

# Firestopping Basics for Combustible Pipes

FCIA Existing Building Fire-Resistance Symposium  
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# Presenters



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# PIPE COMPATIBILITY WITH FIRESTOPPING MATERIALS

Pipe manufacturers have different approaches to addressing compatibility:

- Tables
- Searchable database
- Compatibility program

## CPVC

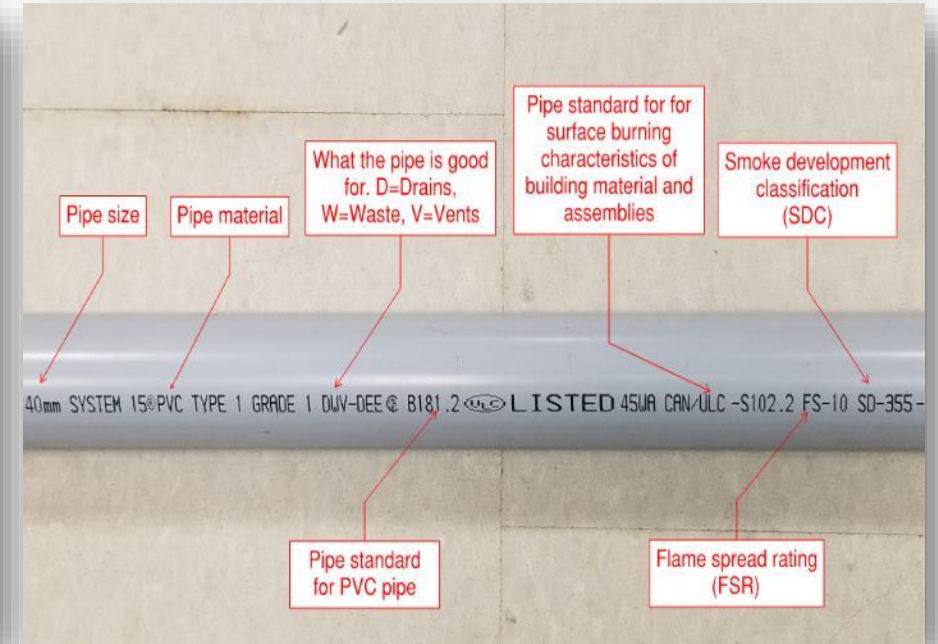
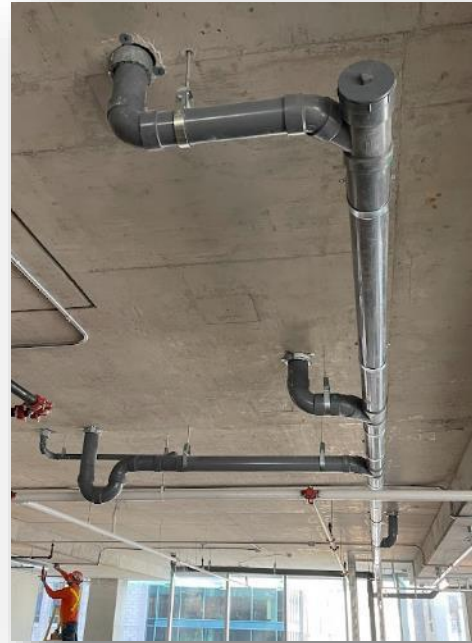
- Typically for sprinkler, potable water, industrial applications. The compound is licensed by Lubrizol to make **FlowGuard, BlazeMaster, Corzan, or TempRite** Technology.
- Reference the FBC System Compatible Program from Lubrizol: <https://www.lubrizol.com/CPVC/FBC-System-Compatible-Program>



# PLASTIC PIPE TYPES vs. APPLICATION

## PVC Drainage Applications (Drain-Waste-Vent)

- Schedule 40 (Solid Wall)
  - Low Buildings
  - High Buildings/Plenum rated (25/50)
- Schedule 40 (Cellular Core)
  - 1-2 dwelling units, or row houses up to 3 storeys



# PLASTIC PIPE TYPES vs. APPLICATION

## PVC Pressure Applications

- Schedule 40 and Schedule 80
  - Process piping for commercial/industrial
  - Swimming Pools
  - Potable Water



# PLASTIC PIPE TYPES vs. APPLICATION

## ABS Drainage Applications (ABS DWV)

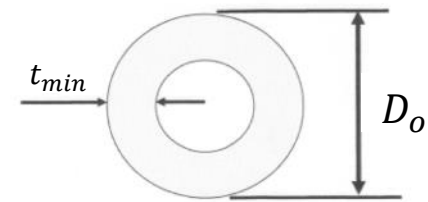
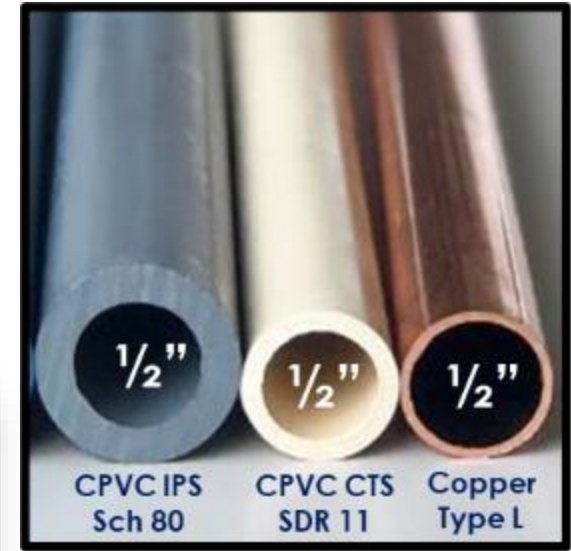
- Schedule 40 (Solid Wall and Cellular Core)
  - Combustible Construction (i.e. wood frame)



