Structural Fire-Resistance, Fire-Separations, Firestopping & Code Requirements

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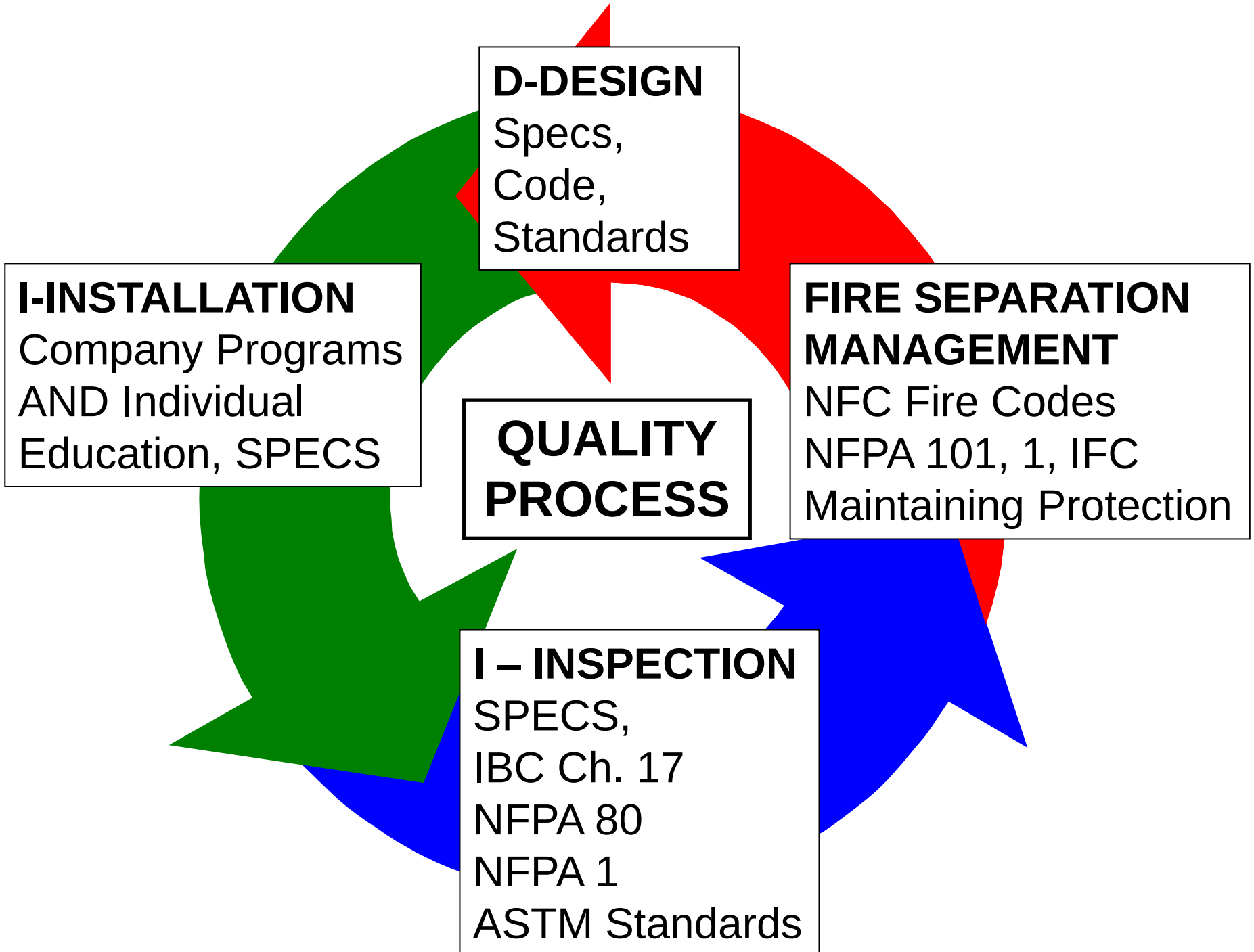
September 21, 2023

FCIA

NFCA®
National Fireproofing Contractors Association

CTI
CREATIVE TECHNOLOGY INC.
FIRE PROTECTION
CONSULTING AND TRAINING

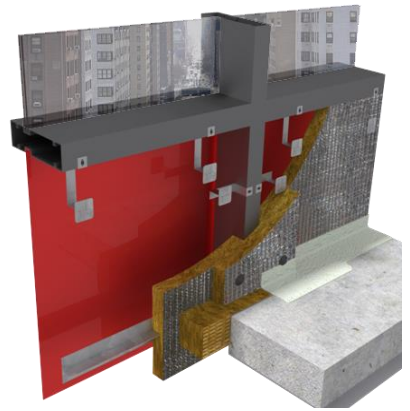

D-DESIGN
Specs,
Code,
Standards
I-INSTALLATION
Company Programs
AND Individual
Education, SPECS
FIRE SEPARATION
MANAGEMENT
NFC Fire Codes
NFPA 101, 1, IFC
Maintaining Protection
QUALITY
PROCESS
I – INSPECTION
SPECS,
IBC Ch. 17
NFPA 80
NFPA 1
ASTM Standards

“FCIA’s DIIM” – Fire-Resistance too….

- Fire Resistance & Smoke Resistant Systems
  - Properly ***Designed*** and Specified Assemblies
    - **APPLIED FIREPROOFING 07 81 00**
    - **FIRESTOPPING – 07 84 00**
    - Specification – ***RSW, CCS***
  - ***Tested and Listed Systems*** –
    - **CAN/ULC-S101,**
    - **CAN/ULC-S115**
    - **CAN/ULC-S112, S104, ASTM E2307, E2837, E3037 - Movement, UL1479/2079 - Smoke (L), Water (W)**
  - Professional ***Installation*** –
    - NFCA/FCIA Member, ULC/UL Qualified Contractors, FM 4991 Approved;
    - NFCA Member Accredited Contractors
  - Properly ***Inspected*** –
    - ASTM E605/E736 SFRM, ASTM DRAFT IFRM by IAS AC 291 Accredited Inspection Agencies
    - ASTM E2174 / E2393
    - NFCA Fireproofing Exams; ULC, FM & IFC Firestop Exams
    - ***Maintained*** – Annually – by NFCA & FCIA Members – **National Fire Code of Canada**
  - **http://www.constructioncanada.net/firestopping-and-effective-compartmentation/**

