

**SECTION 07 84 00
FIRESTOPPING**

Note to specifier: This specification section covers both "Through-Penetration Firestop Systems" and "Fire-resistive Construction Joints."

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Section, apply to work specified in this section.

1.02 DEFINITIONS

- A. 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, or construction joints between, fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

Only tested firestop systems shall be used in specific locations as follows:

- A. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
- B. Safing slot gaps between edge of floor slabs and curtain walls.
- C. Openings between structurally separate sections of wall or floors.
- D. Gaps between the top of walls and ceilings or roof assemblies.
- E. Expansion joints in walls and floors.
- F. Openings and penetrations in fire-rated partitions or walls containing fire doors.
- G. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
 - 1. Section 03 30 00 - Cast-In-Place Concrete
 - 2. Section 04 20 00 - Unit Masonry
 - 3. Section 07 90 00 - Joint Sealants
 - 4. Section 09 20 00 - Plaster and Gypsum Board
 - 5. Section 13 48 00 - Sound, Vibration and Seismic Control
 - 6. Section 21 00 00 - Fire Suppression
 - 7. Section 22 00 00 - Plumbing
 - 8. Section 23 00 00 - Heating, Ventilating, and Air Conditioning (HVAC)
 - 9. Section 26 00 00 - Electrical
 - 10. Section 27 00 00 - Communications

1.05 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems"

- D. Underwriters Laboratories (UL) of Northbrook, IL runs ASTM E-814 under their designation of UL 1479 and publishes the results in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 - 1. UL Fire Resistance Directory:
 - a. Firestop Devices (XHJI)
 - b. Fire Resistance Ratings (BXRH)
 - c. Through-Penetration Firestop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 - f. Joint Systems (XHBN)
 - g. Perimeter Fire Containment Systems (XH DG)
 - 2. Alternate Systems: "Omega Point Laboratories Directory" (updated annually).
- E. Test Requirements: ASTM E 1966, "Standard Test Method for Fire Resistive Joint Systems"
- F. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"
- G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"
- H. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials"
- I. ASTM D6904, "Standard Practice for Resistance to Wind Driven Rain for Exterior Coatings Applied on Masonry"
- J. ASTM C 679, "Standard Test Method for Tack-Free Time of Elastomeric Sealants"
- K. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- L. International Building Code
- M. NFPA 101 - Life Safety Code
- N. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide through-penetration firestop systems and fire-resistive joint systems that comply with specified requirements of tested systems.
- B. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no qualified tested system is available through a manufacturer, an engineering judgment derived from similar qualified tested system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment documents must follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

- A. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of qualified tested firestop systems to be used and manufacturer's installation instructions to comply with Section 01 30 00.
- B. Manufacturer's engineering judgment identification number and document details when no qualified tested system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in document.
- C. Submit safety data sheets provided with product delivered to jobsite.

- D. Submit certificate by firestopping manufacturer that the products supplied comply with LEED requirements for indoor environmental quality credit including printed statement of VOC.

1.08 INSTALLER QUALIFICATIONS

- A. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install manufacturer's products per specified requirements. A supplier's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

Note to Specifier: Section B and Section C are suggested if the owner or architect require a specialty contractor to firestop the entire project or a portion of it.