# PLASTIC PIPE TYPES vs. APPLICATION

## CPVC Pressure Applications

- Schedule 40 and Schedule 80
  - Process piping for commercial/industrial
  - Swimming Pools
- SDR 11 / SDR 21 (Iron Pipe Size)
  - Potable Water
- SDR 11 (Copper Tube Size)
  - Potable Water
- SDR 13.5 (Iron Pipe Size)
  - Sprinkler Piping



DR = Dimension Ratio

$$DR = SDR = \frac{D_o}{t_{min}}$$

CPVC SDR 11  
(IPS)



# PLASTIC PIPE TYPES vs. APPLICATION

## PP-R / PP-RCT (Polypropylene Random Copolymer)

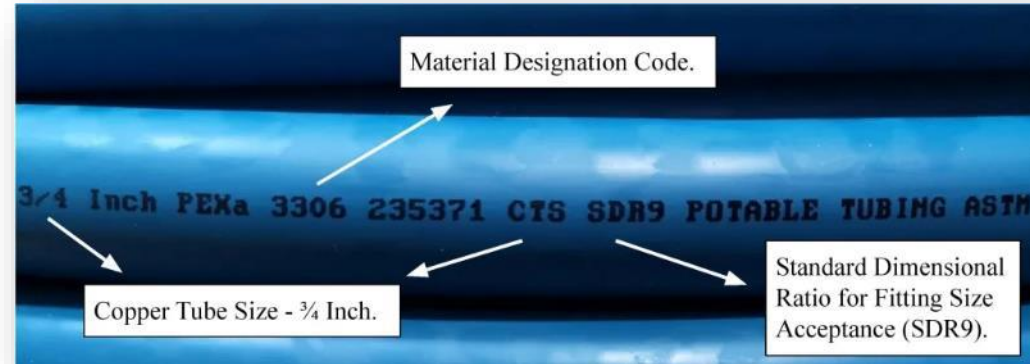
- Metric DR/SDR
  - Commercial, Potable, Hydronic

## PEX (Cross Linked Polyethylene)

- Copper Tube Size DR/SDR
  - Commercial, Potable, Hydronic

## PE-RT (Raised Temperature Polyethylene)

- Copper Tube Size DR/SDR
  - Commercial, Potable, Hydronic

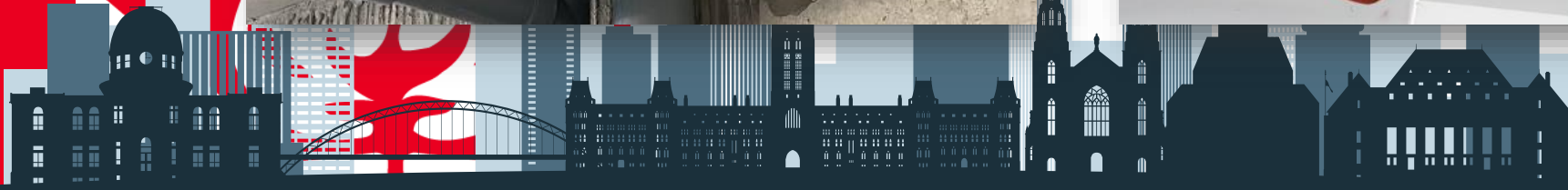
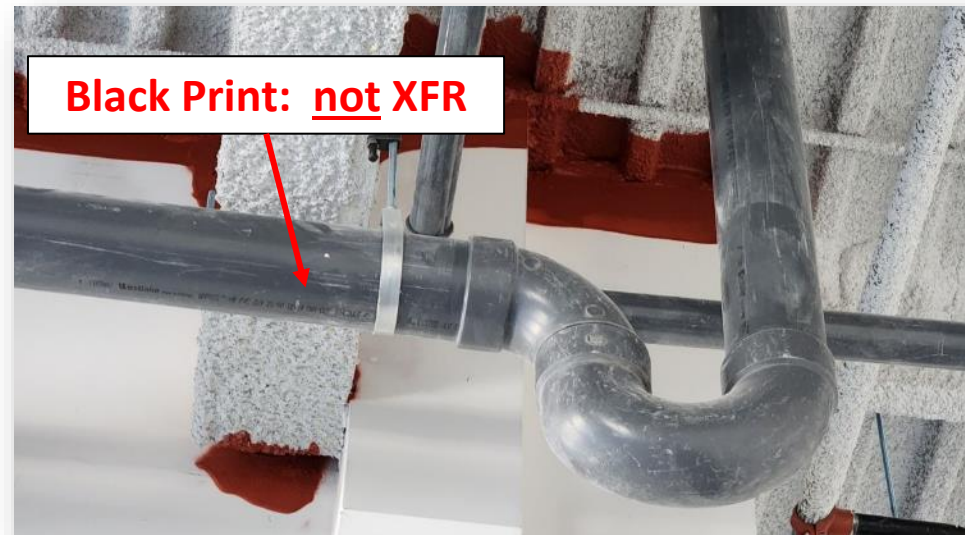
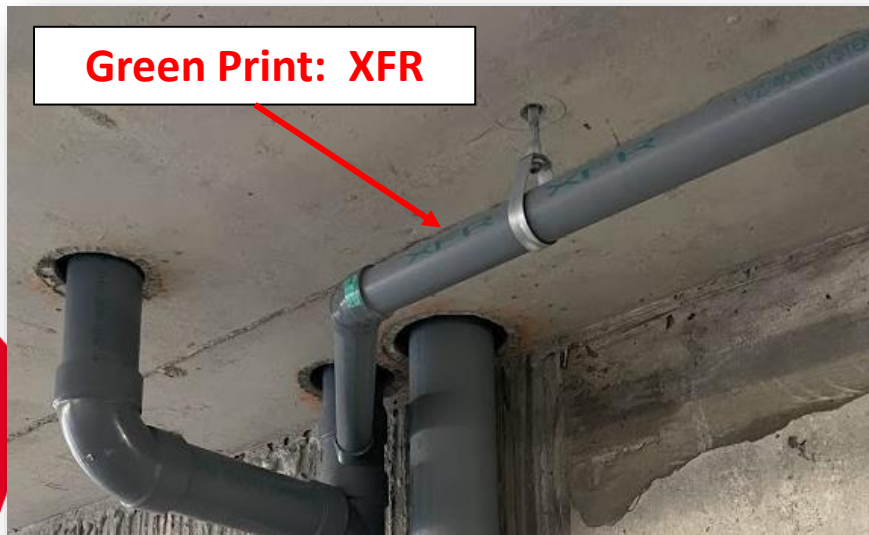