Structural Fire-Resistance, Fire Separations, Firestopping & Code Requirements

Introductory Comments

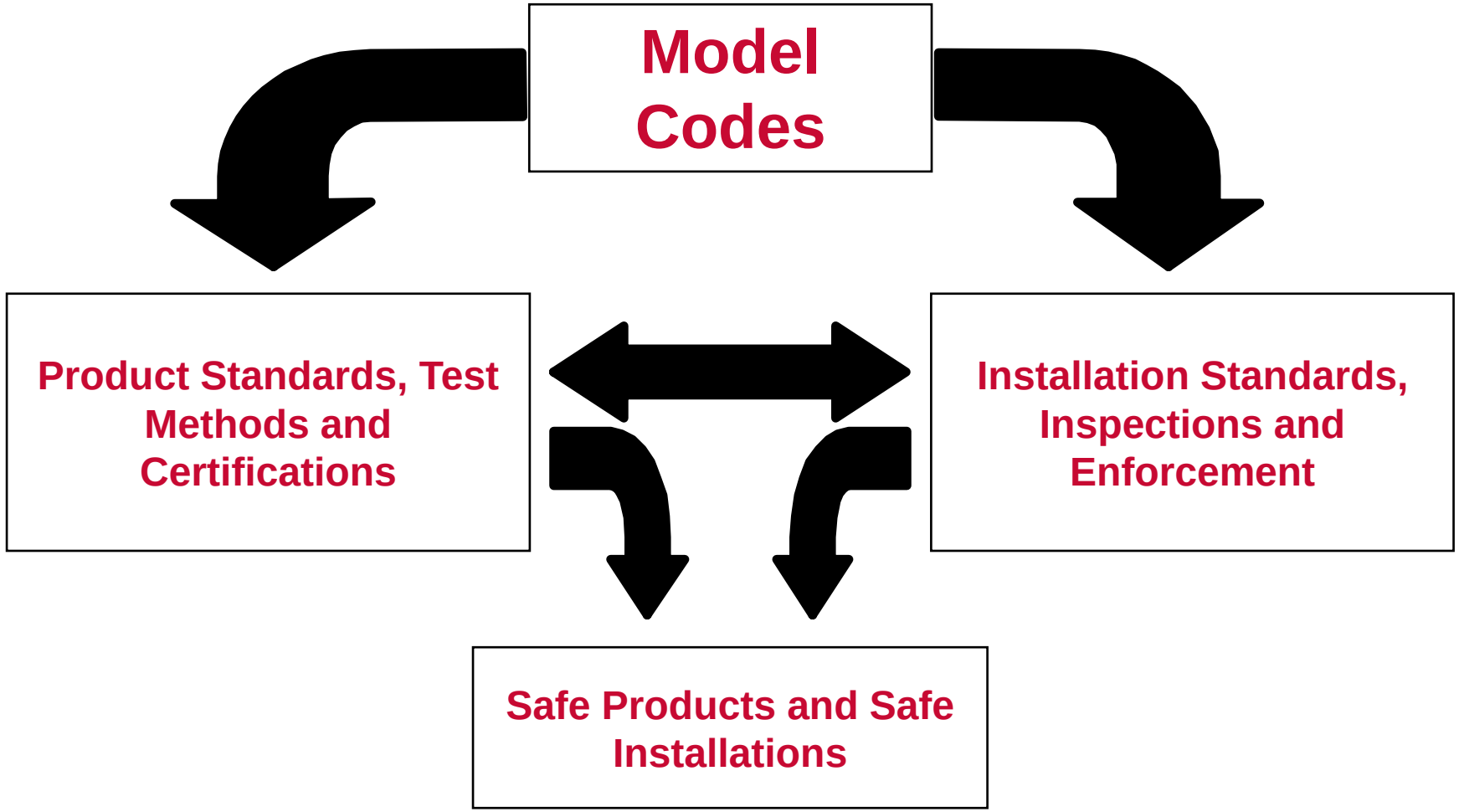


OCF/Thermafiber Graphics

Adler Photo

Donalco Western Photo

The US and Canadian Safety System



Fire Separations, Firestopping and Code Requirements

Canadian Building and Fire Codes

Building & Fire Code Requirements

- **Canadian Codes – More from Andre later….**
  - **National Building Code of Canada**
  - **National Fire Code of Canada**
- International Code Council Codes –
  - New and Existing Buildings – International Building Code – Chapter 7
  - Maintenance – International Fire Code – Chapter 7
- NFPA 5000 / 101 – Chapter 8
- UAE Fire and Life Safety Code – Chapter 1, Section 21
- Saudi Fire and Life Safety Code
- Other Worldwide Codes
- ***Minimum Requirements*** – ***Construction*** & ***Maintaining Protection***

Building & Fire Code Requirements

National Building Code of Canada (NCC)

National Fire Code of Canada (NFC)

- **NEW PROCESS STARTING…**
- **OLD -- The Canadian Commission on Building and Fire Codes (CCBFC) oversees the code development system**
  - Volunteers appointed by NRC
  - Regulators, construction industry & public interest
  - 2020 Cycle Finished…published November 2010
  - 2025 Cycle Underway…

Why Fire Resistance in Buildings?
Code Requirements Meet Objectives…

OS1 Fire Safety

An objective of this Code is to **limit the probability that, as a result of the design or construction of the building, a person in or adjacent to the building will be exposed to an unacceptable risk of injury due to fire.** The risks of injury due to fire addressed in this Code are those caused by—

OS1.1 – fire or explosion occurring

OS1.2 – fire or explosion impacting areas beyond its point of origin

OS1.3 – collapse of physical elements due to a fire or explosion

OS1.4 – fire safety systems failing to function as expected

OS1.5 – persons being delayed in or impeded from moving to a safe place during a fire emergency

Why Fire Resistance

OS2 Structural Safety

An objective of this Code is to limit the probability that, as a result of the design or construction of the building, a person in or adjacent to the building will be exposed to an unacceptable risk of injury due to **structural failure**. The risks of injury due to structural failure addressed in this Code are those caused by—

OS2.1 – loads bearing on the building elements that exceed their load bearing capacity

OS2.2 – loads bearing on the building that exceed the load bearing properties of the supporting medium

OS2.3 – damage to or deterioration of building elements

OS2.4 – vibration or deflection of building elements

OS2.5 – instability of the building or part thereof

OS2.6 – collapse of the excavation

National Building Code Requirements

Fire-Resistance Structural & Compartmentation Codes
NBC - Division A, Part 1, Section 1.4.1.2

- ***Fire resistance rating*** *means the time in minutes or hours that a material or assemblies of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria, or as determined by extension or interpretation of information derived therefrom as prescribed in this Code.*

- ***ULC-S101*** **–** *Standard Methods of Fire Endurance Tests of Building Construction Materials*

Structural Fire-Resistance, Fire Separations, Firestopping & Code Requirements

Standards – ULC-S101 – ULC-S115

The Raymond Group Photo

Firestop Solutions Photo

Adler Photo

Fire-Resistance Code Requirements – NBC

- **Products Become Systems Based on Testing**
  - **Columns, Beams, Floors, Roofs & Walls** – Structural Fire Resistance
    - **CAN/ULC-S101**, ASTM E119 / UL 263
  - **Fire Separations (& Fire Barriers, Smoke Barriers)**
    - **CAN/ULC-S101**, ASTM E119 / UL 263

Great Northern Insulation Photo

  - **Firestopping – CAN/ULC-S115**, ASTM E814 / UL 1479, ASTM E1966 / UL 2079, E2307, E2837, **…**test methods…"
  - **Swinging/Rolling Fire Doors** – **CAN/ULC-S104**, **S105 Frames**, **S113 for 20 minute wood doors**, UL 10B/C / NFPA 252, UL 1784

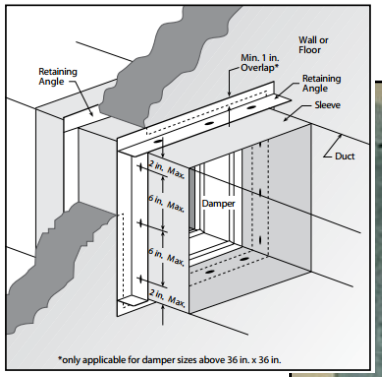
Fire-Resistance Code Requirements – NBC

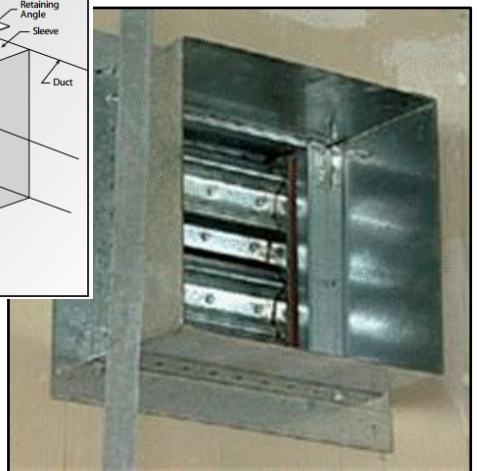
- **Fire Rated Glazing** – **CAN/ULC-S106**, **S101**, **S104**, UL 9 / NFPA 257, ASTM E119 / UL 263

