventilating and Air Conditioning.
11. Division 26 – Electrical.
12. Division 27 – Communications.

1.2 REFERENCES

A. American National Standards Institute (ANSI):
1. ANSI/UL 263 - Fire Tests of Building Construction and Materials.
2. ANSI/UL 723 - Surface Burning Characteristics of Building Materials.
3. ANSI/UL 1479 - Standard for Fire Tests of Through-Penetration Firestops.

B. American Society for Testing and Materials(ASTM):
1. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E 814 - Standard Test Method for Fire Tests of Through-Penetration Firestops.
4. ASTM E 2174 - Standard Practice for On-Site Inspection of Installed Firestops.

C. Factory Mutual (FM) - FM4991 - Standard for Approval of Firestop Contractors.

D. International Code Congress (ICC):
1. International Building Code (IBC).
2. International Residential Code (IRC).
3. International Mechanical Code (IMC).
4. International Fire Code (IFC).
5. International Code Congress Evaluation Service (ICC ES).

E. National Fire Protection Association (NFPA):
1. NFPA 70 - National Electrical Code.
2. NFPA 80 – Standard for Fire Doors and Other Opening Protectives.
3. NFPA 96 – Standard for Ventilation Control and Fire Protection of

Commercial Cooking Operations.
4. NFPA 101 - Life Safety Code.
5. NFPA 5000 – Building Construction and Safety Code.

F. Underwriters Laboratories (UL) - UL Building Materials Directory:
1. Through-Penetration Firestops Systems (XHEZ).
2. Firestop Devices (XHJI).
3. Forming Materials (XHKU),
4. Wall Opening Protective Materials (CLIV).
5. Fill, Void or Cavity Materials (XHHW).

G.; American Society of Sanitary Engineering (ASSE):
1. ASSE Series 9000 – Professional Qualification Standard for Firestop Systems and Device Installers, Inspectors and Surveyors.

H. International Association of Plumbing and Mechanical Officials (IAPMO):
1. Uniform Plumbing Code (UPC).
2. Uniform Mechanical Code (UMC).

I. International Standards Organization (ISO):
1. ISO 6944.
2. ISO 10295-1: 2007.

1.3 PERFORMANCE REQUIREMENTS

A. Provide systems that are listed by at least one the following:
1. Underwriters Laboratories Inc. (UL), in "Fire Resistance Directory".
2. Intertek Testing Service (Formerly known as Omega Point Laboratories), in "Directory of Listed Products".
3. Factory Mutual (FM), in FMRC Approval Guide.
4. Any other qualified independent testing and inspection agency that conducts periodic follow-up inspections and is acceptable to authorities having jurisdiction.

B. Provide firestop products that are flexible enough to allow for pipe vibration in a through penetration application.

C. Provide products with the appropriate flame spread index and smoke develop index, when tested in accordance with ASTM E 84.

D. Provide products identical to those tested and listed for classification by UL, Intertek or any other qualified independent testing agency.

E. Provide products that bear classification marking of qualified independent testing agency.

F. Where firestop systems not listed by any listing agency are required due to project conditions, submit a substitution proposal with evidence specified.

G. Use only products specifically listed for use in listed systems.

H. Provide products that are compatible with each other, with the substrates forming openings, and with the items, if any, penetrating the firestopping, under the

conditions represented by this project, based on testing and field performance demonstrated by manufacturer.

I. Firestopping materials must meet and be acceptable for use by all applicable codes cited in this section.

J. Provide products that meet the intent of the state or local and LEED ® guidelines on volatile organic compounds (VOC).

K. Where applicable provide products that meet the intent of the F rating classification for passage of flame per ASTM E 814 or ANSI/UL 1479 for through penetrations.

L. Where applicable provide products that meet the intent of the T rating classification for the transfer of temperature per ASTM E 814 or ANSI/UL 1479 for through penetrations.

M. Where applicable provide systems that meet the intent of the L rating classification for the movement of smoke per ANSI/UL 1479 for through penetrations.

N. Where applicable provide products that meet the intent of the W rating classification for passage of water per ANSI/UL 1479 for through penetrations.

1.4 SUBMITTALS

A. Submit under provisions of the Contract and Division 01 – General Requirements.

B. Shop Drawings: For each firestopping system, provide the following:
1. Listing agency's detailed drawing showing opening, penetrating item(s), and firestopping materials, identified with listing agency's name and number or designation and fire rating achieved.
2. For proposed systems that do not conform strictly to the listing, submit written instructions showing modifications and approved by firestop system manufacturer.
3. Submit under provisions of the International Building Code (IBC) section 703 requiring a submittal package for fire-resistance ratings and fire tests.