# 💡 Good to Know: 25/50 PIPE AND FIRESTOP LISTINGS

## Standard PVC vs. System XFR

- System XFR is NOT “Fire Rated” Pipe
- A “PVC” listing will not apply to 25/50 PVC Pipe (i.e. XFR)
- System XFR is made from **PVC resin**, but the compound that gives the 25/50 flame and smoke performance changes the fire behavior of the pipe.
  - The listing must say “System XFR” or “XFR”
  - The pipe must say XFR in **Green Print**.
- **25/50 Pipe with Black Print** indicates it’s a different 25/50 compound, therefore cannot use a System XFR listing.



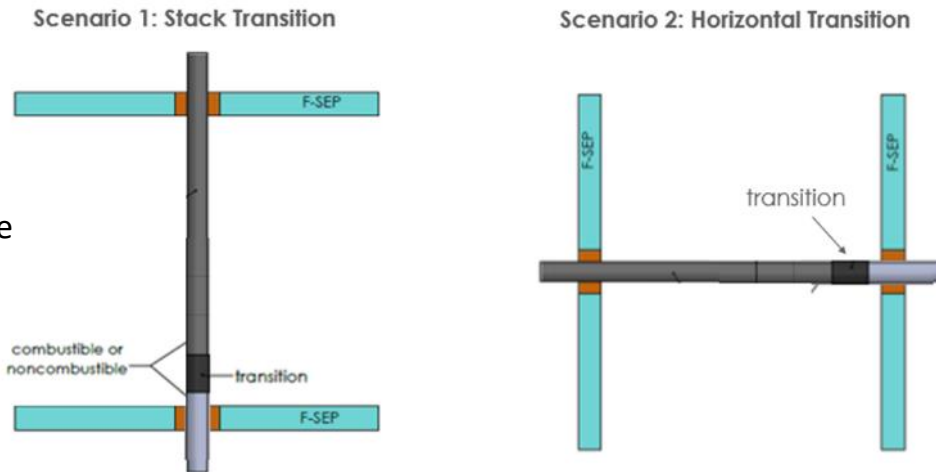
# NBC 2020 – Pipe Transitions

## 3.1.9.4 Transitions are addressed

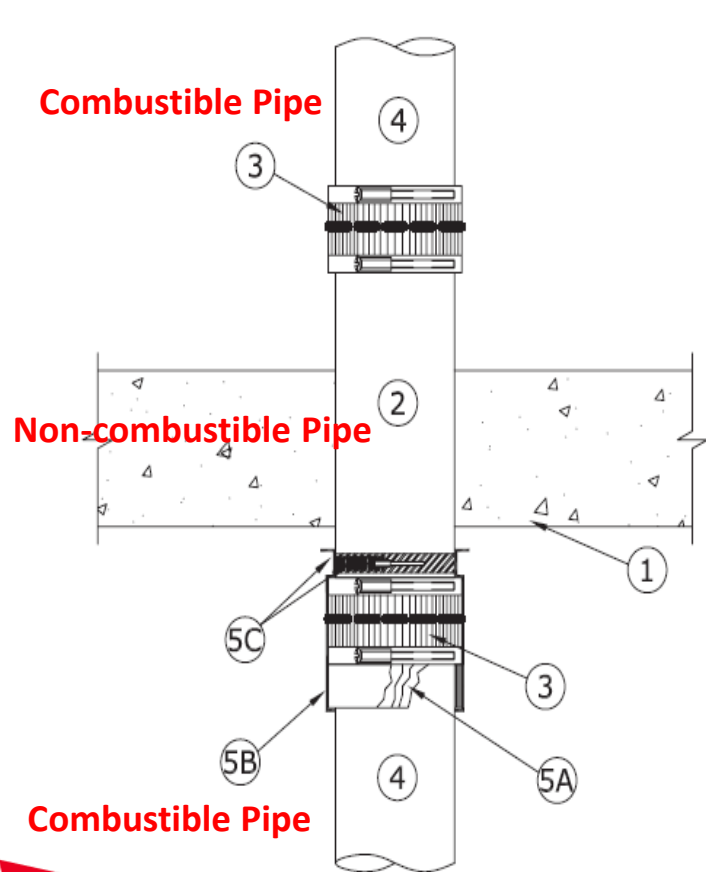