TGP Photo

- **Fire/Smoke/Ceiling Dampers** – **CAN/ULC-S112**, **S112.1**, **S112.2**, UL 555, UL 555S, UL 555C

- **SYSTEM Testing = Suitability Statement**

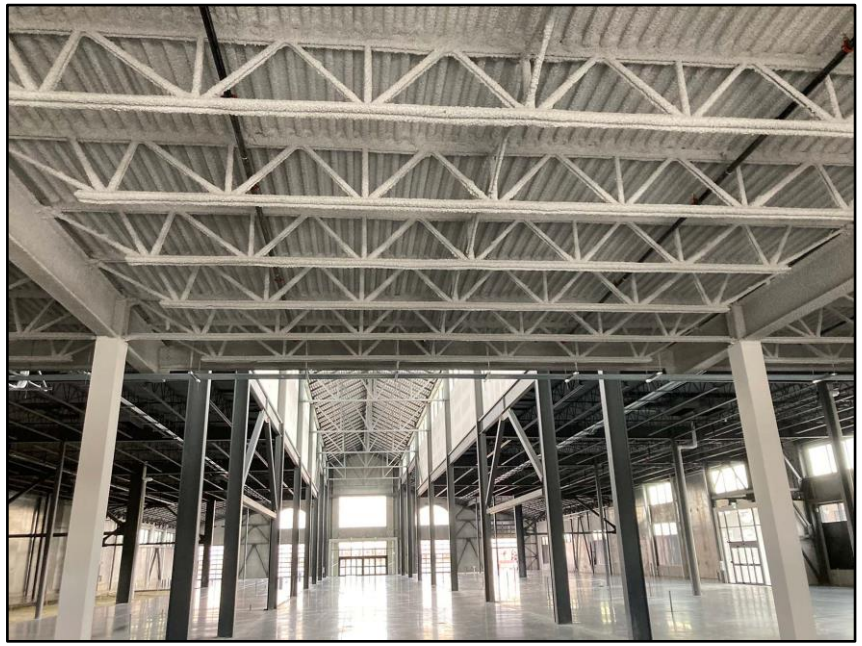




Greenheck Photos

Fire-Resistance Code Requirements – NBC

- **Products Become Systems Based on Testing**
  - **Columns, Beams, Floors, Roofs & Walls** – Structural Fire Resistance
  - **CAN/ULC-S101,** ASTM E119 / UL 263

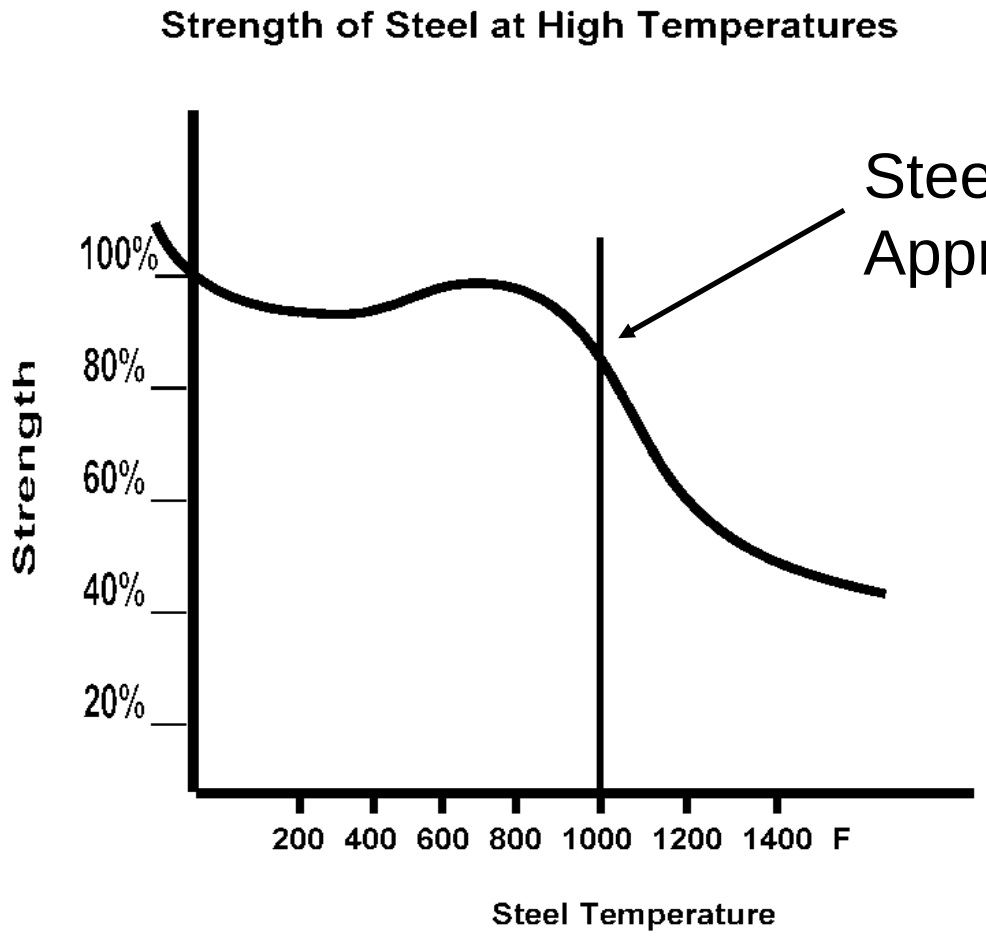


Beyond Thermal Photo

Adler Photo

Aries Photo

Why Structural Protection & CAN/ULC-S101?



