**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**

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

.1 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.

1.3 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

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

.1 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.

 .2 Safing slot gaps between edge of floor slabs and curtain walls.

 .3 Openings between structurally separate sections of wall or floors.

 .4 Gaps between the top of walls and ceilings or roof assemblies.

 .5 Expansion joints in walls and floors.

 .6 Openings and penetrations in fire-rated partitions or walls containing fire doors.

 .7 Openings around structural members which penetrate floors or walls.

1.4 RELATED WORK OF OTHER SECTIONS

.1 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 - Masonry Work
3. Section 07 90 00 - Joint Sealants
4. Section 09 20 00 – Plaster and Gypsum Board
5. Section 09 22 16 – Non-Structural Metal Framing
6. Section 13 48 00 - Sound, Vibration and Seismic Control
7. Section 21 00 00 - Fire Suppression
8. Section 22 00 00 - Plumbing
9. Section 23 00 00 - Heating, Ventilating and Air Conditioning
10. Section 26 00 00 – Electrical
11. Section 27 00 00 - Communications

1.5 REFERENCES

1. Test Requirements: CAN/ULC-S115:2018, " STANDARD METHOD OF FIRE TESTS OF FIRESTOP SYSTEMS.
2. Underwriters Laboratories of Canada (ULC) of Scarborough runs CAN/ULC-S115:2018 under their designation of ULC-S115:2018 and publishes the results in their "FIRE RESISTANCE RATINGS DIRECTORY" that is updated annually.
3. 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. UL tests that meet the requirements of ULC-S115-M are given a cUL listing and are published by UL in their “Products Certified for Canada (cUL) Directory.

Omega Point Laboratories runs ASTM E-814 and publishes the results annually in their “Omega Point Laboratories Directory”.

1. Test Requirements: UL 2079, “Tests for Fire Resistance of Building Joint Systems”. These test requirements provide more guidelines for testing moving joints than that given in CAN4-S115-M. UL tests that meet the requirements of ULC-S115-M are given a cUL listing and are published by UL in their “Products Certified for Canada (cUL) Directory.
2. Canada Green Building Council (CaGBC). LEED Canada V4.0- Building Design and Construction, Interior Design + Construction (ID+C)

Health Canada/ Workplace Hazardous Material Information System (WHMIS).

1. Inspection Requirements: ASTM E 2174, “Standard Practice for On-site Inspection of Installed Fire Stops.”, and ASTM E2393 Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
2. Test Requirements: ASTM E 2307, “Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus”.
3. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.
4. CAN/ULC-S102:2018, Standard Test Method for Surface Burning Characteristics of Building Materials and CAN/ULC-S101 Fire Endurance Tests of Building Construction and Materials.
5. ASTM D6904, “Standard Practice for Resistance to Wind Driven Rain for Exterior Coatings Applied on Masonry”.
6. ASTM C 679, “Standard Test Method for Tack-Free Time of Elastomeric Sealants”.
7. All major building codes: NBC, OBC, BCBC, and ABC.

*(Note to specifier: Retain or delete building codes listed above as applicable)*

1. NFPA 101 - Life Safety Code.
2. Canadian Electrical Code

1.6 QUALITY ASSURANCE

1. Fire-Test-Response Characteristics: Provide through-penetration fire stop systems and fire-resistive joint systems that comply with specified requirements of tested systems.
2. Firestop System installation must meet requirements of CAN/ULC-S115:2018 tested assemblies that provide a fire rating as shown in Section 2.1 Clauses 4, 5, 6 & 7 below.
3. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
4. 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.
5. For those firestop applications that exist for which no ULC or cULtested system is available through a manufacturer, a manufacturer's engineering judgment derived from similar ULC or cULsystem designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council

1.7 SUBMITTALS

1. Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of ULC or cUL firestop systems to be used and manufacturer's installation instructions to comply with Section 01 30 00.
2. Manufacturer's engineering judgment identification number and drawing details when no ULC or cUL 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 drawing.
3. Submit material safety data sheets provided with product delivered to job-site.
4. Submit shop drawings in accordance with Section 01 33 00- Submittals:

.1 submit complete cUL , ULC or equivalent approved systems for all applications.

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

1.8 INSTALLER QUALIFICATIONS

1. Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary training to install manufacture’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 2 and Section 3 are suggested if the owner or architect require a specialty contractor to firestop the entire project or a portion of it.