- B. Installation Responsibility: assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.
- C. The work is to be installed by a Hilti Accredited Fire Stop Specialty Contractor.
- D. The work is to be installed by a contractor with at least one of the following qualifications:
 1. FM 4991 Approved Contractor
 2. UL Approved Contractor
- E. The installer must have no less than 3 years of experience with firestop installation.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at jobsite.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Scheduling:
 1. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
 2. Schedule installation of Drop-In firestop devices after placement of concrete but before installation of the pipe penetration. Diameter of sleeved or cored hole to match the listed system for the device.
 3. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
 4. Schedule installation of preformed joint materials to be installed with the metal framing
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 – PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.
- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Provide a fire-rated cable pathway device whenever single and/or bundled low-voltage cables penetrate fire rated concrete, masonry and drywall walls and floors, where frequent cable additions and changes may occur. The fire-rated cable management device shall contain integrated intumescent firestop wrap strip materials sufficient to maintain the hourly rating of the barrier being penetrated. The device shall be capable of being easily ganged together with any combination of compatible sleeves using gang plate systems. The fire-rated cable management device shall consist of a bare metal housing and frame(s) to enable grounding for electrical continuity. The device shall provide airflow containment sufficient to achieve the L-Rating requirements of the barrier type.
 - 1. Round fire-rated cable management device: The device shall consist of a corrugated steel tube with zinc coating, contain an inner plastic housing, intumescent material rings, and inner fabric smoke seal membrane. The device shall contain a smoke seal fabric membrane or intumescent firestop plugs sufficient to achieve the L-Rating. Install device per the manufacturer's published installation instructions.
 - 2. Rectangular fire-rated cable management device: The device shall consist of a rectangular galvanized steel sleeve with a symmetrical half-shell design for retrofit capabilities. The device shall consist of an inner and outer layer of brushes on both ends of the device sufficient to achieve the L-Rating. The device shall be capable of being easily ganged together using gang plate or floor grid systems with ganging clips. Install device per the manufacturer's published installation instructions.
- D. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
 - 1. F-Rating: Not less than the fire-resistance rating of the wall construction being penetrated.

Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

- 2. Horizontal assemblies include floors, floor/ceiling assemblies and ceiling membranes of roof/ceiling assemblies.
- 3. F-Rating: Minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
- 4. T-Rating: when penetrant is located outside of a wall cavity, minimum of 1-hour rating, but not less than the fire-resistance rating of the floor construction being penetrated.
- 5. T-ratings shall be achieved by utilizing a Low Bio Persistent Endothermic Mat incorporating foil scrim on both sides
 - a. Basis of Design: Hilti CFP-ES Endo-Shield Low Bio Persistent Endothermic Mat with foil scrim on both sides. LBC Red list Compliant.

Note to Specifier: Retain or delete W-rating listed below if horizontal assemblies require water resistance.

- 6. W-Rating: Class 1 rating in accordance with water leakage test per UL 1479.
- E. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with UL 1479 or ASTM E 814.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at both ambient and elevated temperatures.

Note to Specifier: Mold Resistance - On a rating scale from zero to four (0-4), a value of zero (0) indicates No Growth observed; a value of one (1) indicates Traces of Growth observed (less than 10%); a value of four (4) indicates Heavy Growth (60% to complete coverage)

- F. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of one (1) or less as tested per ASTM G21.
- G. Rain and water resistance: provide perimeter joint sealant tested in accordance with ASTM D 6904 with less than 1 hour tack free time as tested in accordance with ASTM C 679.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory or other qualified tested firestop systems; provide products of the following manufacturers as identified below:

- 1. **Basis of Design:**

- Hilti, Inc., Plano, Texas
 - 800-879-8000
 - www.us.hilti.com

- 2. Substitution requests shall be considered in accordance with contract provisions.

2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. Accessories: provide components for each firestopping and smoke seal systems that are needed to install fill materials. Use only components specified by firestopping material manufacturer and approved by the qualified testing agency. Accessories include, but are not limited to, the following items:
 - 1. Permanent forming, damming and backing material.
 - 2. Temporary forming material.
- C. Pre-formed firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and/or cable bundles penetrating concrete floors the following products are acceptable:
 - 1. Hilti Cast-In Place Firestop Device (CP 680-P)
 - a. Add Aerator Adaptor when used in conjunction with aerator system.
 - 2. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
 - 3. Hilti Tub Box Kit (CP 681) for use with tub installations.
 - 4. Hilti Firestop Speed Sleeve (CP 653 BA) for use with cable penetrations.
 - 5. Hilti Firestop Speed Sleeve (CFS-SL GA L) for use with cable penetrations.
 - 6. Hilti Modular Firestop Sleeve System (CFS-MSL) for use with new and existing cable penetrations in walls and floors.
 - 7. Hilti CFS-MSL Modular Sleeve

8. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
 9. Hilti Firestop Block (CFS-BL)
 10. Hilti Closet Stub (CFS-CID CS)
 11. Hilti Cast-in Firestop sleeve (CFS-CID MD P) and (CFS-CID MD M) for use with combustible and noncombustible pipes through metal deck.
 12. Hilti Cast-in Firestop sleeve (CFS-CID P) and (CFS-CID M) for use with large diameter combustible and noncombustible pipes through concrete floors.
- D. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
 2. Hilti Fire Foam (CP 620/CP 660)
 3. Hilti Flexible Firestop Sealant (CP 606)
 4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
 5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
- E. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
1. Hilti Silicone Sealant Gun Grade (CFS-S SIL GG)
 2. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
 3. Hilti Flexible Firestop Sealant (CP 606)
 4. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- F. Sealants, sprays, or pre-formed materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. Hilti Firestop Top Track Seal (CFS-TTS)
 2. Hilti Top Track Seal for Metal deck (CFS-TTS MD)
 3. Hilti Firestop Joint Spray (CFS-SP WB)
 4. Hilti Firestop Silicone Joint Spray (CFS-SP SIL)
 5. Hilti Flexible Firestop Sealant (CP 606)
 6. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
 7. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
 8. Hilti Bottom-of-Wall Sealant (CP 605)
- G. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
1. Hilti Speed Plugs (CP 777)
 2. Hilti Speed Strips (CP 767)
- H. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
- I. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
 2. Hilti Fire Foam (CP 620/CP 660)
 3. Hilti Flexible Firestop Sealant (CP 606)

4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
 5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
- J. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
1. Hilti Firestop Putty Stick (CP 618)
 2. Hilti Firestop Plug (CFS-PL)
- K. Wall opening protective materials for use with U.L. listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
1. Hilti Firestop Putty Pad (CP 617)
 2. Hilti Firestop Box Insert
- L. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. Hilti Firestop Collar (CP 643N)
 2. Hilti Firestop Collar (CP 644)
 3. Hilti Wrap Strips (CP 648-E/648-S)
- M. Materials used for large openings and complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti Firestop Block (CFS-BL)
 2. Hilti Composite Sheet (CFS-COS)
 3. Hilti Firestop Mortar (CP 637)
 4. Hilti Fire Foam (CP 620/CP 660)
 5. Hilti Firestop Board (CP 675T)
- N. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. Hilti Firestop Block (CFS-BL)
 2. Hilti Firestop Board (CP 675T)
- O. Re-penetrable, cable management devices for use with new or existing cable bundles penetrating gypsum, concrete, or masonry walls, the following products are acceptable:
1. Hilti Modular Firestop Sleeve System (CFS-MSL) for use with new and existing cable penetrations in walls and floors.
 - a. Hilti CFS-MSL Modular Sleeve
 - b. Hilti CFS-MSL P Modular Sleeve Plate
 - c. Hilti CFS-MSL GPA Adjustable Gangplate
 - d. Hilti CFS-MSL GPR Retrofit Gangplate
 - e. Hilti CFS-MSL GPP Pre-drywall Gangplate
 - f. Hilti CFS-MSL CGL Ganging Clips
 2. Hilti Firestop Speed Sleeve (CP 653 BA) with integrated smoke seal fabric membrane.
 3. Hilti Firestop Speed Sleeve (CFS-SL GA L) for use with cable penetrations
 4. Hilti Firestop Cable Collar (CFS-CC)
 5. Hilti Firestop Sleeve (CFS-SL SK)
 6. Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
 7. Hilti Firestop Gangplate (CFS-SL GP) for use with multiple cable management devices.