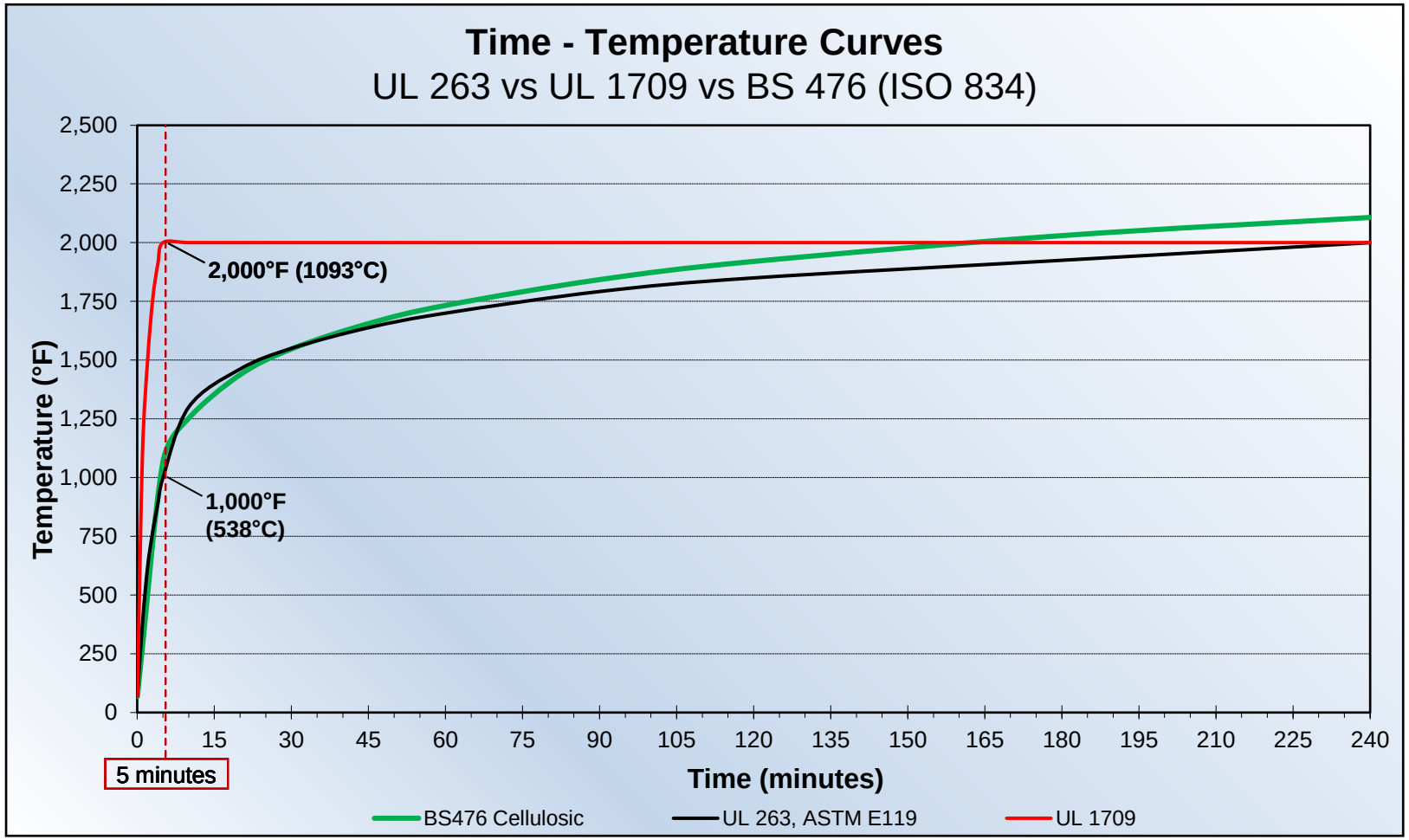
Steel Temperature Approaches 1000°F (538°C)

Gradual loss of load carrying capacity

World-Wide Fire Test Standards
Steel & Concrete….

- Cellulosic
  - CAN/ULC-S101
  - UL 263
  - ASTM E119
  - BS 476 Cellulosic (ISO 834)
  - NFPA 251(withdrawn)
- Hydrocarbon
  - UL 1709
  - ASTM E1529

Global Time – Temperature Curves



ULC-S101 / UL 263 / ASTM E119
Cellulosic
- Office buildings
- Hospitals
- Schools

UL 1709 / ASTM E1529
Hydrocarbon
- Oil refineries
- Petrochemical plants
- Li Batteries???

