REGINA

PLANNING & DEVELOPMENT SERVICES ADVISORY

Fire Stopping Codes & Standards

Background

This bulletin provides construction professionals with general guidance, code requirements and the permitted use of various firestopping applications within fire rated construction.

Key Understandings

- Firestopping is a method of passive fire protection that seals openings in fire-rated walls and floors to prevent the spread of fire and smoke. It is essential for maintaining the fire resistance of building assemblies, especially in areas where penetrations like pipes or electrical cables are present.
- An appropriate firestopping material must be installed in accordance with a tested firestop system that matches the specific penetration/joint application to maintain the fire rated assembly.
- Firestopping system documentation, also known as technical documentation or ULC system sheets, are essential for ensuring proper installation, maintenance and inspection of firestop systems. These documents provide details on the specific firestop materials used, their limitations and how to install them correctly.
- Construction professionals should check the availability of a tested system for a particular arrangement onsite.
    - If a 'membrane-only' fire separation (Article 3.4.6.2.(2)) is used to complete a fire compartment, there are several restrictions and increased requirements that apply including increased firestopping requirements. See explanation below.
- Contractors or designers encountering a unique job-site condition or for a firestopping application which has not been tested and listed shall use a customized engineering judgment (EJ) *(see page 9).* These can be provided by the firestop manufacturer for a single application or for an entire project to account for these unique applications.
- All contractors shall maintain documentation of all the listed firestop systems *(see page 8)* and engineering judgments that were utilized on the project and supply this to the building inspector for verification when requested.
    - A listed firestop system contains complete information about the tested system in accordance with CAN/ULC-S115 and will show a typical assembly diagram of all components and installation parameters with detailed descriptions. The chosen system will mention the overall fire rating of the testing system and will also provide some variations on different factors. These factors may include the size range of various penetrating components and the different types of materials that can be used. It also provides a list of all applicable product ranges for the given assembly.
- Occupancy and completion of building permits are subject to construction professionals and building owners providing these technical documents to the building and mechanical inspectors.

Penetrations in Fire Separation and Fire-Rated Assemblies

3.1.9.1. Firestops (General Requirements)

(1) Except as provided in Sentences (2) to (7) and Article 3.1.9.3., penetrations of a fire separation or a membrane forming part of an assembly required to have a fire-resistance rating shall be

(a) sealed by a firestop that, when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," has an F rating not less than the required fire-resistance rating of the fire separation, or

(b) cast in place, where the item penetrating the fire separation is steel, ferrous, copper, concrete or masonry (see Note A-3.1.9.1.(1)(b)). (See also Article 3.1.9.4. for requirements regarding penetrations by combustible drain, waste and vent piping.)

A-3.1.9. *In the application of Subsection 3.1.9., a building service or structural element is considered to penetrate an assembly if it passes into or through the assembly.*
Firestopping of membrane penetrations and through-penetrations involves installing an assemblage of specific materials or products that are designed, tested and fire-resistance-rated to resist for a prescribed period of time the spread of fire through the penetrations.

A-3.1.9.1.(1)(b) *The intention behind the use of the term "cast in place" is to reinforce that there are to be no gaps between the building service or penetrating item and the membrane or assembly it penetrates. The term" cast in place" describes a typical means of firestopping for a service penetration through a concrete slab or wall.*

Summary

- Firestopping is required for all building services or structural element penetrations through a rated assembly.
- In Canada, the fire test method to determine firestop ratings is CAN/ULC-S115.
- Base requirement (unless modified elsewhere) is for firestop system to have F-rating not less than the required fire resistance rating of the fire separation. The basic requirement is that the firestop system must have an F-rating that is equal to or higher than the needed fire resistance rating of the fire separation.
- Cast-in penetrating item can be accepted without firestopping if it's metallic or masonry, and there must be no gaps. (revised in NBC 2020 edition)

Penetrations of fire walls, or of floor above a parkade

3.1.9.1. Firestops (General Requirements)

(2) *Except as permitted in Sentence (6), penetration of a firewall or a horizontal fire separation that is required to have a fire-resistance rating in conformance with Article 3.2.1.2. shall be sealed at the penetration by a firestop that, when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," has an FT rating not less than the fire-resistance rating for the fire separation.*

(6) *Service equipment penetrations through a horizontal fire separation having a fire-resistance rating as described in Sentences (2) and (3) that are contained within the cavity of a wall above and below the horizontal fire separation are permitted to be sealed at the penetration by a firestop that, when*

subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," has an F rating not less than the fire-resistance rating for the fire separation.