8. Hilti Firestop Gangplate Cap (CFS-SL GP CAP) for use at blank openings in gangplate for future penetrations.
- P. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. Hilti Firestop Joint Spray (CFS-SP WB)
 2. Hilti Flexible Firestop Sealant (CP 606)
 3. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
 4. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
- Q. For blank openings made in fire-rated wall or floor assemblies, where future penetration of pipes, conduits, or cables is expected, the following products are acceptable:
1. Hilti Firestop Block (CFS-BL)
 2. Hilti Firestop Plug (CFS-PL)
 3. Hilti Cast-In Place Firestop Device (CP 680) (for floors only)
- R. For single or cable bundles up to one inch diameter penetrating gypsum, masonry, concrete walls or wood floor assemblies the following product is acceptable:
1. Hilti Firestop Cable Disc (CFS-D)
- S. Pre-formed materials or Sealants for use as part of a perimeter fire barrier system between fire-resistance-rated floors and exterior wall assemblies, the following products are acceptable:
1. Hilti Preformed Firestop System (CFS-EOS QuickSeal)
 2. Hilti Firestop Joint Spray (CFS-SP WB)
 3. Hilti Firestop Silicone Joint Spray (CFS-SP SIL)
 4. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
 5. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
- T. For joints and penetrations in non-rated fire separations, the following products are acceptable:
1. Hilti Smoke and Acoustic Track Seal (CS-TTS SA)
 2. Hilti Light Smoke and Acoustic Sealant (CS-S SA)
 3. Hilti Smoke and Acoustic sealant (CP 506)
 4. Hilti Smoke and Acoustic Spray (CP 572)
- U. For large wall opening protective materials for use with metallic electrical panels, the following product is acceptable:
1. Hilti Endo-Shield Low Bio Persistent Endothermic Mat (CFP-ES) with foil scrim on both sides.
LBC Red list compliant
- V. For T-Ratings for penetrations in horizontal assemblies, the following product is acceptable:
1. Hilti Endo-Shield Low Bio Persistent Endothermic Mat (CFP-ES)

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate construction of openings, penetrations, and construction joints to ensure that the fire stop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems. Coordinate construction and sizing of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
- C. Coordinate firestopping with other trades so that obstructions are not placed in the way prior to the installation of the fire stop systems.
- D. Do not cover up through-penetration firestop and joint system installations that will become concealed behind other construction until each installation has been examined by the building inspector.

3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory and/or qualified tested firestop systems documentation.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - 1. Seal all holes or voids made by penetrations to ensure an air and water-resistant seal.
 - 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of a qualified tested firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 - 3. Protect materials from damage on surfaces subjected to traffic.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

- E. Manufacturer's Field Services: Contractor to ensure a manufacturer's direct representative is on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. Training will be done per manufacturer's written recommendations published in their literature and drawing details. During installation, contractor shall have manufacturer's representative provide periodic visual observations and written documentation of the results. Contact Hilti for support at 800.879.8000.

3.05 IDENTIFICATION & DOCUMENTATION

- A. The firestop contractor is to supply documentation for each single application addressed. This documentation is to identify each penetration and joint location on the entire project.

- A.1 The Documentation Form for through penetrations is to include:

1. A Sequential Location Number
2. The Project Name
3. Date of Installation
4. Detailed Description of the Penetration's Location
5. Tested System or Engineered Judgment Number
6. Type of Assembly Penetrated
7. A Detailed Description of the Size and Type of Penetrating Item
8. Size of Opening
9. Number of Sides of Assemblies Addressed
10. Hourly Rating to be Achieved
11. Installer's Name

- A.2 The Documentation Form for Construction Joints is to include:

1. A Sequential Location Number
2. The Project Name
3. Date of Installation
4. Detailed Description of the Construction Joint's Location
5. Tested System or Engineered Judgment Number
6. Type of Construction Joint
7. The Width of the Joint
8. The Lineal Footage of the Joint
9. Number of Sides Addressed
10. Hourly Rating to be Achieved
11. Installer's Name

- B. Copies of these documents are to be provided to the general contractor at the completion of the project.
- C. 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.