BS 476 / ISO 834
Cellulosic
- Office buildings
- Hospitals
- Schools

Columns

- Sample size – Minimum 2.75 m (9 ft)
- Most often tested unloaded

UL Image

UL Image

UL Image

Conditions of Acceptance – Columns

- **538ºC (1000ºF) / 649ºC (1200ºF)**

OR

Support load if tested load bearing

UL Image

UL Image

Beams

- Sample size – Minimum 3.65 m (12 ft)
- Load applied – Per design

UL Image

UL Image

UL Image

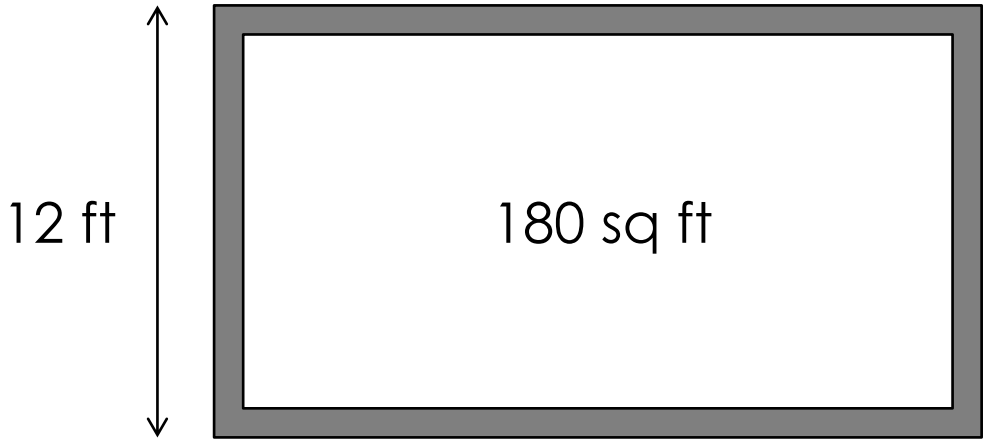
UL Image

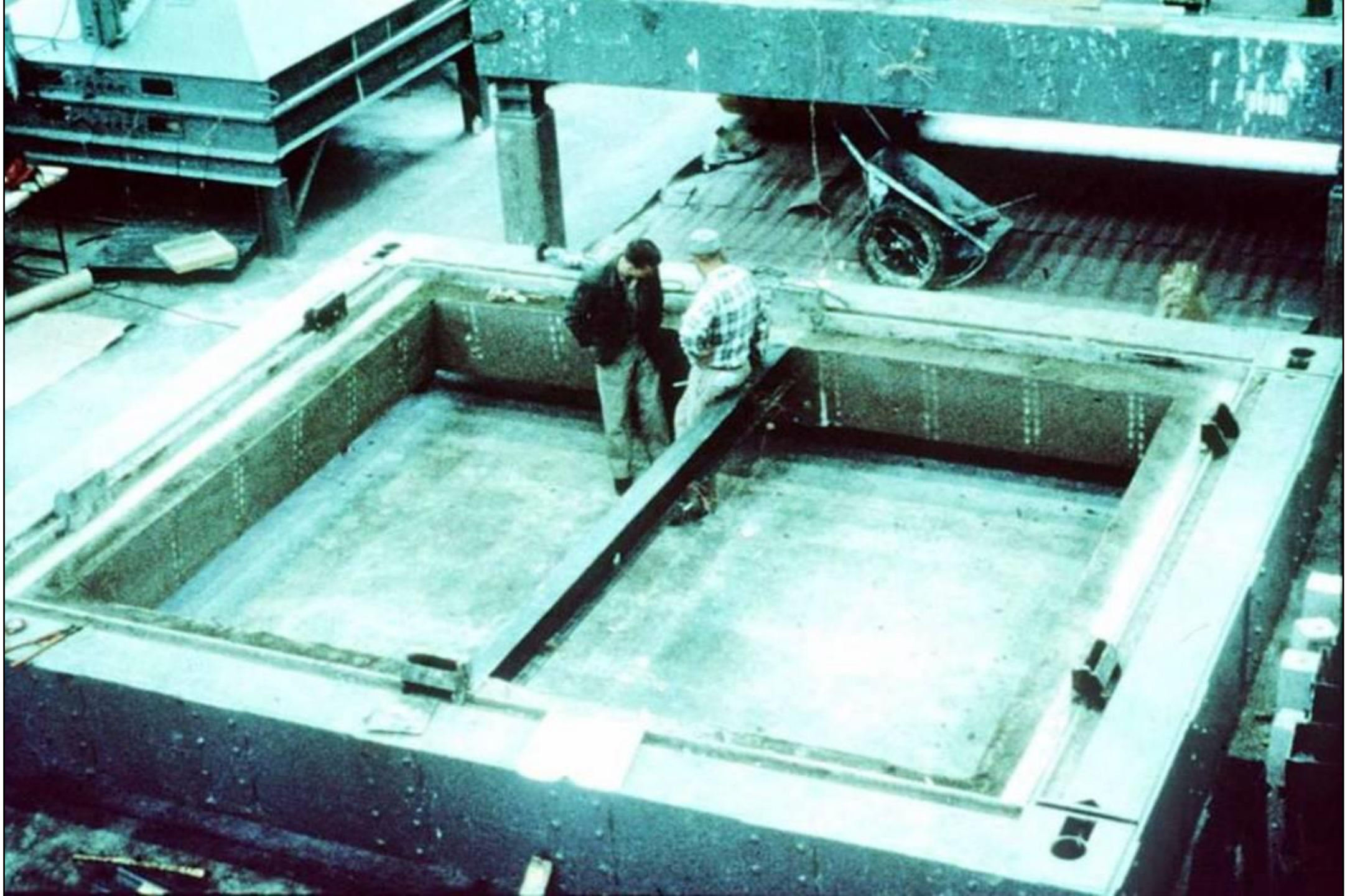
Conditions of Acceptance – Beams

- Support load
- 593ºC (1100ºF) / 704ºC (1300ºF)

Floor/Ceiling or Roof/Ceilings

- Sample size – 16.7 sq m (180 sq ft) / 3.65 m (12 ft)
- Load applied – Per design





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Conditions of Acceptance
Floor/Ceilings or Roof/Ceilings

- Support load
- Flame passage
- 140ºC (250ºF) / 180ºC (325ºF)
- Support temperatures

UL Image

UL Image

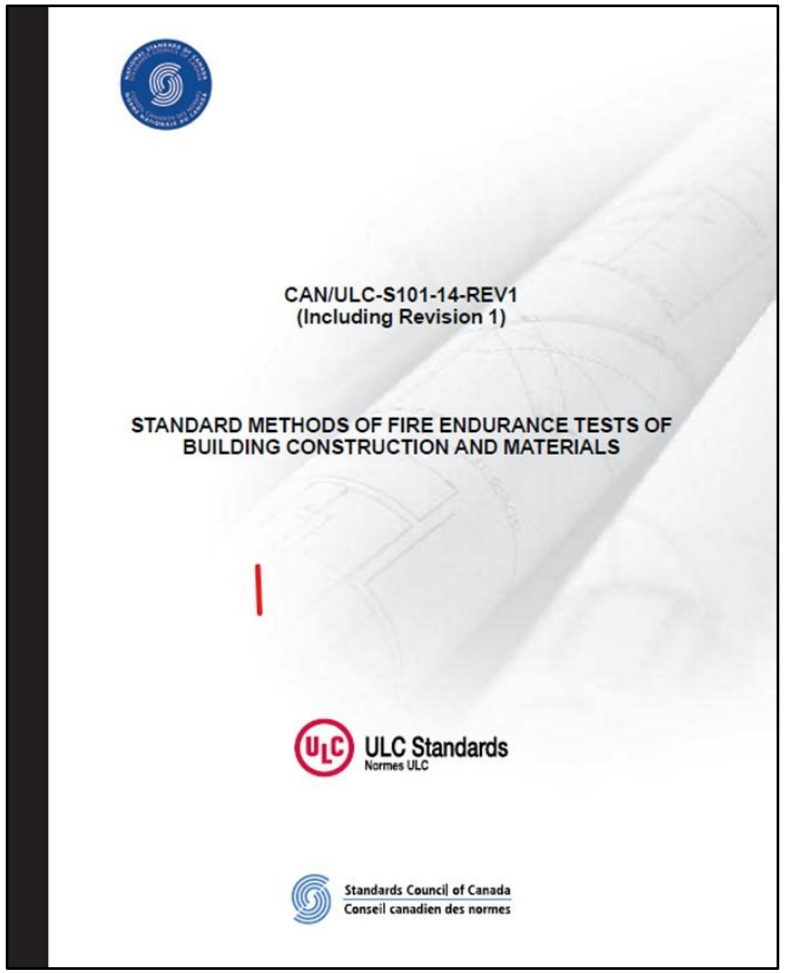
Canada Standards Development Process

- Administered by ULC
  - Proposals initially developed and discussed through Task Groups focused on standard in question
  - Final voting and approval by ULC Standards Committee on Fire Tests
  - Audit Committee ensures processes followed
  - As of April, 2022, Standard designation will include year of publication: CAN/ULC-S115:2018A

Significant Changes in ULC-S101:2014 - Rev 2019

- Scope excludes durability requirements
- No other significant changes

Adler Photo



Common Question 1 - IFRM

- Is it necessary to leave space around a building element which is protected with an intumescent fire-resistive material (IFRM)?
  - **Yes, an intumescent fire-resistive material need space for free expansion in order to develop the proper char formation.**
  - The UL Guide Information for Fire-resistance Ratings – ANSI/UL 263 states: "Unless otherwise detailed in the individual designs, mastic and intumescent coatings are tested without any covering adjacent to the tested member that might interfere with the expansion of the coating. The effect on the fire-resistance rating of steel members (beams, columns, etc.) caused by any covering that would interfere with the expansion of a mastic and intumescent coating during a fire has not been investigated. Contact the manufacturer for their required clearance around structural members protected with mastic and intumescent coatings."

Common Question 2 – SFRM or IFRM

- The building configuration prevents the application of protection on one side of a beam or column. What can be done to properly protect this element?
  - Tested and listed designs from UL and other are tested with protection on all exposed sides. As such, some type of protection is needed.
  - Mfrs have developed a number of creative solutions, typically ending in an Engineering Judgment.
  - **Contact your manufacturer when the situation develops.**

Common Question 3 – LARGE/SMALL SCALE

- Does “small-scale” testing have a place within fire-resistive construction?
  - Generally no! ASTM E119 and UL 263 require min sample sizes to allow for realistic deflection during the fire tests. “Small scale” testing does not allow for this deflection resulting in a less critical test. Also, small-scale assemblies typically can not be loaded as required by the standards.
  - “Small-scale” testing is used very judicially to ***supplement*** full-scale testing.
    - If “small-scale” testing is suspected, ASK THE QUESTION!!!