Summary

- Penetration of a fire wall or a floor above a parkade must have firestopping with an FT rating.
- Penetrations of such a floor can have only an F rating if the penetration is concealed within the cavity of a wall above and below the floor. (revised in NBC 2020 edition)

Joints within and between fire separations

3.1.8.3. Continuity of Fire Separations

(2) *Except as provided in Sentence (5), the continuity of a fire separation having a fire-resistance rating that abuts another fire separation, a floor, a ceiling, or a roof shall be maintained by a firestop conforming to Sentence (3). (See Note A-3.1.8.3.(2).)*

(3) *The firestop required in Sentence (2) shall have an FT rating not less than the fire-resistance rating of the abutting fire separation when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems."*

(5) *Joints between ceilings and walls, between floors and walls, and between walls at corners need not comply with Sentences (2) and (4) where such joints consist of gypsum board that is attached to framing members and arranged as to restrict the passage of flame and smoke through the joints.*

Summary

- The juncture of any two fire rated assemblies must have a fire resistance rated joint system (joint firestop). (revised in NBC 2020 edition)
- Joint firestopping must provide an FT rating not less than the rating of the abutting fire separation (wall or floor), as tested per CAN/ULC-S115. (revised in NBC 2020 edition)
- Gypsum board to gypsum board joints in rated assemblies need not use a listed firestop system where the joints restrict the passage of flame and smoke. The City of Regina understands this to mean that the joints are mudded/taped or fire taped.

Curtain wall perimeter joint

3.1.8.3. Continuity of Fire Separations

(4) *Except as provided in Sentence (5), joints located in a horizontal plane between a floor and an exterior wall shall be sealed by a firestop that, when subjected to the fire test method in ASTM E2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus," has an F- rating not less than the fire-resistance rating of the horizontal fire separation.*

Summary

- The edge-of-slab joint must have a firestop system tested to ASTM E2307, with an F-rating equal to the rating of the floor. (revised in NBC 2020 edition)

Joint firestopping must accommodate movement

A-3.1.8.1.(1)(b) *When choosing products for firestopping, the physical characteristics of the material used at the joints as well as the nature of the assembly and its potential movement should be taken into consideration.*

A-3.1.8.3.(2) *Fire-resistance-rated joint firestop systems can be tested and listed as either static or dynamic. Dynamic joint firestop systems are subjected to movement cycling prior to undergoing fire testing at maximum joint extension. This approach ensures that the fire-resistance rating of the joint firestop system will be maintained even after the joint has cycled through its anticipated range of movement over the service life of the building. Most joints between fire-resistance-rated assemblies, other than those between loadbearing elements, experience some movement over the service life of the building.*

Summary

- Joint firestopping must consider the anticipated range of movement of the joint. Select joint firestopping with the suitable % movement, as indicated in the system listing.

Membrane Penetrations of Fire Rated Assemblies (Outlet boxes)

All Recessed Outlet Boxes

3.1.9.3. Penetration by Outlet Boxes

(3) *Except as provided in Sentence (3), outlet boxes are permitted to penetrate the membrane of an assembly required to have a fire-resistance rating, provided they are sealed at the penetration by a firestop that has an FT rating not less than the fire-resistance rating of the fire separation when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems."*

A-3.1.9.3. *Outlet Boxes. For the purposes of Article 3.1.9.3., outlet boxes include, but are not limited to, electrical boxes, junction boxes, high and low voltage outlets, switches, enclosures for electrical equipment, laundry boxes, and shower diverter.*

Summary

- All boxes recessed in the membrane of a fire rated wall or floor/ceiling must be firestopped with a firestop system providing an FT rating equal to the fire rating of the assembly.
- Some exceptions to the need for firestopping exist, as detailed in 3.1.9.3.(3) (noncombustible only) and 3.1.9.3.(4).