7) Except as provided in Sentence (8), penetrations of a *fire separation* that incorporate transitions between *combustible* and *noncombustible* drain, waste and vent piping shall be sealed by a *firestop* that has an F rating not less than the *fire-resistance rating* required for the *fire separation* 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.

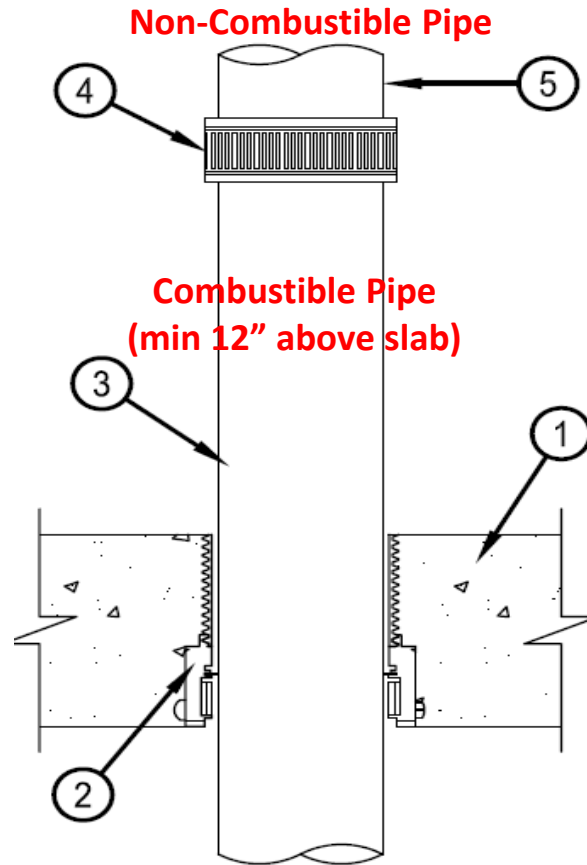
Firestops tested to ULC-S115 that **incorporate a transition** within the proximity of the penetration.



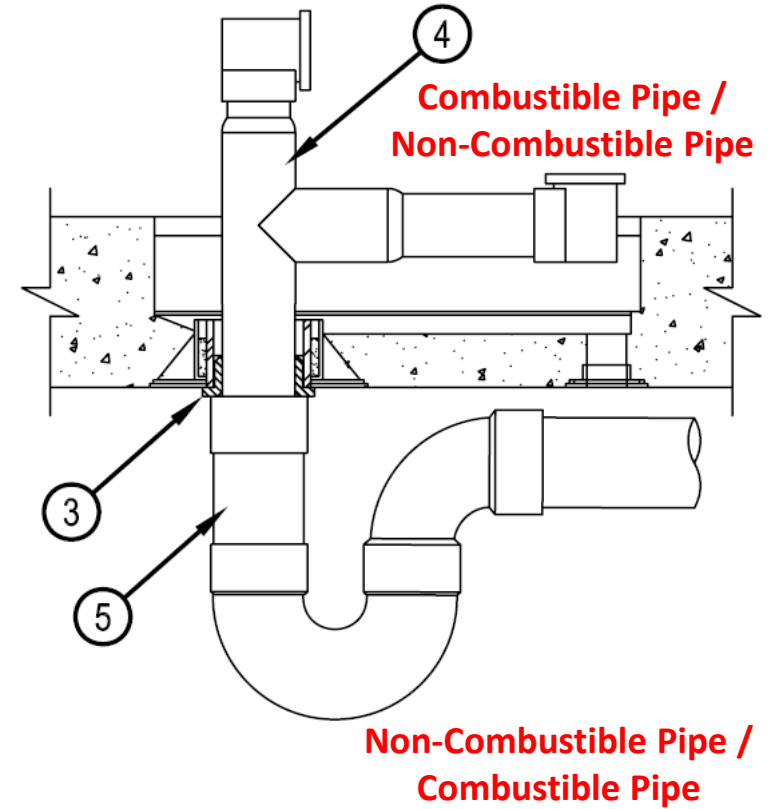
# Examples of Existing Pipe Transition Listings



F-A-2129 / F-A-2207 / F-A-2154  
(no 50 Pa)



F-B-2009 / F-B-2058  
(50 Pa)



F-A-2006 (50 Pa)  
and F-A-1003 (no 50 Pa)