Firestopping for Continuity
Products become SYSTEMS Based on Testing

- **'Field Erected Construction…Tested to…'**
  - Standards – **CAN/ULC-S115**, ASTM E814 / UL 1479, UL 2079, ASTM E1966, ASTM E2837, ASTM E2307, FM 4990
    - F Rating – Flame
    - FT Rating – Temperature
    - FH Rating – Hose
    - FTH Rating – Flame, Temp & Hose
    - L Rating (Optional) – Smoke
    - W Rating (Not in ULC Std) – Water
    - M Rating (Not in ULC Std) – Movement

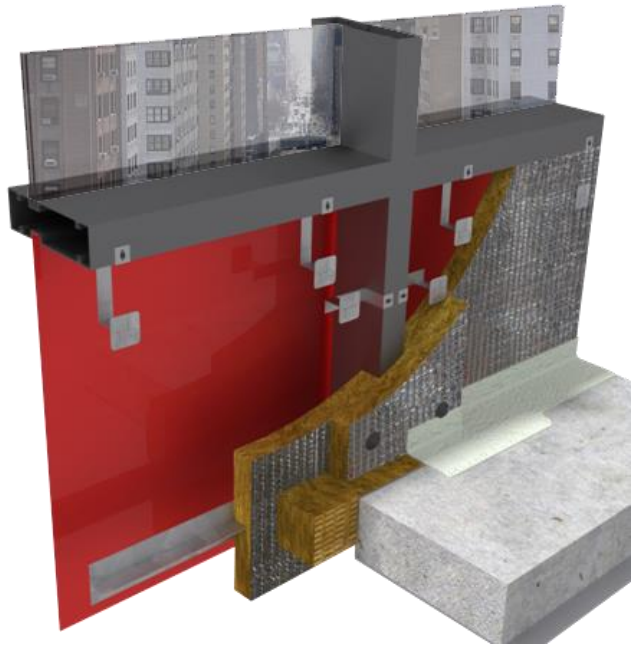
3M Photo

Significant Changes in ULC-S115:2018

- Replaces ULC-S115:2011–Rev 2016
- New requirements for placement of thermocouples (TC) for membrane penetrations
  - Min two TCs placed opposite membrane penetration and two TC near top of wall

Significant Changes in ULC-S115:2018 Cont.

- New Section 9 covering Perimeter Joint Firestop Systems
  - 9.1.1 Perimeter Joint Systems shall be tested in accordance with the requirements in ASTM E2307, Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-storey Test Apparatus.



OCF/Thermafiber Graphics

Significant Changes in ULC-S115:2018 Cont.

- ULC-S115 makes minor adjustments in the test procedures described in ASTM E2307
  - Protection and Conditioning requirements of ULC-S115 also apply
  - After 30 minutes, the furnace temperature curve shall follow ULC-S101
  - Differential pressure shall be 2.5 Pa at a distance of 305 mm below the horizontal assembly (i.e. the 50 Pa pressure does not apply)
- For joint firestop systems, allowance added deforming the TC pad and reducing it’s size based on unique characteristics of the system

Significant Changes in ULC-S115:2018 – Rev 2023

- Replaces ULC-S115:2018
- Revised differential pressure requirements for Perimeter Joint Firestop System
  - Deletes reference to Section 5.5.5 of ULC-S115 which states pressure requirements for penetration firestop systems

Significant Changes in ULC-S115:2018 – Rev 2023 Cont.

- Net impact is that the differential pressure is now required to be in accordance with ASTM E2307 instead of ULC-S115, making for a less severe fire test

Affinity Firestop Photo

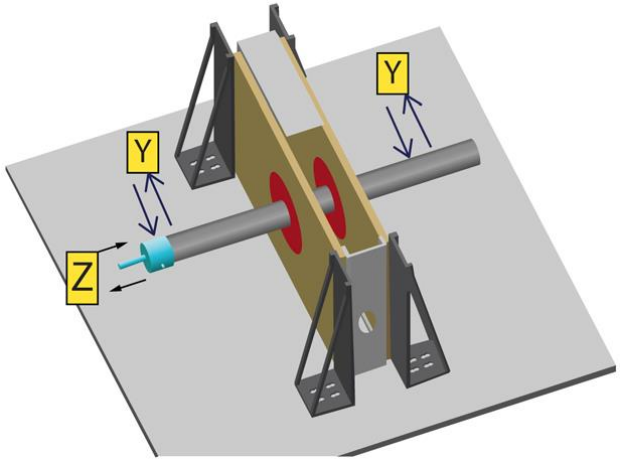
Future Changes to ULC-S115:2018 – Rev 2023

- ULC-S115:2018 open for proposed changes
- FCIA has submitted seven proposals…
  - Adjusts length of penetrating item on exposed and unexposed sides for consistency with ASTM E814 / UL 1479
  - Adjusts length of penetrating item on exposed side for partially insulated penetrating item for consistency with ASTM E814 / UL 1479
  - Addition of optional Water Leakage Test to document procedure currently being used to establish L Ratings
  - Addition of Environmental Exposure testing on intumescent firestopping materials consistent with ASTM E814 / UL 1479

Future Changes to ULC-S115:2018 – Rev 2023 Cont.

- Clarification of the method of testing membrane-penetrations in wall assemblies. Differentiates procedure for recessed boxes vs other membrane-penetrations.
- Addition of Cotton Waste test for determining flaming on unexposed side of test assembly
- Addition of optional Movement Cycling in accordance with ASTM E3037 to document procedure currently being used to establish M Ratings

- Preliminary review completed
- Next step - Resolve Negatives



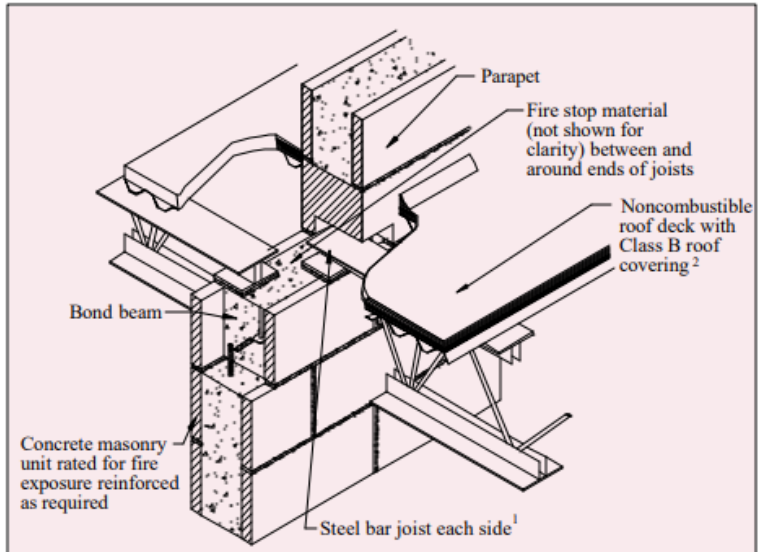
ASTM Image

Fire Separations, Firestopping and Code Requirements

Canadian Building and Fire Codes

National Building Code Requirements

- Fire-Resistance-Rated Assemblies – NBC Defined Terms
  - *Fire Wall*
  - *Fire Separation*



Notes:
1. Joists may be aligned if bond beam width permits proper installation of firestop material between joist ends. Stagger joists (as shown) as necessary.
2. 30 in. (762 mm) parapet is required unless all conditions are met: a) roof deck is noncombustible; b) roof covering is Class B (minimum); and c) no openings within 4 ft (1.22 m) of fire wall.
3. Top chord bearing wood joists similar.