Combustible Recessed Outlet Boxes

3.1.9.3. Penetration by Outlet Boxes

(2) *Combustible outlet boxes are permitted to penetrate the membrane of an assembly required to have a fire-resistance rating, provided they are sealed at the penetration by a firestop that, when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," has an FT rating not less than the fire-resistance rating for the fire separation.*

Summary

- This has the same requirements as 3.1.9.3.(1), (FT-rated firestop) for outlet boxes in general but there are no instances where a combustible outlet box would not need firestopping. (revised in NBC 2020 edition)

Exceptions for Non-Combustible Recessed Boxes

3.1.9.3. Penetration by Outlet Boxes

(1) *Except as provided in Sentences 3.1.9.1.(2) and (3), noncombustible outlet boxes that penetrate a vertical fire separation or a membrane forming part of an assembly required to have a fire-resistance rating need not conform to Sentence (1), provided*

(a) they do not exceed
(i) 0.016 m2 in area, and
(ii) an aggregate area of 0.065 m2 in any 9.3 m2 of surface area, and
(b) the annular space between the membrane and the noncombustible electrical outlet boxes does not exceed 3 mm.

(4) *Outlet boxes on opposite sides of a vertical fire separation having a fire-resistance rating shall be separated by a) a horizontal distance of not less than 600 mm, b) a fire block conforming to Article 3.1.11.7., or c) a firestop installed on each outlet box that has an FT rating not less than the fire-resistance rating of the fire separation when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems."*

Summary

- Gap around a box isn't too large (max 3mm)
- Firestopping of a non-combustible outlet box is not needed if the box meets all of these requirements: Not too big (max size 5"x5", 126 mm x 126 mm)
- They aren't too close in proximity (max 100 sq. in (0.065m2) per 100 sq ft (9.3m2) of wall area
- Boxes are suitably separated on opposite sides of a wall, by either 600 mm measured horizontally, or by fire blocking (e.g. 5-sided gypsum box)
- Boxes that are not suitably separated on opposite sides of walls (even if they meet other requirements) must be firestopped to provide FT-rating (e.g. putty pad used within its listing limits)

Special Rules for Firestopping of 'Membrane-only' Fire Separations

3.1.9.1. Firestops

(3) *Except as permitted in Sentences (6) and (7), penetrations of a fire separation in conformance with Sentence 3.6.4.2.(2) shall be sealed by a firestop that, when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," has an FT rating not less than the fire-resistance rating for the fire separation of the assembly.*

(6) *Service equipment penetrations through a horizontal fire separation having a fire-resistance rating as described in Sentences (2) and (3) that are contained within the cavity of a wall above and below the horizontal fire separation are permitted to be sealed at the penetration by a firestop that, when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," has an F rating not less than the fire-resistance rating for the fire separation.*

(7) *Service equipment penetrations through a horizontal fire separation having a fire-resistance rating as described in Sentence (3) are permitted to be sealed at the penetrations by a firestop that, when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," has an F rating not less than the fire-resistance rating for the fire separation, provided the penetration*

(a) *is contained within the concealed space of a floor or ceiling assembly having a fire-resistance rating,*
(b) *is located above a ceiling membrane that is a horizontal fire separation, or*
(c) *is contained within a horizontal service space conforming to Subsection 3.6.4 that is directly above or below the floor.*

Note: If a 'membrane-only' fire separation is used to complete a fire compartment, there are several restrictions and increased requirements that apply including increased firestopping requirements. See explanation below.

In the NBC, complete fire compartments are achieved in two ways:

1. By providing equivalent vertical fire separations up through any concealed space above required vertical separations (Sentence 3.1.8.3.(1)), or
2. By providing a membrane fire separation where the membrane alone has a sufficient rating to complete the fire compartment (Sentence 3.6.4.2.(2)).