C. Product Certificates: Submit certificates of conformance signed by firestop system manufacturer certifying that materials furnished comply with requirements.

D. Product Data: Furnish manufacturer's product data sheets on each material to be used in firestop systems. Information on manufacturer's product data sheet should include:
1. Product characteristics including compliance with appropriate ASTM/UL/ANSI test standards.
2. Storage and handling requirements and recommendations.

E. Installation Instruction: Furnish manufacturer's installation instructions.

F. Sustainable or LEED Submittals:

G. VOC Content: For sealants and sealant primers, furnish documentation of VOC content.

1.5 QUALITY ASSURANCE

A. General: All through-penetration firestop systems shall be installed with approved methods using materials that have been tested and classified to produce an approved assembly.

B. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of twenty five (25) years experience in passive fire protection.
   1. Products shall be manufactured in a facility that follows ISO 9001 best practices.
   2. Products shall have undergone a formal life cycle assessment evaluating environmental impact.

C. Installer Qualifications: Firm must be qualified by having experience, staff, and be properly trained to install the specified products, and meets the following criteria:
   1. Contractor is acceptable to manufacturer.
   2. Contractor is acceptable to Authority Having Jurisdiction (AHJ).
   3. Contractor has completed the manufacturer's certified product installation training.
   4. Contractor must provide a list of completed projects as evidence of experience; include project name and address, owner's name and address, and architect's name and phone number.
   5. Certificate: Contractor should provide certificate of qualification.

D. Codes: Where manufacturer's application procedures are in conflict with those of the local Authority Having Jurisdiction, the more strict guidelines will prevail.

E. Pre-installation Meetings: Meetings to agree on firestop requirements, conditions, manufacturer's instructions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products until ready for installation in manufacturer's original unopened packaging, legibly marked with manufacturer's name and product identification, date of manufacture, lot number, listing agency's classification marking, curing/dry time, and mixing instructions (if applicable) and MSDS reference number.

B. Store and handle in such a manner as to prevent deterioration or damage due to moisture, temperature changes, contaminants, and other causes; follow manufacturer's instructions.

C. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local Authority Having Jurisdiction (AHJ).

1.7 PROJECT CONDITIONS

A. Coordinate construction and cutting of openings so that each particular firestop system may be installed in accordance with its listing, including sizing, sleeves, and penetrating items, L rating and manufacturer’s published STC rating.

B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install

firestopping under environmental conditions outside manufacturer's absolute limits.

C. Provide ventilation as required by firestopping manufacturer, including mechanical ventilation if required.

1.8 WARRANTY

A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: 3M Fire Protection Products

B. Hilti Firestop Products

C. STI Firestop

Single Source: To maintain control and integrity of the firestop applications a single manufacturer should be used. Specific UL or approved listing agencies systems applicable to each type of firestop condition should be supplied by one manufacturer.

2.2 SCOPE/APPLICATION

A. Provide installed firestop products that limit the spread of fire, heat, smoke, and gasses through otherwise unprotected openings in rated assemblies, including walls, partitions, floors, roof/ceilings, and similar locations, restoring the integrity of the fire rated construction to its original fire rating.

B. Provide firestop systems listed for the specific combination of fire-rated construction, type of penetrating item, annular space requirements, and fire rating, and the following criteria:
1. F-Rating: Equal to or greater than the fire-resistance rating of the assembly in which the firestopping will be installed.
2. T-Rating: In habitable areas where penetrating items are exposed to potential contact with materials on exposed side(s) of rated assembly, T-rating must equal its F-rating.
3. L-Rating: L-rating of 1 cfm per linear foot (5.5 cu m/h/m) maximum at ambient temperatures. For those applications that require air leaking protection.
4. W-Rating: meets UL Water Leakage Test, W Rating – Class 1 requirements for systems tested and listed in accordance with ANSI/UL 1479.
5. Wall Penetrations: Through penetration systems must be symmetrical, with the same rating from both sides of the wall. Membrane penetrations may be asymmetrical.
6. Testing: Determine ratings in accordance with ASTM E 814 or UL 1479.

2.3 THROUGH PENETRATION FIRESTOP PRODUCTS

A. 3M Fire Barrier Cast-in-Place Devices: Firestopping device for use prior to a concrete pour. Adjustable height with pull tabs, straight edge design for close placement to walls and adjacent devices.
   1. Fire Resistance: For use in 1, 2, or 3 hour fire-rated systems.
   2. Locations: Horizontal assemblies only.