- D. A firestop documentation manager software shall be used to document, track, and maintain the passive firestop systems throughout the construction and maintenance phase of the facility. The software solution shall be used to track and document every firestop system installed on the project and each subsequent addition, change, or removal of the firestop system. The firestop documentation shall be managed with a cloud-based software which allows the installer to use a standard smartphone or tablet device (either iOS, Android, or Windows capable) to capture the relevant information for the installation. The following data shall be tracked for each penetration within the facility: product installed, system installed, date of installation, location of the penetration including a notation on the 2D plan image, F-rating, name of installer, photo (pre-installation and post-installation), and inspection status. The Owner and/ or Construction Manager may designate additional items to be tracked. The firestop documentation manager software must perform the following basic functions:
1. Create multiple projects/facilities, add/create/remove users for each project, upload documents including UL systems, 2D floor plans, product data, engineering judgments, etc.
 2. Define data to track using pre-defined input fields or creating custom input fields as desired.
 3. Capture multiple photos for each penetration, including a pre-installation and post-installation photo.
 4. Scan QR Code on Hilti identification label to link the program data to a specific penetration location.
 5. Annotate (mark) location of penetration on 2D floor plan.
 6. Create reports by filtering data and utilizing report templates.
 7. Online/ offline (for use in areas where data service is unavailable) synchronization of data between mobile device, online application, and cloud-based system.
 8. Ability to transfer ownership of projects from one customer to another from construction phase to facility maintenance.
- E. Permanently attach Hilti identification labels to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove or change penetrating items or firestopping. Labels shall have a unique QR code for each penetration which can be scanned by the firestop documentation software to quickly identify the penetration attributes.

Acceptable Software: Hilti CFS-DM, from Hilti Inc., Plano, TX. Tel (800) 879-8000 or Hilti (Canada) Corporation, Mississauga, Ontario (800) 363-4458 website: www.us.hilti.com or www.hilti.ca.com

1. Substitutions: Not permitted.
2. Single Source: Obtain firestop documentation manager software and firestop systems for each type of penetration and construction condition indicated only from a single manufacturer.

3.06 ADJUSTING AND CLEANING

- A. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

3.07 LABOR USE TO INSTALL FIRESTOP SYSTEMS

- A. If firestopping is not assigned to a single-source firestop specialty contractor, the installation of each scope of work is to be performed jurisdictionally correct per existing trade agreements.

3.08 SCHEDULE OF COMMON FIRESTOP SYSTEMS

Schedule of joint firestop systems. Basis of design: Hilti, Inc.