3.1.9.3. Penetration by Outlet Boxes [Through 'Membrane-only' Fire Separations]
(1) *Except as provided in Sentences 3.1.9.1.(2) and (3), noncombustible outlet boxes….*

Note: this Sentence, which is often used to relax firestopping for metal outlet boxes, cannot be used for outlet box penetrations of 'membrane-only' fire separations. This Sentence specifically points users back to Sentence 3.1.9.1.(3). Therefore, electrical boxes through a 'membrane-only' fire separation must be firestopped with a system that has an FT rating equal to the fire separation. The problem is that no known firestop system exists for such a situation.

Summary

- Persons making penetrations through fire separations must know if the separation is a 'membrane-only' fire separation or not. They should coordinate this with the architect. It is important to know this because it significantly affects the firestopping requirements.
- Penetrations of 'membrane-only' fire separations have increased requirements, as they require an FT rating equal to the fire separation, unless relaxations apply (note that the relaxations are new to NBC 2020, and those in Sentence (7) are not clearly written).
- Electrical boxes through a membrane-only fire separation must be firestopped with a system that has an FT rating equal to the fire separation. Currently there is no known firestop system existing for these situations.

Special rules for combustible piping penetrations

Combustible DWV pipes

3.1.9.4. Combustible Piping Penetrations
(4) *Combustible drain, waste and vent (DWV) piping is permitted to penetrate a fire separation required to have a fire-resistance rating or a membrane that forms part of an assembly required to have a fire-resistance rating, provided*
a) except as provided in Clause (b), the piping is sealed at the penetration by a firestop that has an F rating not less than the fire-resistance rating required for the fire separation when subjected to the fire test method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," b) in buildings more than 3 storeys in building height, the piping is sealed at the penetration by a firestop that has an F rating not less than the fire-resistance rating required for the fire separation when subjected to the fire test

method in CAN/ULC-S115, "Standard Method of Fire Tests of Firestop Systems," with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side.

Summary

- Penetrations by combustible DWV pipes are permitted if penetration is firestopped to provide an F-rating at least equal to fire rating of penetrated assembly.
- Penetrations in buildings higher than 3 storeys or higher must have firestopping that has been fire tested to CAN/ULC S-115 using an elevated pressure (50 Pa instead of the "normal" firestop test pressure difference of 2,5 Pa). (revised in NBC 2020 edition)

Combustible water distribution piping

3.1.9.4. Combustible Piping Penetrations

(2) *Combustible water distribution piping is permitted to penetrate a fire separation that is required to have a fire-resistance rating, provided the piping is protected at the penetration with a firestop in conformance with Clause (4)(a) or (b).*

Summary

- Penetrations of combustible water distribution piping are permitted if they are protected the same as DWV pipes (see above)