1. Installation Responsibility: assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single sole source firestop specialty contractor.
2. The work is to be installed by a contractor with at least one of the following qualifications:

FM 4991 Approved Contractor

 ULC Approved Contractor

 Hilti Accredited Fire Stop Specialty Contractor

1. Firm with not less than 3 years of experience with fire stop installation.

1.9 DELIVERY, STORAGE, AND HANDLING

1. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and ULC or cUL label where applicable.
2. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
3. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements.
4. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
5. Do not use damaged or expired materials.

1.10 PROJECT CONDITIONS

1. Do not use materials that contain flammable solvents.
2. Scheduling
3. Schedule installation of CAST IN PLACE firestop devices after completion of floor formwork, metal form deck, or composite deck but before placement of concrete.
4. 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
5. Schedule installation of other firestopping materials after completion of penetrating item installation but prior to covering or concealing of openings.
6. Schedule installation of preformed joint materials to be installed with the metal framing
7. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
8. 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.
9. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

**PART 2 - PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

1. 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.
2. 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.
3. Provide a round fire-rated cable management device whenever cables penetrate fire rated walls, where frequent cable changes and additions may occur. The fire-rated cable management 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 length of the sleeve shall be 12.4 inches. 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 fire-rated cable management device shall contain a smoke seal fabric membrane or intumescent firestop plugs sufficient to achieve the L-Rating requirements of the barrier type. Install device per the manufacturer’s published installation instructions.
4. Penetrations in Fire Resistance Rated Walls: Provide firestopping with ratings determined in accordance with CAN/ULC-S115:2018 as indicated below:

|  |  |
| --- | --- |
| Fire Resistance Ratingof Separation | Required ULC or cUL “F” Rating of Firestopping Assembly |
| 30 minutes | 20 minutes |
| 45 minutes | 45 minutes |
| 1 hour | 45 minutes |
| 1.5 hours | 1 hour |
| 2 hours | 1.5 hours |
| 3 hours | 2 hours |
| 4 hours | 3 hours |

1. For combustible pipe penetrations through a Fire Separation provide a firestop system with a “F” Rating as determined by ULC or cUL which is equal to the fire resistance rating of the construction being penetrated.
2. Penetrations in Horizontal Assemblies: Provide firestopping with ratings determined in accordance with CAN/ULC-S115:2018. For penetrations through a Fire Wall or horizontal Fire Separation provide a firestop system with a “FT” Rating as determined by ULC or cUL which is equal to the fire resistance rating of the construction being penetrated.

*Note to specifier: Retain or delete W-rating listed below if horizontal assemblies require water resistance. W-ratings are not required by the NBC.*

1. W-Rating: Class 1 rating in accordance with water leakage test per UL-S115.
2. Provide a firestop system with an Assembly Rating as determined by ULC-S115 which is equal to the time rating of construction joint assembly.
3. Penetrations in Smoke Barriers: Provide firestopping with ratings determined in accordance with CAN/ULC-S115:2018.
4. 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)

1. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of 0 as determined by ASTM G21.
2. 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.

2.2 ACCEPTABLE MANUFACTURERS

1. Subject to compliance with through penetration firestop systems and joint systems listed in the U.L.C Fire Resistance Directory – Volume III or UL Products Certified for Canada (cUL) Directory, provide products of the following manufacturers as identified below:

1. Basis of Design:

 Hilti (Canada) Corporation, Mississauga, Ontario

 1-800-363-4458

 www.hilti.ca

1. Substitution requests shall be considered in accordance with contract provisions

2.3 MATERIALS

1. Use only firestop products that have been ULC or cULtested 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.
2. 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:
3. Permanent forming, damming and backing material.
4. Temporary forming material.
5. Pre-formed firestop devices for use with non-combustible and combustible pipes (closed and open systems), conduit and/or cable bundles penetrating concrete floors and/or gypsum walls, the following products are acceptable:
6. Hilti Tub Box Kit (CP 681) for use with tub installations.
7. Hilti Cast-In Place Firestop Device (CP 680-PX) for use with XFR pipe
8. Hilti Cast-In Place Firestop Device (CP 680-M) for use with noncombustible penetrants.
9. Hilti Speed Sleeve (CP 653) for use with cable penetrations.
10. Hilti Firestop Drop-In Device (CFS-DID) for use with noncombustible and combustible penetrants.
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 Firestop Block (CFS-BL)
13. Sealants or caulking materials for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
14. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
15. Hilti Fire Foam (CP 620)/CP 660
16. Hilti Flexible Firestop Sealant (CP 606)
17. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
18. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
19. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
20. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
21. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
22. Hilti Flexible Firestop Sealant (CP 606)
23. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
24. Sealants, sprays, or pre-formed materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
25. Hilti Top Track Seal (CFS-TTS)
26. Hilti Top Track Seal for Metal deck (CFS-TTS MD)
27. Hilti Firestop Joint Spray (CFS-SP WB)
28. Hilti Firestop Silicone Joint Spray (CFS-SP SIL)
29. Hilti Flexible Firestop Sealant (CP 606)
30. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
31. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
32. Hilti Bottom of Wall sealant (CP 605)
33. Pre-formed mineral wool designed to fit flutes of metal profile deck; as a backer for spray material.
34. Hilti Speed Plugs (CP 777)
35. Hilti Speed Strips (CP 767)
36. Intumescent sealants or 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:
37. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
38. Foams, intumescent sealants, or caulking materials for use with flexible cable or cable bundles, the following products are acceptable:
39. Hilti Intumescent Firestop Sealant (FS-ONE MAX)
40. Hilti Fire Foam (CP 620)/660
41. Hilti Flexible Firestop Sealant (CP 606)
42. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
43. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
44. Non-curing, re-penetrable intumescent putty or foam materials for use with flexible cable or cable bundles, the following products are acceptable:
45. Hilti Firestop Putty Stick (CP 618)
46. Hilti Firestop Plug (CFS-PL)
47. Wall opening protective materials for use with cUL. / ULC listed metallic and specified nonmetallic outlet boxes, the following products are acceptable:
48. Hilti Firestop Putty Pad (CP 617)
49. Hilti Firestop Box Insert
50. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems) tested to 50 Pa. pressure differential, the following products are acceptable:
51. Hilti Firestop Collar (CP 643N)
52. Hilti Wrap Strips (CP 648E/648S)
53. Materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
54. Hilti Firestop Block (CFS-BL)
55. Hilti Composite Sheet (CFS-COS)
56. Hilti Firestop Mortar (CP 637)
57. Hilti Fire Foam (CP 620)/660
58. Hilti Firestop Board (CP 675T)
59. Non-curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
60. Hilti Firestop Block (CFS-BL)
61. Hilti Firestop Board (CP 675T)
62. Re-penetrable, round cable management devices for use with new or existing cable bundles penetrating gypsum or masonry walls, the following products are acceptable:
63. Hilti Speed Sleeve (CP 653) with integrated smoke seal fabric membrane.
64. Hilti Firestop Cable Collar (CFS-CC)
65. Hilti Firestop Sleeve (CFS-SL SK)
66. Hilti Retrofit Sleeve (CFS-SL RK) for use with existing cable bundles.
67. Hilti Gangplate (CFS-SL GP) for use with multiple cable management devices.
68. Hilti Gangplate Cap (CFS-SL GP CAP) for use at blank openings in gangplate for future penetrations.
69. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
70. Hilti Firestop Joint Spray (CFS-SP WB)
71. Hilti Flexible Firestop Sealant (CP 606)
72. Hilti Firestop Silicone Sealant Gun Grade (CFS-S SIL GG)
73. Hilti Firestop Silicone Sealant Self Leveling (CFS-S SIL SL)
74. 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:
75. Hilti CFS-BL Firestop Block (for walls and floors)
76. Hilti CFS-PL Firestop Plug (for walls and floors)
77. Hilti CP 680 Cast-In Place Firestop Device (for floors only)
78. For single or cable bundles up to one inch diameter penetrating gypsum, masonry, concrete walls or wood floor assemblies the following product is acceptable:
79. Hilti CFS-D Firestop Cable Disc

.19 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)
6. For joints and penetrations in non-rated fire separations the following products are

 acceptable:

1. Hilti CP 506 Smoke and Acoustic sealant
2. Hilti CP 572 Smoke and Acoustic Spray

**PART 3 - EXECUTION**

3.1 PREPARATION

1. 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.