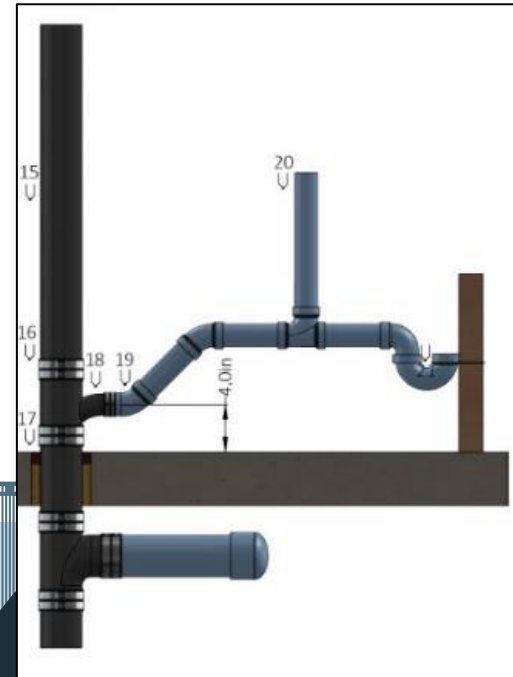
# NBC 2020 – Pipe Transitions

## 3.1.9.4 Transitions are addressed



**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*. (See Note A-3.1.9.4.(8).)

**A-3.1.9.4.(8) Combustible Branches.** Combustible branches for drain, waste and vent piping are permitted to be used to connect to a plumbing fixture within a fire compartment. The integrity of the fire separation is maintained through the use of a firestop system where the vertical stack piping penetrates the fire separation.



# Pipe Transitions at 50 Pa – F-A-2154

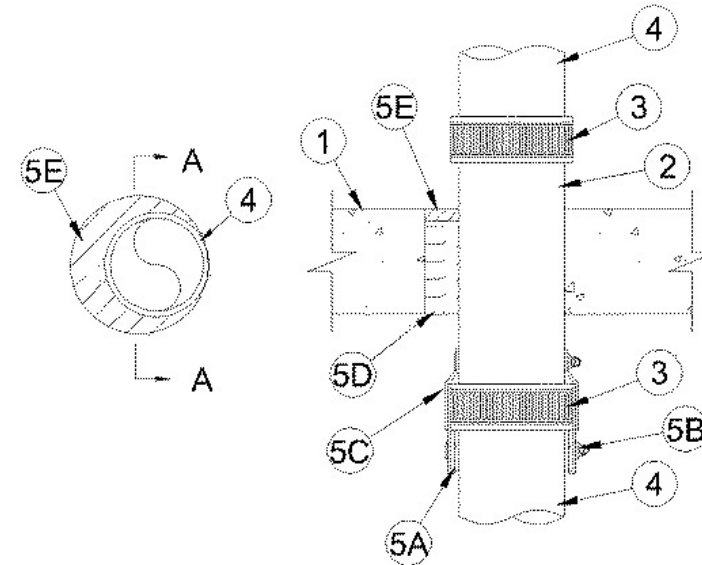
- Testing F-A-2154 (2.5 Pa) to 50 Pa
  - Nominal 4" (102mm) pipe"
  - 4.5" (114mm) concrete floor
  - PVC pipe transitions to steel or cast iron pipe that terminates 1-1/2 to 12 in. (38 to 305 mm) below bottom of floor and minimum 1-3/4 in. (44 mm) above top of the floor.

System No. F-A-2154

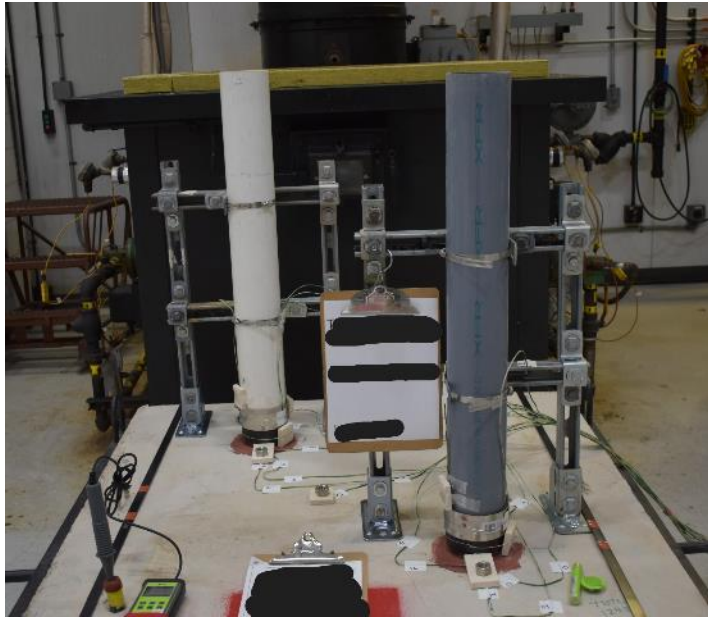
January 16, 2015

F Rating — 2 Hr

T Ratings — 0 and 1-1/2 Hr (See Item 2)