Penetrations by combustible fire sprinkler pipes

3.1.9.4. Combustible Piping Penetrations

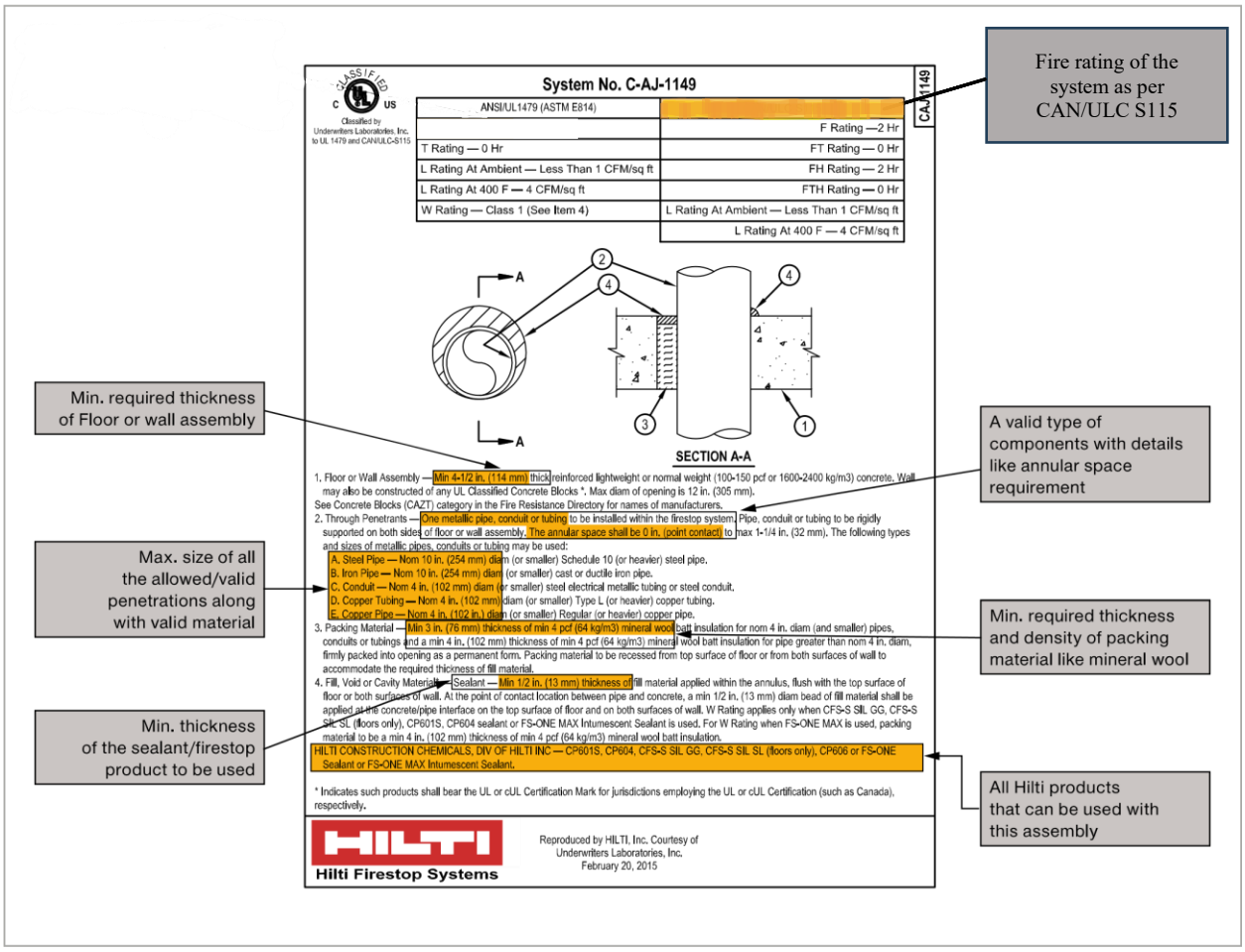
(1) *Combustible sprinkler piping is permitted to penetrate a fire separation provided the fire compartments on each side of the fire separation are sprinklered.*

Summary

- Combustible sprinkler pipes are only allowed to penetrate fire rated assemblies if the space on both sides of the assembly is sprinklered.
- The general requirements for firestopping of all penetrations (3.1.9.1) apply.
- Sprinkler piping provides water distribution, so it's expected that 3.1.9.4.(2) above applies, and thus combustible sprinkler piping should be firestopped as mandated for other combustible piping (F-rating, 50Pa fire test pressure if penetrating buildings higher than three storeys)