3.2 COORDINATION

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

3.03 INSTALLATION

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

3.4 FIELD QUALITY CONTROL

1. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
2. Keep areas of work accessible until inspection by applicable code authorities.
3. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, “Standard Practice for On-Site Inspection of Installed Fire Stops” and ASTM E-2393, “Standard Practice for On-Site Inspection of Installed Firestop Joint Systems”.  or another recognized standard.
4. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.

1. Manufacturer’s Field Services: The manufacturer’s representative to be present during the first installation of every first firestop system. The manufacturer’s technical representative to provide periodic walk-through. After every site visit the manufacturer’s technical representative to submit site reports to indicate application reviewed, location and installer. Contractor to submit site reports by manufacturer to consultant within one week of each visit.

3.5 IDENTIFICATION & DOCUMENTATION

1. 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.
2. The Documentation Form for through penetrations is to include:
3. A Sequential Location Number
4. The Project Name
5. Date of Installation
6. Detailed description of the penetrations location
7. Tested System or Engineered Judgment Number
8. Type of assembly penetrated
9. A detailed description of the size and type of penetrating item
10. Size of opening
11. Number of sides of assemblies addressed
12. Hourly rating to be achieved
13. Installers Name

1. The Documentation Form for Construction Joints is to include:
2. A Sequential Location Number
3. The Project Name
4. Date of Installation
5. Detailed description of the Construction Joints location
6. Tested System or Engineered Judgment Number
7. Type of Construction Joint
8. The Width of the Joint
9. The Lineal Footage of the Joint
10. Number of sides addressed
11. Hourly rating to be achieved
12. Installers Name
13. Copies of these documents are to be provided to the general contractor at the completion of the project.
14. 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:
15. The words: "Warning -Through Penetration Firestop System-Do Not Disturb. Notify Building Management of Any Damage."
16. Contractor's Name, address, and phone number.
17. Through-Penetration firestop system designation of applicable testing and inspecting agency.
18. Date of Installation.
19. Through-Penetration firestop system manufacturer's name.
20. Installer's Name.
21. 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.

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 (Canada) Corporation, Mississauga, Ontario (800) 363-4458 website:  [www.hilti.ca](https://www.hilti.ca/medias/sys_master/documents/hf8/9188595728414/www.hilti.ca)

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.

3.6 ADJUSTING AND CLEANING

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

3.7 LABOR USE TO INSTALL FIRESTOP SYSTEMS

1. 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 through penetration firestop systems. Basis of design: Hilti, Canada