# Modified F-A-2154 Setup



Nonexposed Side



Nonexposed Side



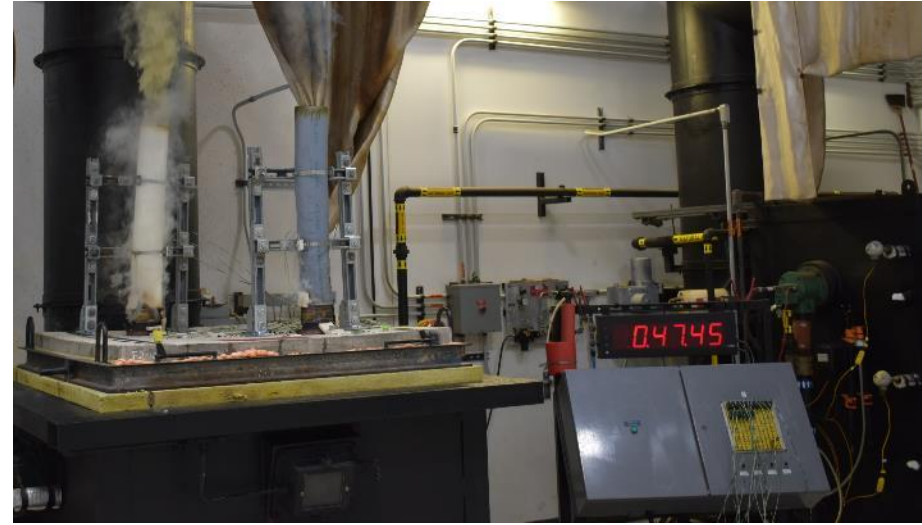
Exposed Side



# Modified F-A-2154 Setup



Nonexposed Side During Fire Endurance



Nonexposed Side During Fire Endurance



# Modified F-A-2154 Setup



Nonexposed Side During Fire Endurance



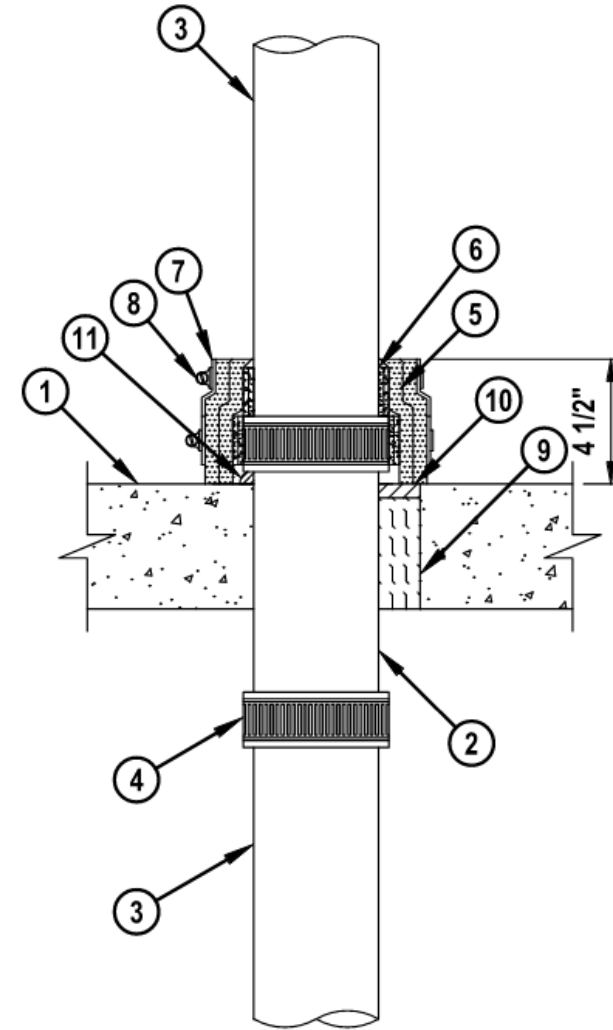
Nonexposed Side End of Fire Endurance





# Modified F-A-2154 Setup

- Intumescent material moved from below the floor to the top of the floor.
- Intumescent housed within a thermal wrap which also helped with the extreme temperatures on the metal pipe during the first test