B. 3M Fire Barrier Ultra RC Pack: One piece metal collar assembly encasing intumescent material for firestopping of pipes and cables through rated walls and floors.
   1. Fire Resistance: For use in 1 or 2 hour fire-rated systems.
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

C. 3M Fire Barrier Ultra Plastic Pipe Device: Intumescent device for firestopping of plastic pipe and cables through rated walls and floors.
   1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
   2. Configuration: One-piece metal collar, with locking latch and bendable tabs to secure; equipped also for conventional anchoring.
   3. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

D. 3M Fire Barrier RC-1 Restricting Collar with either FS 195+ Wrap Strip or 3M Interam Ultra GS Wrap Strip. (See product descriptions below): For firestopping of plastic pipes from 4 inches (102 mm) to 10 inches (254mm) in diameter.
   1. Fire Resistance: For use in 1or 2 hour fire-rated systems.
   2. Material: 28 gauge steel.
   3. Size: 25 foot (7.6 m) roll.
   4. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

E. 3M Fire Barrier CP25WB+ Sealant: High-performance, intumescent, water-based sealant. No-sag, fast drying, paintable, red in color. Versatile firestop sealant for pipes (not for use with CPVC), cables, cable tray, blank opening and other penetrations along with mineral wool or other fire-rated assembly products.
   1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
   3. STC rating of 54 when tested in STC 54-rated wall assembly.

F. 3M Fire Barrier IC 15WB+ Sealant: General-purpose, intumescent, water-based sealant. No-sag, fast drying, paintable, yellow in color. Economical firestop sealant for pipes, cables, cable tray, blank opening and other penetrations along with mineral wool or other fire-rated assembly products.
   1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
   3. STC rating of 54 when tested in STC 54-rated wall assembly.

G. 3M Fire Barrier Sealant FD 150+: Single-part, water-based, acrylic latex sealant. No-sag, low-shrinkage, low VOC. Blue, red or limestone color. Used to firestop for pipe penetrations (not for use with CPVC).
   1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
   3. STC rating of 54 when tested in STC 54-rated wall assembly.

H. 3M Fire Barrier Water Tight Sealant 3000 WT: Single-part, water-tight, intumescent silicone firestop sealant for filling voids in concrete gypsum, metal, plastic, wood

and insulation. Light gray color with black flecks. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
3. STC rating of 53 when tested in STC 54-rated wall assembly.

I. 3M Fire Barrier Water Tight 1000 NS Sealant: Single-part, non-slump firestopping silicone sealant for floor and wall openings. Light gray color. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems..
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
3. STC rating of 56 when tested in STC 56-rated wall assembly.

J. 3M Fire Barrier Water Tight Sealant 1003 SL: Single-part, self-leveling firestopping silicone sealant for floor openings. Light gray color. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems..
2. Locations: For horizontal assemblies only.
3. STC rating of 56 when tested in STC 56-rated wall assembly.

K. 3M Fire Barrier Sealant 2000 NS: Single-part, non-slump elastomeric silicone firestop sealant. Sag-resistant, low VOC. Light grey color. Used in mechanical, electrical and plumbing applications to firestop openings and penetrations through fire-rated floor or wall assemblies. Typical penetrants include: metallic pipe, non-metallic pipe (FGG/BM system CPVC compatible), conduit and electrical wiring.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical and horizontal assemblies.
3. STC-Rating of 56 when tested in STC 56-rated wall assembly.

L. 3M Fire Barrier Sealant 2000+: Single-part, elastomeric silicone firestop sealant. Sag-resistant, low VOC. Light grey color. Used in mechanical, electrical and plumbing applications to firestop openings and penetrations through fire-rated floor or wall assemblies. Typical penetrants include: metallic pipe, non-metallic pipe (FGG/BM system CPVC compatible), conduit and electrical wiring.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical and horizontal assemblies.
3. STC-Rating of 56 when tested in STC 56-rated wall assembly.

M. 3M Fire Barrier Moldable Putty+: One-part, 100 percent solids intumescent firestop. Remains pliable, flexible and easily re-enterable. Non-toxic synthetic formula. Versatile putty for pipes, cables, cable tray, blank opening and other penetrations along with mineral wool or other fire-rated assembly products.
1. Type: Stick or Pad
2. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
3. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

N. 3M Fire Barrier 2001 Silicone RTV Foam: Two-part, liquid-silicone elastomer, foams in place when mixed. For use sealing large or complex openings such as cable bundles and cable trays.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

O. 3M Fire Barrier Mortar: For sealing openings in concrete and masonry walls and floors. Self Leveling, non-sag, low VOC.
   1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

P. 3M Fire Barrier Self-Locking Pillow: Self-contained, intumescent firestop pillow with interlocking strips. Meets fire rating without the use of wire mesh. For use in firestopping larger openings
   1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