|  |  |
| --- | --- |
| **CONCRETE FLOORS** | **CONCRETE OR BLOCK WALLS** |
| **TYPE OF PENETRANT** | **F-RATING (HR)** | **BASIS OF DESIGN cUL SYSTEM** | **TYPE OF PENETRANT** | **F-RATING (HR)** | **BASIS OF DESIGN cUL SYSTEM** |
| BLANK OPENINGS | 1 | F-A-0006, C-AJ-0055, C-AJ- 0070, C-A-J-0138 | BLANK OPENINGS | 1 | C-AJ-0055, C-AJ-0070 |
| 2 | F-A-0006, C-AJ-0055, C-AJ-0070, C-A-J-0138 | 2 | C-AJ-0055, C-AJ-0070 |
| 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, F-A-1091 | 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-2240, F-A-2025, CA-J-2078 , C-AJ-2035, CA-J-2022  | SINGLE NON-METALLIC PIPE OR CONDUIT (I.E. PVC, CPVC, ABS, FRP, ENT) | 1 | C-AJ-2109C-AJ-2078, W-J-2332, C-AJ-2024, C-AJ-2035, C-AJ-2022 |
| 2 | C-AJ-2035, C-AJ-2022,C-AJ-2021 | 2 | C-AJ-2078, W-J-2332, C-AJ-2024, C-AJ-2035, C-AJ-2022 |
| 3 | C-A-J-2012, C-AJ-2035-F-A-2012 | 3 |  CA-J-2035 C-J-2035 C-AJ-2024 |
| 4 |  | 4 | ,  |
| 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,C-AJ-3334, 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 |
| 4 | W-J-3050 |
| CABLE TRAY | 1 | C-AJ-4034, C-AJ-4071 | CABLE TRAY | 1 | W-J-4027, C-AJ-4034, C-AJ-4071 |
| 2 | C-AJ-4034, C-AJ-4071 | 2 | W-J-4027, C-AJ-4034, C-AJ-4071 |
| 3 | C-AJ-4034, C-AJ-4035 | 3 | C-AJ-4034, C-AJ-4035 |
| 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-5090 | 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, C-AJ-7084 | 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 | 2 | C-A-J-7145 | MECHANICAL DUCTWORK WITHOUT DAMPERS INSULATED | 1 | W-J-7029, W-J-7124 |
| 2 | W-J-7091, W-J-7112, 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 cUL SYSTEM** | **TYPE OF PENETRANT** | **F-RATING (HR)** | **BASIS OF DESIGN cUL 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, W-L-1465 |
| 2 | F-C-1009, F-C-1059, F-C-1168 | 2 | W-L-1054, W-L-1058, W-L-1164, W-L-1506, W-L-1465 |
| 4 | W-L-1110, W-L-1111, W-L-1165 |
| NON-METALLIC PIPE OR CONDUIT | 1 | F-C-2011, F-C-2416, , F-C-2007 | NON-METALLIC PIPE OR CONDUIT | 1 | W-L2028, W-L-2061, W-L-2020 |
| 2 |  | 2 | W-L-2028, W-L-2061, W-L-2020 |
| 4 |  |
| SINGLE OR BUNDLED CABLES | 1 | F-C-3012, F-C-3110, F-C-3074 | SINGLE OR BUNDLED CABLES | 1 | W-L-3065, W-L-3111, W-L-3112, W-L-3334, W-L-3414, W-L-3396 |
| 2 | F-C-3012, F-C-3110 | 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 |
| 4 | W-L-3139, W-L-3334 |
| INSULATED PIPES | 1 | F-C-5004, F-C-5037, F-C-5036, F-C-5065 | CABLE TRAY | 1 | W-L-4011, W-L-4060, W-L-4081 |
| 2 | W-L-4011, W-L-4060, W-L-4081 |
| 4 | W-L 8014 |
| 2 | F-C-5004, F-C-5037 | INSULATED PIPES | 1 | W-L-5028, W-L-5029, W-L-5047 |
| 2 | W-L-5028, W-L-5029, W-L-5047 |
| 4 | W-L-5073 |
| NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS | 1 | F-C-7013, F-C-7043 | NON-INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS | 1 | W-L-7040, W-L-7042, W-L-7155 |
| 2 | W-L-7040, W-L-7042, W-L-7155 |
| INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS | 1 | N/A\*\* | INSULATED MECHANICAL DUCTWORK WITHOUT DAMPERS | 1 | W-L-7059, W-L-7153, W-L-7156, W-L-7151 |
| 2 | N/A\*\* | 2 | W-L-7059, W-L-7153, W-L-7156, W-L-7151 |
| MIXED PENETRANTS | 1 | F-C-8009, F-C-8014, F-C-8026, F-C-8038 | MIXED PENETRANTS | 1 | W-L-1095, W-L-8013 |
| 2 | W-L-1095, W-L-8013 |
| 4 | W-L-8014 |

Schedule of joint firestop systems. Basis of design: Hilti Canada

|  |  |  |
| --- | --- | --- |
| **Joint Type** | **F-Rating****(Hr)** | **Hilti Basis of Design cUL 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-1013¹ | FF-D-1012, FF-D-1013 |
| 2 | FF-D-1012, FF-D-1013¹ | FF-D-1012, FF-D-1013 |
| 3 | FF-D-1011, FF-D-1026¹ | 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-0097¹ | HW-D-1009, HW-D-1045 |
| 3 | HW-D-1008¹, 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 |
| 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-538\* | HWD-1011, HWD-1012, HW-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-D0538\* | HW-D-1011, HW-D-1012, HW-D-1020 |
| 3 | HW-D-0292, HW-D-0295 | HWD-1011, HWD-1012, HW-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-1011¹, WW-D-0032 | WW-D-1011 |
| 4 | WW-D-1047 | WW-D-1128 |
| Gypsum to Concrete (**Wall to Wall)** | 1 | WW-D-0068 | N/A\*\* |
| 2 | WW-D-0068 | N/A\*\* |

\* SEE NOTE 3 \*\* CONTACT HILTI FOR CURRENT cUL-CLASSIFIED SYSTEM OR ENGINEERING JUDGMENT DRAWING: 1-800-363-4458

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 cUL 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.

**END OF SECTION**