Joint Type	F-Rating (Hr)	Hilti Basis of Design UL System	
		Joint Width Less than or Equal to 2"	Joint Width Greater than 2" Less than or Equal to 6" ⁴
Concrete (Floor to Floor)	1	FF-D-1012, FF-D-1013 ¹	FF-D-1012, FF-D-1013
	2	FF-D-1012, FF-D-1013 ¹	FF-D-1012, FF-D-1013
	3	FF-D-1011, FF-D-1026 ¹	FF-D-1011, FF-D-1026
	4	FF-D-1047	FF-D-1125
Concrete (Edge of Floor Slab to Wall)	1	FW-D-1011, FW-D-1012, FW-D-1013	FW-D-1011, FW-D-1012, FW-D-1013, FW-D-1021
	2	FW-D-1011, FW-D-1012, FW-D-1013	FW-D-1011, FW-D-1012, FW-D-1013, FW-D-1021
	3	FW-D-1011	FW-D-1011, FW-D-1021
	4	FW-D-1047	FW-D-1092
Concrete or Block Wall to Flat Concrete Floor (Top-of-Wall)	1	N/A**	N/A**
	2	HW-D-0097 ¹	HW-D-1009
	3	HW-D-1008 ¹ , HW-D-0268	HW-D-1008
	4	HW-D-1042	HW-D-1103
Concrete or Block Wall to Concrete Over Fluted Metal Deck (Top-of-Wall)	1	HW-D-0098	N/A**
	2	HW-D-0080, HW-D-0081, HW-D-0098	HW-D-1037
	3	N/A**	N/A**
	4	HW-D-0294	N/A**
Gypsum Wall to Flat Concrete Floor (Top-of-Wall)	1	HW-D-0757, HW-D-0082, HW-D-0083, HW-D-0106, HW-D-0119	HW-D-1011, HW-D-1012, HW-1020
	2	HW-D-0757, HW-D-0082, HW-D-0083, HW-D-0106, HW-D-0119	HW-D-1011, HW-D-1012, HW-1020
	3	HW-D-0119	HW-D-1011, HW-D-1012, HW-1020
Gypsum Shaft Wall to (Top-of-Wall)	2	HW-D-0342 (FLAT CONCRETE) HW-D-0541, HW-D-0542 (CONCRETE OVER METAL DECK)	N/A**
Gypsum Shaft Wall to Concrete Floor (Bottom-of-Wall)	1	BW-S-0023	N/A**
	2	BW-S-0023	N/A**
Gypsum Wall to Concrete Floor (Bottom-of-Wall)	1	BW-S-0001, BW-S-0002	N/A**
	2	BW-S-0001, BW-S-0002	N/A**
Gypsum Wall to Concrete Over Fluted Metal Deck (Top-of-Wall)	1	HW-D-0042*, HW-D-0049*, HW-D-0087*, HW-D-0089*, HW-D-0045, HW-D-0046*, HW-D-0076*, HW-D-0077*, HW-D-0154, HW-D-0184*, HW-D-0292, HW-D-0295, HW-D-0538*	HWD-1011, HWD-1012, HW-D-1020
	2	HW-D-0042*, HW-D-0049*, HW-D-0087*, HW-D-0089*, HW-D-0045, HW-D-0046*, HW-D-0076*, HW-D-0077*, HW-D-0154, HW-D-0184*, HW-D-292, HW-D-0295, HW-D-0538*	HW-D-1011, HW-D-1012, HW-D-1020
	3	HW-D-0292, HW-D-0295	HW-D-1011, HWD-1012, HW-D-1020
	4	HW-D-0292, HW-D-0295	N/A**
Concrete (Wall to Wall)	2	WW-D-0017, WW-D-0082	WW-D-1080, WW-D-1084
	3	WW-D-1011 ¹ , WW-D-0032	WW-D-1011
	4	WW-D-1047	WW-D-1128
Gypsum to Concrete (Wall to Wall)	1	WW-D-0040	N/A**
	2	WW-D-0040	N/A**

* SEE NOTE 3 ** CONTACT HILTI FOR CURRENT UL-CLASSIFIED SYSTEM OR ENGINEER JUDGMENT DRAWING: 800-879-8000

NOTES:

1. CLASSIFIED SYSTEMS FOR 2" - 6" WIDE JOINTS MAY BE USED FOR JOINTS 2" WIDE AND LESS.
2. CONFIRM THAT MOVEMENT CAPABILITIES OF THE SELECTED UL SYSTEM MEETS OR EXCEEDS THE SPECIFIED MOVEMENT RANGE OF THE PARTICULAR JOINT.
3. SYSTEMS MARKED WITH ASTERIK (*) ARE SUITABLE FOR TOP-OF-WALL JOINTS WHERE THE FLUTED METAL DECK HAS SPRAY-ON MONOKOTE MK-6/HY FIREPROOFING.
4. VERIFY ALLOWABLE JOINT WIDTH ON SPECIFIC UL SYSTEM DRAWING.

Schedule of through penetration firestop systems. Basis of design: Hilti, Inc.