Q. 3M Fire Barrier Pillow: Self-contained, intumescent firestop product. Meets fire rating without the use of wire mesh. For use in firestopping larger openings
   1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems..
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

R. 3M Fire Barrier CS-195+ Composite Sheet: Organic/inorganic intumescent elastomeric sheet, bonded on one side to a layer of 28 gauge galvanized steel. Other side reinforced with steel-wire mesh and covered with aluminum foil. Re-enterable. For use in firestopping larger openings
   1. Thickness: Nominal 0.3 inch (7.6 mm).
   2. Thermal Expansion: 8 - 10 times original size.
   3. Tensile Strength (ASTM D412): 93.6 psi (645 kPa)/489 percent.
   4. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems..
   5. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

S. 3M Interam Ultra GS Wrap Strip: Graphite based, flexible, largely inorganic, intumescent mat. For use around non-metallic piping with or with RC-1 collar.
   1. Fire Resistance: For use in 1, 2 or 3 hour fire rated systems..
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

T. 3M Fire Barrier FS-195+ Wrap/Strip: One-part, organic/inorganic intumescent strip with foil on one side. May be cut to fit irregular shapes. For use around non-metallic piping with or with RC-1 collar.
   1. Length: 24 inch (610 mm).
   2. Width: 1 or 2 inches.
   3. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
   4. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

U. 3M Fire Barrier Pass-Through Devices: One-Piece device for firestopping of cable penetrations through rated walls and floors.
   1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

V. 3M Fire Barrier Tuck-In: Graphite-based, flexible, intumescent wrap strip for use around non-metallic piping. Adhesive closure tab.
   1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
   2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

W. 3M Fire Barrier Putty Sleeve Kit: Device used for firestopping of cable penetrations through fire rated walls and floors.
   1. Fire Resistance: For use in 1, 2 3 or 4 hour fire-rated systems.

2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Conduct tests according to manufacturer's written recommendations to verify that substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt and other foreign substances capable of impairing bond of firestopping.

C. Verify that items penetrating fire rated assemblies are securely attached, including sleeves, supports, hangers, and clips.

D. Verify that openings and adjacent areas are not obstructed by construction that would interfere with installation of firestopping, including ducts, piping, equipment, and other suspended construction.

E. Verify that environmental conditions are safe and suitable for installation of firestopping.

F. If substrate preparation is the responsibility of another installer, notify Architect or Engineer of Record of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Prepare substrates in accordance with manufacturer's instructions and recommendations.

B. Install masking and temporary coverings as required to prevent contamination or defacement of adjacent surfaces due to firestopping installation.

3.3 INSTALLATION

A. Install in strict accordance with manufacturer's detailed installation instructions and procedures.

B. Install so that openings are completely filled and material is securely adhered.

C. Where firestopping surface will be exposed to view, finish to a smooth, uniform surface flush with adjacent surfaces.

D. After installation is complete, remove combustible forming materials and accessories that are not part of the listed system.

E. Repair or replace defective installations in accordance with manufacturer’s recommendations, listed systems details and applicable code requirements.

F. At each through penetration, attach identification labels on both sides in location where label will be visible to anyone seeking to remove penetrating items or firestopping.

G. Clean firestop materials off surfaces adjacent to openings as work progresses, using methods and cleaning materials approved in writing by firestop system manufacturer and which will not damage the surfaces being cleaned.

H. Notify Authority Having Jurisdiction (AHJ) when firestopping installation is ready for inspection; obtain advance approval of anticipated inspection dates and phasing, if any, required to allow subsequent construction to proceed.

I. Do not cover firestopping with other construction until approval of authority having jurisdiction has been received.

3.4 FIELD QUALITY CONTROL

A. Owner will engage an independent testing agency to inspect installed firestopping and to prepare reports indicating whether the installed work complies with the contract documents.

B. Notify testing agency at least 7 days prior to date when firestopping installation will be ready for inspection; obtain advance approval of general schedule and phasing, if any, required to allow subsequent construction to proceed.

3.5 CLEANING AND PROTECTION

A. Remove left over material and debris from Work area. Use necessary means to protect fire protection product(s) before, during, and after installation.

B. Touch-up, repair or replace damaged products before Substantial Completion.

C. Install identification Labels for Through Penetration: Pressure sensitive self-adhesive vinyl labels, preprinted with the following information:
1. The words "Warning - Through Penetration Firestop System - Do not Disturb. Notify Building Management of Any Damage."
2. Listing agency's system number or designation.
3. System manufacturer's name, address, and phone number.
4. Installer's name, address, and phone number.
5. General contractor's name, address, and phone number (if applicable).
6. Date of installation.

END OF SECTION 220530