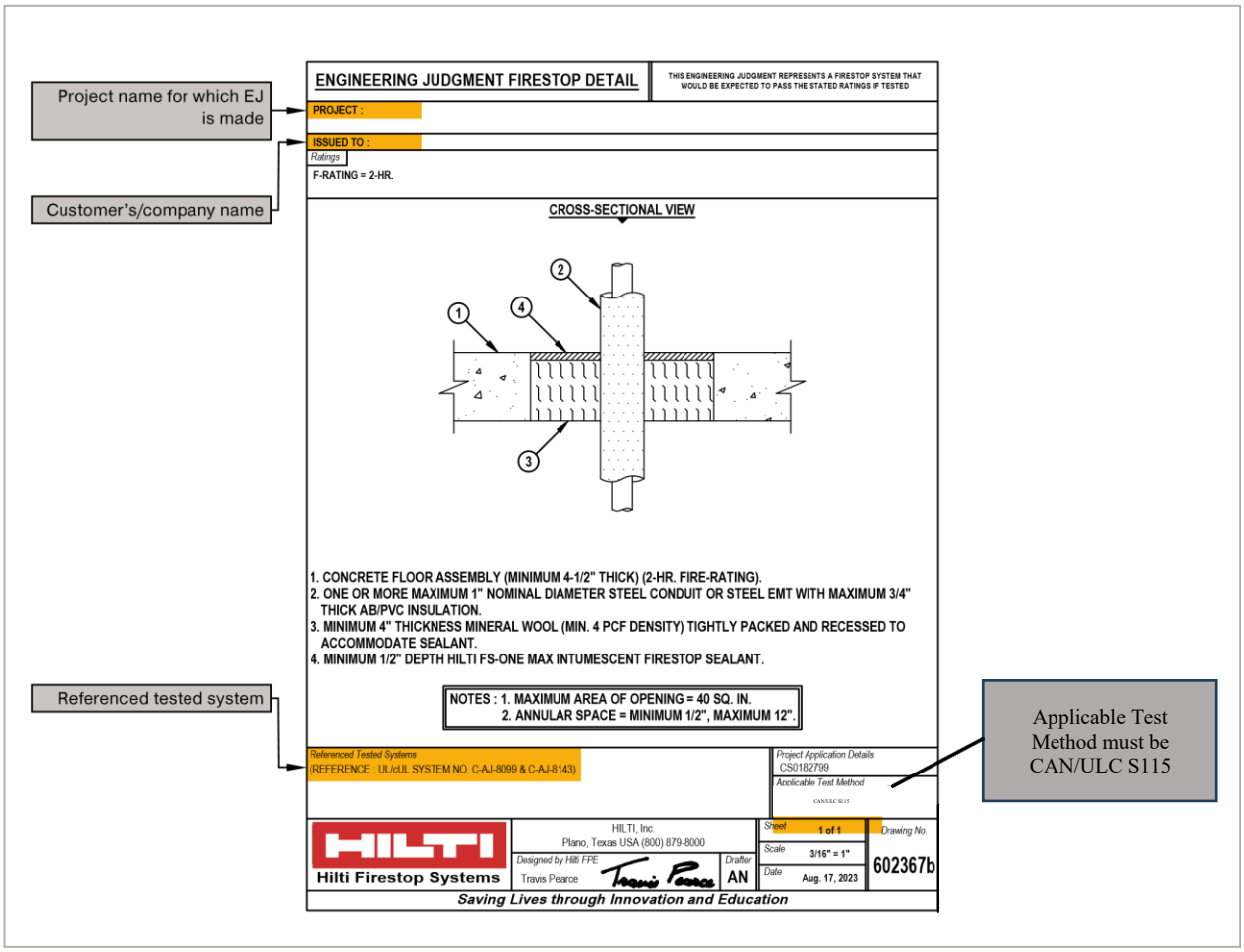
Listed Firestop Systems

A CAN/ULC listed firestop system contains complete information about a tested system. It shows a typical assembly of all involved components and parameters with their detailed description. These are complete documents and provide a list of all applicable product ranges for the given assembly. These documents are to be provided to the building inspector. Below is a sample System Sheet from one of several manufacturers of fire stopping products.