CONCRETE FLOORS			CONCRETE OR BLOCK WALLS		
TYPE OF PENETRANT	F-RATING (HR)	BASIS OF DESIGN UL SYSTEM	TYPE OF PENETRANT	F-RATING (HR)	BASIS OF DESIGN UL SYSTEM
CIRCULAR BLANK OPENINGS	1	F-A-0006, C-AJ-0055, C-AJ-0090	CIRCULAR BLANK OPENINGS	1	C-AJ-0055, C-AJ-0090
	2	F-A-0006, C-AJ-0055, C-AJ-0090		2	C-AJ-0055, C-AJ-0090
	3	F-A-0006, C-AJ-0055, C-AJ-0086		3	C-AJ-0055, C-AJ-0086
SINGLE METAL PIPES OR CONDUIT	1	C-AJ-1226, F-A-1028, F-A-1017	SINGLE METAL PIPES OR CONDUIT	1	C-AJ-1226, W-J-1067, W-J-1020
	2	C-AJ-1226, F-A-1028, F-A-1017		2	C-AJ-1226, W-J-1067, W-J-1020, W-J-1248
	3	C-AJ-1226, F-A-1017		3	C-AJ-1226, W-J-1041, W-J-1068
	4	C-BJ-1037, C-BJ-1034		4	C-BJ-1034, C-BJ-1037, W-J-1041, W-J-1042, W-J-1068
SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, FRP, ENT)	1	F-A-2053, F-A-2025, C-AJ-2109, C-AJ-2098, C-AJ-2271, C-AJ-2167	SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, FRP, ENT)	1	C-AJ-2109, C-AJ-2098, C-AJ-2167, C-AJ-2371, C-AJ-2342
	2	C-AJ-2098, C-AJ-2271, C-AJ-2167, C-BJ-2021, C-AJ-2371, C-AJ-2342		2	C-AJ-2109, C-AJ-2098, C-AJ-2167, C-AJ-2371, C-AJ-2342
	3	F-A-2054, C-AJ-2109, C-AJ-2098, C-AJ-2371, C-AJ-2342		3	C-AJ-2109, C-AJ-2098, C-AJ-2371, C-AJ-2342
	4	C-BJ-2016, C-AJ-2017		4	W-J-2057, W-J-2091
SINGLE/CABLE BUNDLES	1	F-A-3007, C-AJ-3095, C-AJ-3180, C-AJ-3283	SINGLE/CABLE BUNDLES	1	W-J-3036, C-AJ-3095, C-AJ-3180, W-J-3060, W-J-3167
	2	F-A-3007, C-AJ-3095, F-A-3060		2	W-J-3036, C-AJ-3095, C-AJ-3180, W-J-3060, W-J-3167, W-J-3189
	3	F-A-3007, C-AJ-3095, C-AJ-3285		3	C-AJ-3095, C-AJ-3180, W-J-3167
CABLE TRAY	1	C-AJ-4034, C-AJ-4035	CABLE TRAY	1	W-J-4027, C-AJ-4034, C-AJ-4035
	2	C-AJ-4034, C-AJ-4035		2	W-J-4027, C-AJ-4034, C-AJ-4035
	3	C-AJ-4034, C-AJ-4035		3	C-AJ-4034, C-AJ-4035
	4			4	W-J-8007
SINGLE INSULATED PIPES	1	F-A-5015, F-A-5017, C-AJ-5090, C-AJ-5091, C-AJ-5048	SINGLE INSULATED PIPES	1	C-AJ-5090, C-AJ-5091, C-AJ-5061, W-J-5042
	2	F-A-5015, F-A-5017, C-AJ-5090, C-AJ-5091		2	C-AJ-5090, C-AJ-5091, C-AJ-5061, W-J-5042
	3	F-A-5016, C-AJ-5090, F-A-5018		3	C-AJ-5090, C-AJ-5061
	4	C-BJ-5006		4	C-BJ-5006, W-J-5028
ELECTRICAL BUSWAY	1	C-AJ-6006, C-AJ-6017, F-A-6002, C-AJ-6036	ELECTRICAL BUSWAY	1	C-AJ-6006, C-AJ-6017, C-AJ-6036
	2	C-AJ-6006, C-AJ-6017, F-A-6042, C-AJ-6036		2	C-AJ-6006, C-AJ-6017, C-AJ-6036
	3	C-AJ-6006, C-AJ-6017		3	C-AJ-6006, C-AJ-6017