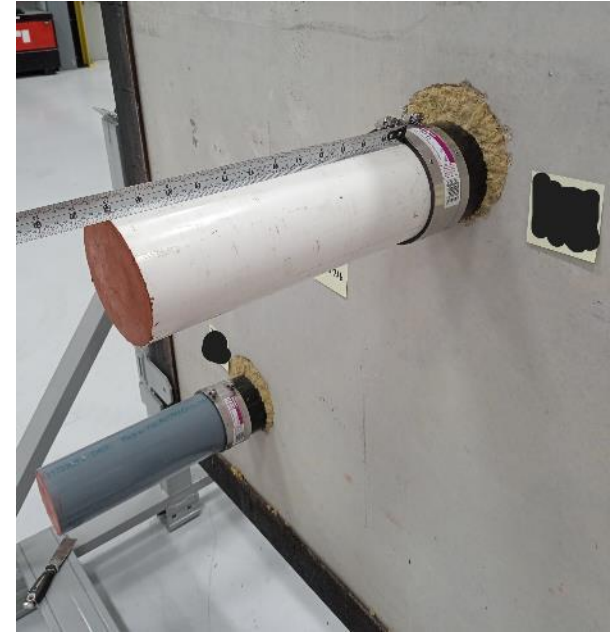
# Modified F-A-2154 Setup



Nonexposed Side



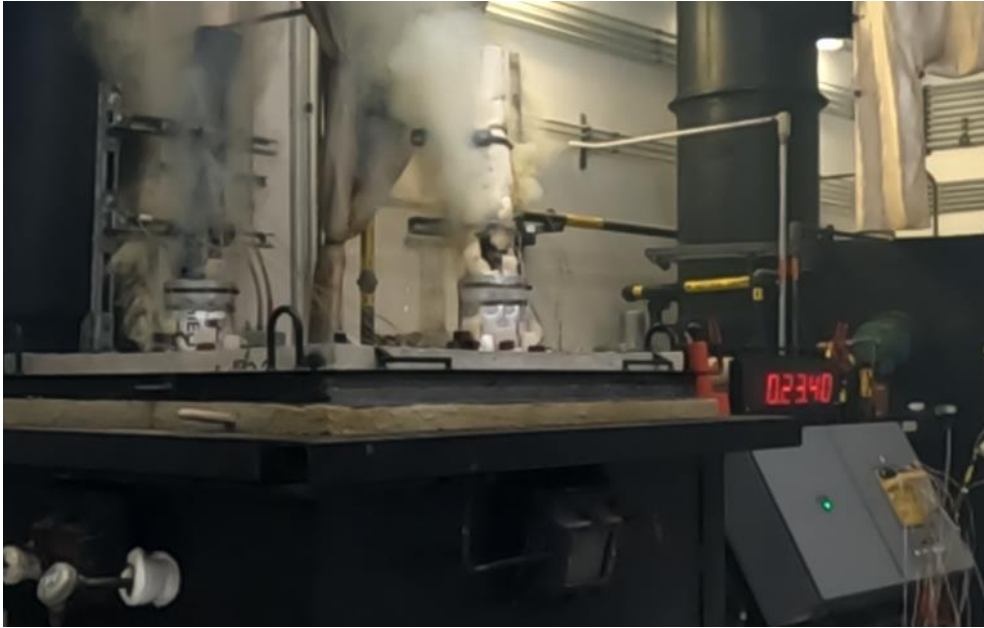
Nonexposed Side



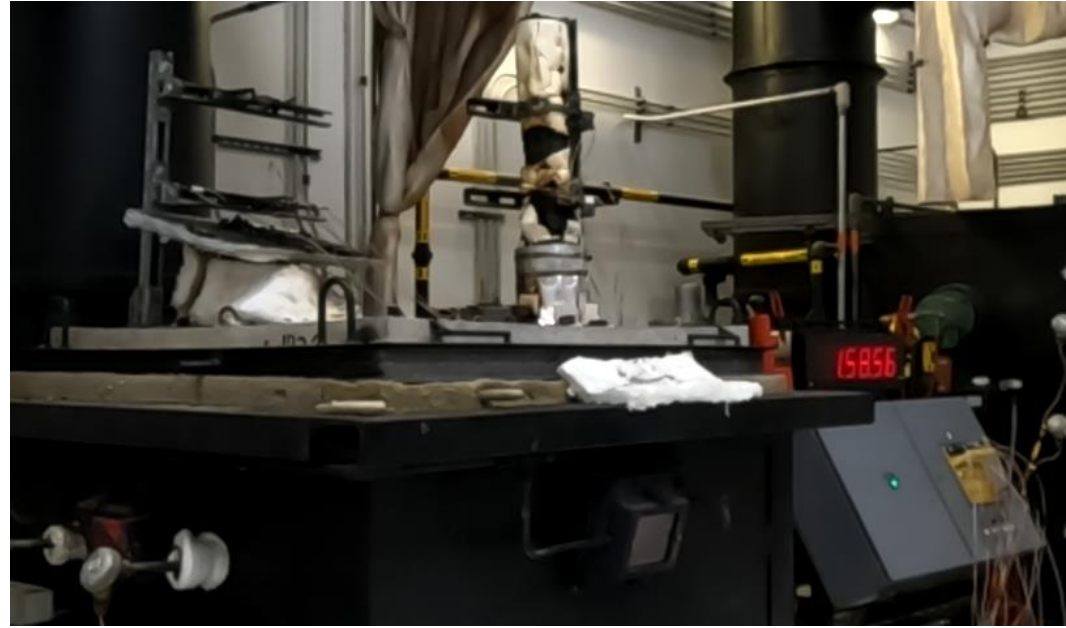
Exposed Side



# Modified F-A-2154 Setup



Nonexposed Side During Fire Endurance



Nonexposed Side During Fire Endurance

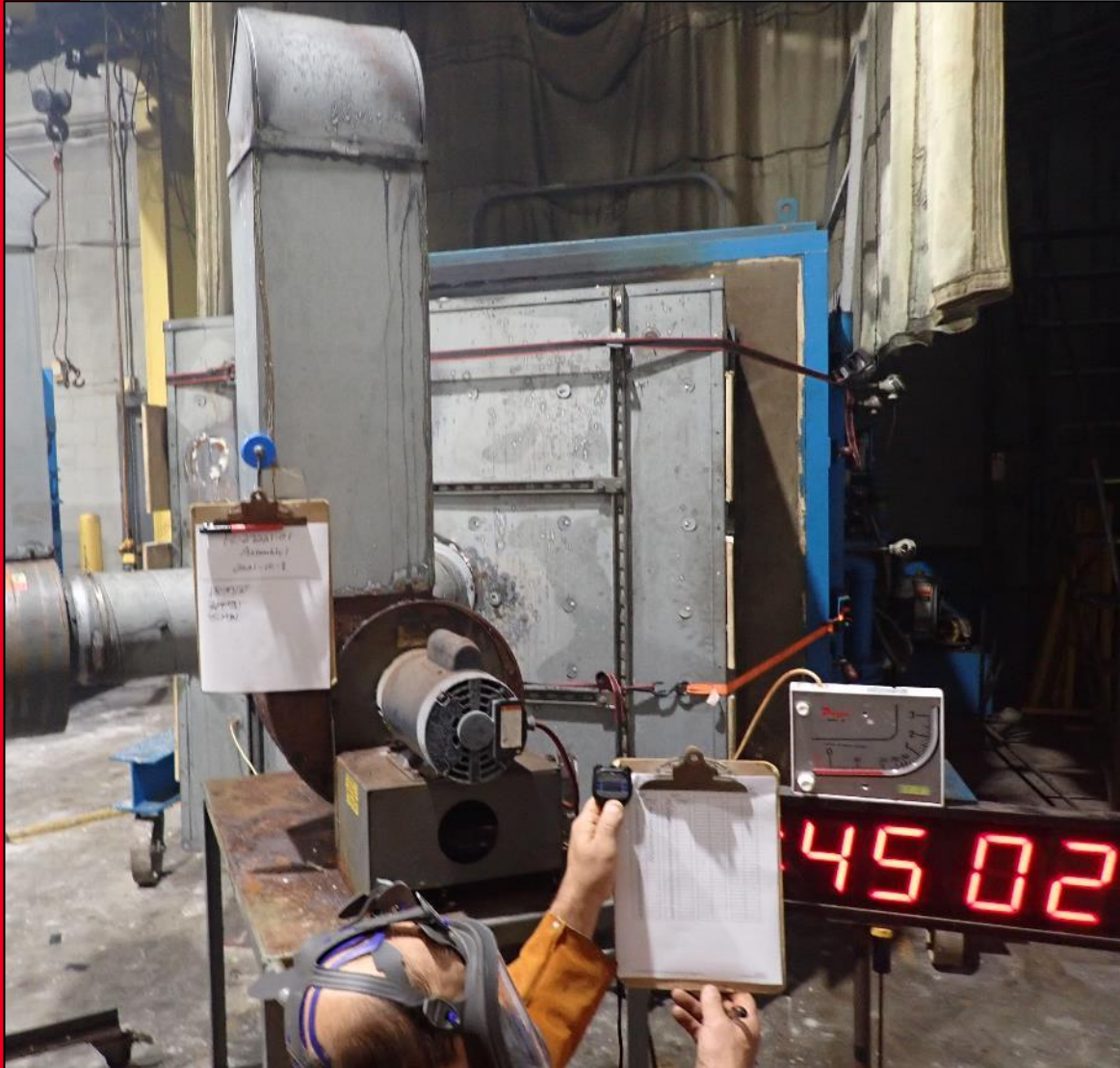


# Penetration Test Requirements Unique to Canada

- Always testing pipes as vented – interesting given real-world applications. Neither ASTM nor EN standards place this restriction
- 50 Pa – The only place in a building where this pressure is expected to be reached – shaft stairwells
  - A fire in a stairwell is a complete life safety system failure that goes beyond firestop
- CAN/ULC S101 does not have a positive pressure – fire resistance rating for walls/floors
- Following slides show some complexities with 50 Pa Testing



# 50 Pa Suck Box Test – Gypsum wallboard walls



Suck Box (3 Pa in furnace + 47 Pa in box) @ 45 minutes



Pipes on Unexposed Side After 2 hours

# 50 Pa Suck Box Test – Gypsum wallboard walls



Closer Look of Pipes on Unexposed Side After 2 hours

# 50 Pa Suck Box Test – Gypsum wallboard walls



Exposed Side After 2 Hours



Hose Stream Test after 2 Hours  
38 Seconds @ 30 PSI

# Insulated Pex & 50 Pa



Pex insulated with fiber glass insulation



Firestop Collar installed around insulated Pex



## 50 Pa Test – Insulated Pex



Pex insulated with fiber glass insulation with Firestop Collar