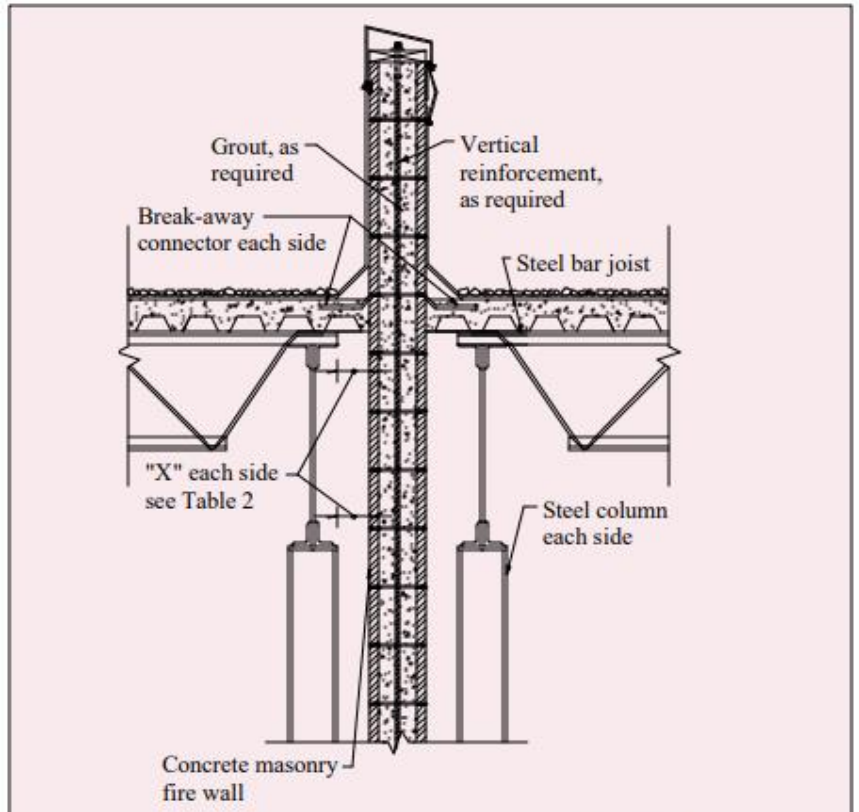
Figure 2—Laterally Supported Loadbearing Fire Wall

NCMA-TekAid Photo

Gypsum.org Photo

National Building Code Requirements Cont.

- ***Firewall*** means a type of *fire separation* of *noncombustible construction* that subdivides a *building* or **separates adjoining *buildings*** to resist the spread of fire and that has a *fire-resistance rating* as prescribed in this Code and has **structural stability** to remain intact under fire conditions for the required fire-rated time.



Note: If detailed without breakaway connectors, fire wall would be nonloadbearing freestanding or cantilevered.

Figure 3—Laterally Supported Nonloadbearing Fire Wall

NCMA-TekAid Photo

National Building Code Requirements Cont.

- Continuity of Firewalls
- [F03-OS1.2] Applies to portion "A *firewall* shall extend from the ground continuously through, or adjacent to**, all *storeys* of a *building* or *buildings* so separated …**
- ***Terminates –***
  - @ Reinforced Concrete Roof Slab – 1hr/2hr; 2hr/4hr
  - 150 mm above roof – 2 hr
  - 900 mm above roof – 4 hr

National Building Code Requirements Cont.

- *Fire Separation* - A construction assembly that acts as a barrier against the spread of fire.
  - *Fire-resistance-rated* or Non-rated
  - Combustible or Noncombustible Construction
  - Horizontal or Vertical
  - Load Bearing or Nonload Bearing
  - Continuity
    - Outside wall to outside wall
    - Floor to floor/roof above
  - Protected openings, penetrations and joints

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.7.5 – Rating of Supporting Construction

1) Except as permitted by Sentence (2) and by Articles 3.2.2.20. to 3.2.2.92. for mixed types of construction, all *load bearing* walls, columns and arches in the ***storey* immediately below a floor or roof assembly required to have a *fire-resistance rating* shall have a *fire-resistance rating* not less than that required for the supported floor or roof assembly.**

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.8.1 – General Requirements

1) Any wall, partition or floor assembly required to be a **fire separation shall**
   a) except as permitted by Sentence (2), be constructed as ***continuous*** element, and
   b) as required in this part, have a fire-resistance-rating as specified (see appendix A).
2) Openings in a *fire separation* shall be protected with closures, shafts or other means in conformance with Articles 3.1.8.4-19.

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section A-3.1.8.1.(1)(b)

- Although a *fire separation* is not always required to have a fire-resistance rating, the **fire separation** should act as a **barrier to the spread of smoke and fire** until some response is initiated.
- **If the fire-resistance rating of a fire separation is waived** on the basis of the presence of an automatic **sprinkler system**, it is intended that the ***fire separation will be constructed so that it will remain in place and act as a barrier against the spread of smoke for a period of time*** until the sprinklers have actuated and controlled the fire.
- **ULC-S115** Listed Systems **– NOTE: Fire & Smoke = L-Rating???**

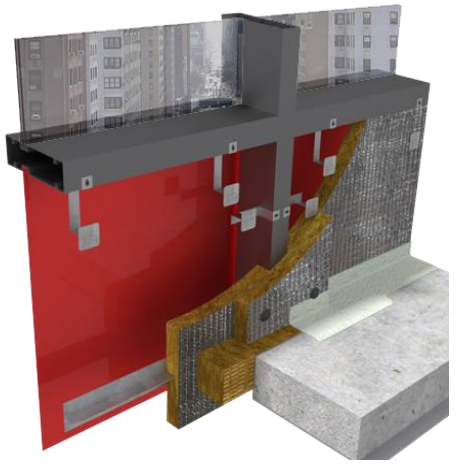
National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 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-storey Test Apparatus,” has an F rating not less than the *fire-resistance rating* of the horizontal *fire separation*.

- New for the 2020 NBC
- Consistent with US based requirements

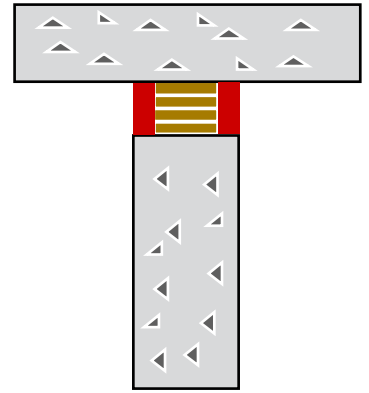


OCF/Thermafiber Graphics

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section A-3.1.8.3(2) – Continuity



- The **continuity of a *fire separation*** with a fire-resistance rating is maintained by **installing a firestop system** at the juncture where it abuts another fire separation, a floor, a ceiling, a roof assembly. The continuity of a fire separation without a fire-resistance rating that abuts another fire separation is maintained by filling all openings at the juncture of the assemblies with a fire-resistance-rated joint firestop system that will ensure the integrity of the fire separation at that location.

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.1 – Penetrations

1) Except as required by Sentences (2) to (7), and Article 3.1.9.1 penetrations of a *fire separation* or 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 **ULC-S115, "Fire Tests of Firestop Systems,"** has an F rating not less than the 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

- **Both provisions revised for 2020. Item a) previously rating related to closures. Item b) now limited to noncombustible penetrants.**

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.1 – Penetrations

2) Except as permitted in Sentence (6), penetrations of a *fire wall* or 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 CAN/ULC-S115, “Fire Tests of Firestop Systems”, has an FT Rating not less than the *fire-resistance rating* of the *fire separation*.

Pro Firestop Photo

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.1 – Penetrations

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

National Building Code Requirements Cont.