MECHANICAL DUCTWORK WITHOUT DAMPERS NON-INSULATED	1	C-AJ-7046, C-AJ-7051, C-AJ-7084	MECHANICAL DUCTWORK WITHOUT DAMPERS NON-INSULATED	1	C-AJ-7046, C-AJ-7051, W-J-7021, W-J-7022
	2	C-AJ-7046, C-AJ-7051		2	C-AJ-7046, C-AJ-7051, W-J-7021, W-J-7022
	3	C-AJ-7046, C-AJ-7051		3	C-AJ-7046, C-AJ-7051
MECHANICAL DUCTWORK WITHOUT DAMPERS INSULATED	N/A**	N/A**	MECHANICAL DUCTWORK WITHOUT DAMPERS INSULATED	1	W-J-7029, W-J-7124
MIXED PENETRANTS	1	C-AJ-8099, C-AJ-8056, C-AJ-8143	MIXED PENETRANTS	1	C-AJ-8099, C-AJ-8056, W-J-8007, C-AJ-8143
	2	C-AJ-8099, C-AJ-8056, C-AJ-8143		2	C-AJ-8099, C-AJ-8056, W-J-8007, C-AJ-8143
	3	C-AJ-8099, C-AJ-8056		3	C-AJ-8041, C-AJ-8056, W-J-8007, C-AJ-8099
	4	C-AJ-8095		4	C-AJ-8095, W-J-8007
WOOD FLOORS			GYPSUM WALLS		
TYPE OF PENETRANT	F-RATING (HR)	BASIS OF DESIGN UL SYSTEM	TYPE OF PENETRANT	F-RATING (HR)	BASIS OF DESIGN UL SYSTEM
METAL PIPES OR CONDUIT	1	F-C-1009, F-C-1059, F-C-1168	METAL PIPES OR CONDUIT	1	W-L-1054, W-L-1058, W-L-1164, W-L-1506
	2	F-C-1009, F-C-1059, F-C-1168		2	W-L-1054, W-L-1058, W-L-1164, W-L-1506
NON-METALLIC PIPE OR CONDUIT	1	F-C-2232, F-C-2030, F-C-2160, F-C-2389	NON-METALLIC PIPE OR CONDUIT	4	W-L-1110, W-L-1111, W-L-1165
	2	F-C-2030, F-C-2128, F-C-2160		1	W-L-2078, W-L-2075, W-L-2128
				2	W-L-2078, W-L-2075, W-L-2128
SINGLE OR BUNDLED CABLES	1	F-C-3012, F-C-3110, F-C-3044	SINGLE OR BUNDLED CABLES	4	W-L-2184, W-L-2245
	2	F-C-3012, F-C-3110		1	W-L-3065, W-L-3111, W-L-3112, W-L-3334, W-L-3414, W-L-3396
				2	W-L-3065, W-L-3111, W-L-3112, W-L-3334, W-L-3414, W-L-3396
				3	W-L-3385, W-L-3277
INSULATED PIPES	1	F-C-5004, F-C-5037, F-C-5036	CABLE TRAY	4	W-L-3139, W-L-3334
	2	F-C-5004, F-C-5037		1	W-L-4011, W-L-4019, W-L-4081
			2	W-L-4011, W-L-4019, W-L-4081	
			4	W-L-8014	
NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	F-C-7013	INSULATED PIPES	1	W-L-5028, W-L-5029, W-L-5047
				2	W-L-5028, W-L-5029, W-L-5047
INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	1	N/A**	NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	4	W-L-5073
	2	N/A**		1	W-L-7017, W-L-7040, W-L-7042, W-L-7155
MIXED PENETRANTS	1	F-C-8009, F-C-8014, F-C-8026	INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS	2	W-L-7040, W-L-7042, W-L-7155
				1	W-L-7059, W-L-7153, W-L-7156, W-L-7151
			MIXED PENETRANTS	2	W-L-7059, W-L-7153, W-L-7156, W-L-7151
				1	W-L-1095, W-L-8013
				2	W-L-1095, W-L-8013
				4	W-L-8014

END OF SECTION