Post Test Photo of insulated Pex using Firestop Collar

# General guidelines for firestopping 50 Pa

- Difficult to give based on the code requirement and test standard complexities.
- Up to 2" Trade Size Pipes (or smaller) may be protected with sealant only systems.
  - Not for every pipe type or application.
  - Generally, for PVC & XFR or CPVC (@2.5 Pa)
- 3 to 4" Trade Size Pipes (or smaller) may be protected with a wrap strip - tuck-in systems.
  - Some sealant options are available.
  - Wrap strip and Firestop Collars are better and more reliable options.
- Pipes larger than 4" Trade Size should be protected with a firestop collar systems.
- Ensure that pipe type and size are clearly referenced in the Listing or Judgment.



# General guidelines for firestopping 50 Pa

Some variables to consider that can affect performance.

- Pipe type
- Pipe Wall Thickness
- Opening Diameter
- Firestop Positioning
- Wall or Floor Test
- Concrete Floor Thickness



# Complexities of testing for Canadian Market

- Canada has many new/diverse sets of plastic pipes.
  - XFR, NAPSYS – HR PVC, Aquatherm, Niron PP-RTC, Etc.
- 50 Pa testing is very critical, and any minor change can affect performance.
- UL will therefore only list the specific type and manufacturer of pipes that are tested.
- Tests are critical so less penetrations are generally tested per assembly.
- And success rate is lower than non-50 Pa testing.
- Pace of new systems is slower than we would like.



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