Compartmentation Codes

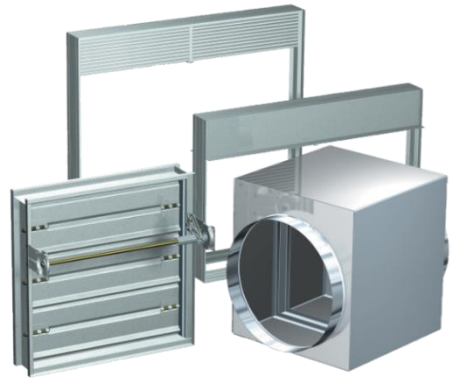
NBC - Division B, Part 3, Section 3.1.9.1 – Penetrations

4) Sprinklers are permitted to penetrate a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* without having to meet the *firestop* requirements of sentences (1) to (3), provided the annular space created by the penetration of a fire sprinkler is covered by a metal escutcheon plate in accordance with NFPA 13, “Installation of Sprinkler Systems”.

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.1 – Penetrations



5) **Unless specifically designed with a *firestop, fire dampers* are permitted to penetrate a *fire separation* or a membrane** forming part of an assembly required to have a *fire-resistance rating* without having to meet the *firestop* requirements of Sentences (1) to (3), provided the *fire dampers* is installed in conformance with NFPA 80, “Fire Doors and Other Opening Protectives”.

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.1 – Penetrations

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*.

- 2010 NBC onwards…

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.1 – Penetrations

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 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*, 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

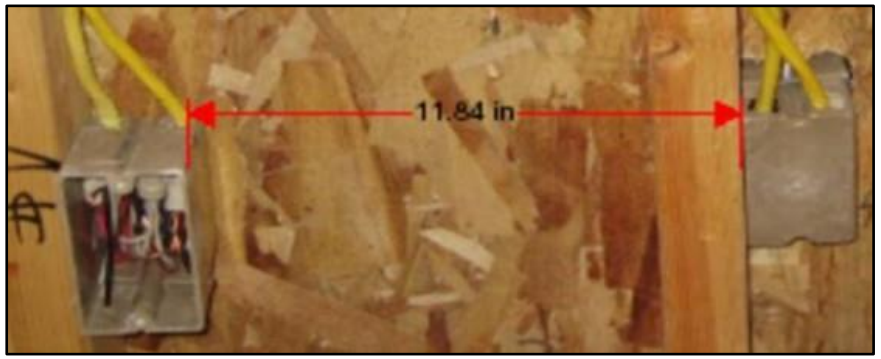
c) is contained within a *horizontal service space* conforming to Subsection 3.6.4.2 (horizontal service space) that is directly above or below the floor.

- 2010 NBC onwards…

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.3 – Penetrations by Outlet Boxes



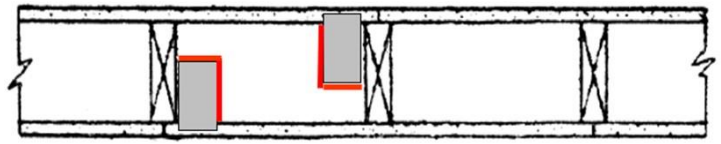
2) *Combustible* outlet boxes are permitted to penetrate the membrane of an assembly required to have a *fire-resistance rating*, provided they are sealed at the penetration by a *firestop* that, when subjected to the fire test method in CAN/ULC-S115, “Standard Method of Fire Tests of Firestop Systems,”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

- 2020 NBC onwards. Removes allowance for unprotected nonmetallic outlet boxes.

National Building Code Requirements Cont.

Compartmentation Codes

NBCC - Division B, Part 3, Section 3.1.9.3 – Penetrations by Outlet Boxes



2) 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.”

- Item c) 2020 NBC++. Allows protection in lieu of spacing or fire blocking.

National Building Code Requirements Cont.

NBC - Division B, Part 3, Section 3.1.9.4 – Combustible Piping Penetrations

4) Combustible drain, waste and vent piping is permitted to penetrate a *fire separation* required to have a *fire-resistance rating* or 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, Fire Tests of Firestop Systems,"

ProFirestop Photo

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.4 – Combustible Piping Penetrations

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 with a pressure differential of 50 Pa between the exposed and unexposed sides, with the higher pressure on the exposed side, and

c. the piping is not located in a vertical service space.

- Item b) revised to reference more than 3 storeys 2020 NBC ++

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.4 – Combustible Piping Penetrations

7) Except as provided in Sentence (8), penetrations of a *fire separation* that incorporate transitions between *combustible* and *noncombustible* drain, waste and vent piping shall be sealed 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.

- 2020 ++

National Building Code Requirements Cont.

Compartmentation Codes

NBC - Division B, Part 3, Section 3.1.9.4 – Combustible Piping Penetrations

8) Transitions between vertical *noncombustible* drain, waste and vent piping and *combustible* branches for drain, waste and vent piping are permitted on either side of a *fire separation*, provided they are not located in a *vertical service space*.

- 2020 NBC onwards….

Summary of Requirements for Protecting Breaches

- Each type of **breach** has a unique fire test using a ULC standard and a smoke leakage test standard associated with it which compliments ULC-S101

Summary of Requirements for Protecting Breaches

- **Penetrations**
  - Fire / Hose Stream Test Standards
    - ULC-S115 (ASTM E814 / UL 1479)
    - **PLASTIC PIPES – ASTM E814 / UL 1479 DOES NOT = ULC-S115**
    - **50 Pa vs. 2.5 Pa Pressure = DIFFICULTY PASSING**
  - Smoke Leakage Standard
    - ONLY in ULC-S115
    - Any lab can perform leakage test, but ULC-S115 is the standard

Requirements for Protecting Breaches

- **Joints**
  - Fire / Hose Stream Test Standards
    - ULC-S115 (Joint Firestops)
      - ASTM E2307 (Perimeter Joint Firestops)
      - ASTM E2837 (Cont. HW Joints)
  - Smoke Leakage Standard
    - ONLY in ULC-S115

Where Can I Find The Most Current Listing?

- Directories of the Nationally Recognized Testing Laboratories
  - FM Global Approval Guide
  - Intertek Directory of Building Products
  - UL/ULC Product iQ Online Directory

Products become systems based on testing!!!

LISTINGS!!

Canadian UL or ULC Marks….

- A cUL listing is issued by UL Solutions (UL) based on Canada standards and is intended to address Canadian based code requirements. A cUL listed product will bear a mark which will include one of the following UL logos.

Engineering Judgments/EFRRA

- Variances to Systems at Site?
  - **First Action in Process**
    - **Find another system** – Same Manufacturer
    - **Find another system** – Different Manufacturer
    - **If no system exists in either case….**
  - **Second Action – EJ**
    - ***Engineering Judgment*** – Alternative Solution
      - ***"EJ"***
    - ***Equivalent Fire Resistance Rated Assembly***
      - ***"EFRRA"***
    - ***NEW UL Technical Evaluation Programme***

J. Sharp – ProFirestop Photo

C. Zussman – Pepper Photo

Engineering Judgments/EFRRA - Canada

- **EJ/Alternative Solutions Process….**
  - ***Reviewed by Designer***
  - ***Possibly Fire Consultant***
  - ***P. Eng. Stamp?***
  - ***AHJ after Architect Approval***
  - ***Signoff by EOR, FS Manufacturer??***
- ***IFC Protocol….***

NFC - Division B, Part 2, Section 2.2.1.2 (1 & 2) Damage to Fire Separations and Fire Protection Materials

1) Where ***fire separations*** are damaged so as to affect their integrity, they shall be repaired so that the integrity of the *fire separation* is maintained…

2) Where **materials used to provide fire protection** are damaged or removed, they shall be repaired or replaced so that the integrity of the fire separation is maintained.

Includes Fireproofing Fire Dampers, Fire Doors… Continuity, Integrity…

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