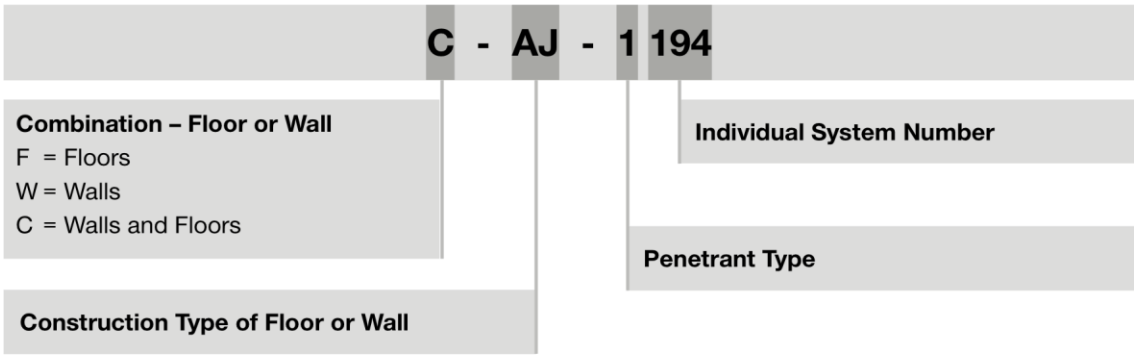
Engineering Judgment

An engineering judgment (EJ) shall be provided by a firestop manufacturer for a single application or for an entire project to account for any unique applications that a contractor encounters which has not been listed.



Penetration Nomenclature

Firestop systems are identified by an alphanumeric identification system. The first letter identifies the type of assembly being penetrated, i.e. walls, floors or both. The second letter identifies the assembly material being penetrated and the numeric component identifies the penetrating item in a sequential format.



Second letter(s) provide more info on wall/floor:

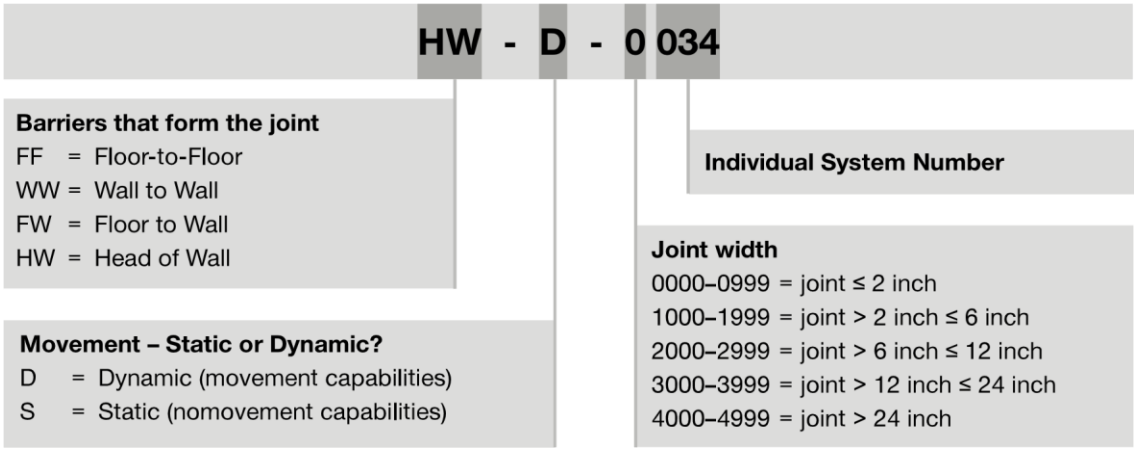
- **A:** Concrete floors ≤ 5 inches thick
- **B:** Concrete floors > 5 inches
- **C:** Framed floors – floor/ceiling assemblies
- **D:** Steel deck construction
- **J:** Concrete or masonry walls ≤ 8 inches thick
- **K:** Concrete or masonry walls > 8 inches thick
- **L:** Framed walls – gypsum wallboard assemblies

1st digit describes the penetrating item(s):

- **0:** Blank openings
- **1:** Metal Pipe, conduit, or tubing
- **2:** Non-metallic pipe, conduit or tubing
- **3:** Cables
- **4:** Cable trays
- **5:** Insulated pipes
- **6:** Miscellaneous electrical (busways)
- **7:** Miscellaneous mechanical (ductwork)
- **8:** Groupings of penetrations, including any combination of items listed above

Joint Nomenclature

This system is identified by an alphanumeric identification system. The first two letters identify the type of joint system while the third letter is either a S or D. The S (static) signifies joint systems that do not have movement capabilities. The D (dynamic) signifies joint systems that do have movement capabilities. The numeric component uses sequential numbers to identify the nominal width of the joint systems.



For more information on Building Permits, Building Safety or Zoning Information, please visit Regina.ca or contact Service Regina.