Fire-Rated Glazing and Framing Systems for Building Envelopes

Firestop Contractors International Association

April 29, 2010

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Presented by
Chuck Knickerbocker

Objectives

1. Understand the role of fire-rated glazing in overall fire protection
2. Understand the materials that make up fire-rated glazing
3. Gain an overview of fire-rated glass and frames testing
4. Gain an understanding of how fire-rated glazing and framing can be used for exterior applications (curtain wall systems)
5. Fire-rated curtain wall system construction and best practices

Key Concepts of Fire Protection

Active vs. Passive Systems

- Active: Detection and Suppression
- Passive: Compartmentation

Detection-Alerts building occupants to the threat of fire

Suppression-Strategically placed sprinklers and extinguishers to help slow or stop fire from spreading

Compartmentation-Fire-and smoke-blocking materials such as masonry, gypsum or fire-rated glass

Key Concepts of Fire Protection

Key Purposes of Fire-Rated Glass

- Allows visibility into a space
- Prevents fire from spreading
- Facilitates safe egress and firefighting

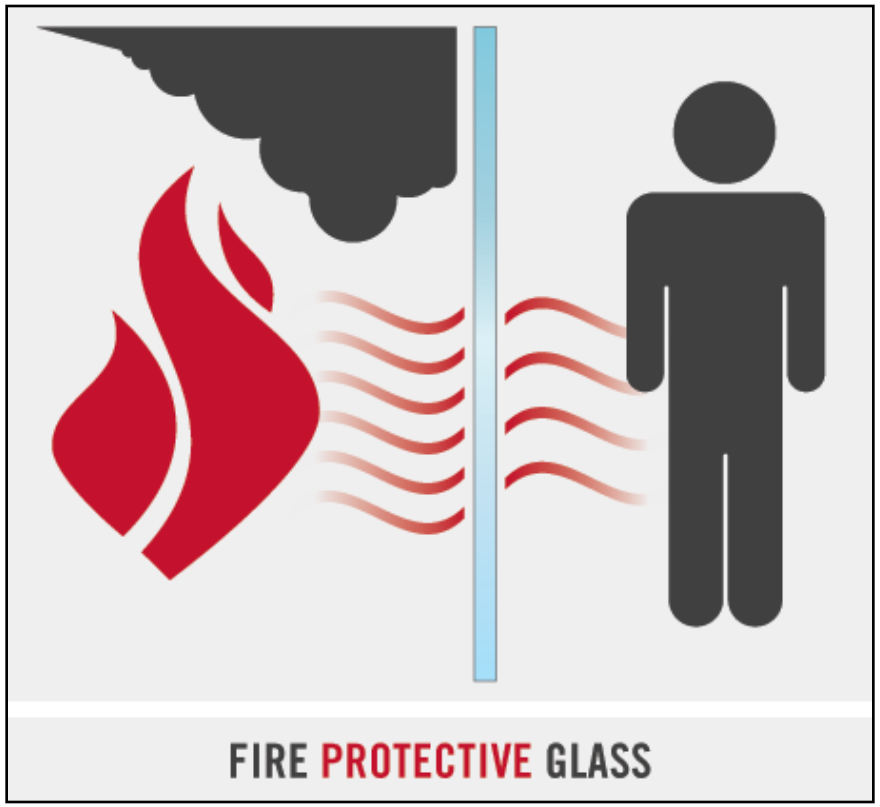
Fire-Rated Glass Basics

- International Building Code (IBC) Chapter 7 governs use of fire rated glass / framing assemblies
- Three primary assembly types: Doors, Windows, Walls

Fire Protective vs. Fire Resistive

FIRE PROTECTIVE

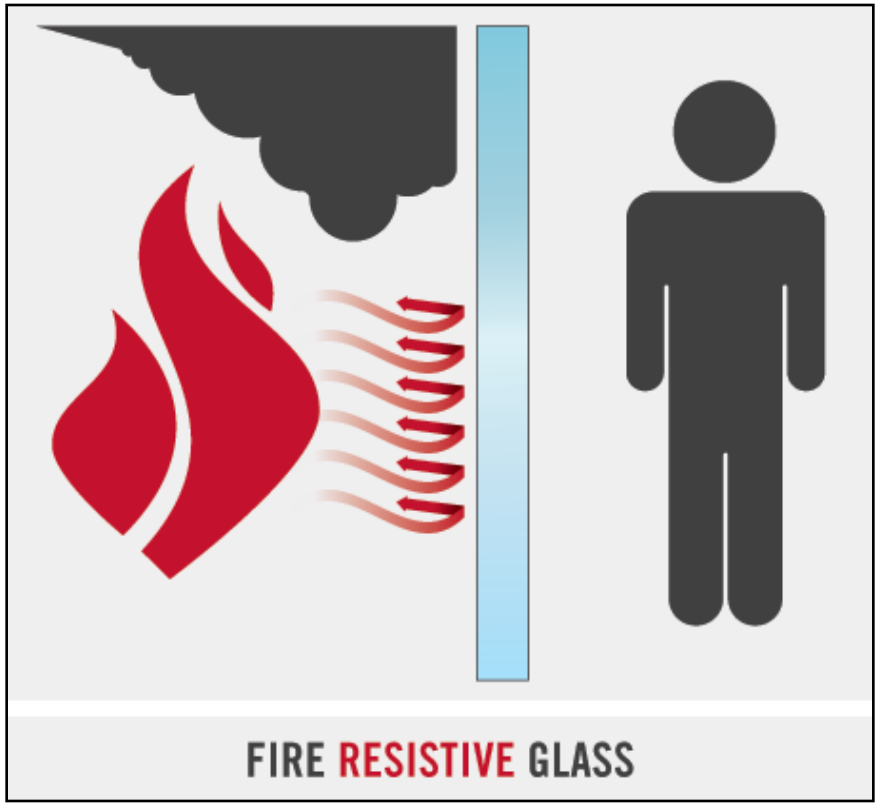
- Classified as door or window assembly under IBC.
- Stops flames and smoke
- "Thin" glazing
- Traditional fire-rated material (wired glass, glass ceramic, hollow metal steel frames, etc.)



Fire Protective vs. Fire Resistive

FIRE RESISTIVE

- Classified as wall assembly under IBC.
- Stops flames, smoke, **AND** radiant heat (both glass and frames)
- "Thick" glazing
- Both glass and frames must block passage of radiant heat



Testing Standards

Key Components of Fire Tests:

-Fire test

-Including radiant heat measurement if ‘wall assembly’

- Hose stream test

- Impact test

Ordinary Float Glass CANNOT Pass the Required Fire Tests

- Float glass breaks @ 250° F

-Tempered glass breaks @ 500° F

Fire and Human Impact Safety Tests

Fire Test

Measures the amount of time, in minutes or hours, that materials or assemblies have withstood a fire exposure in a furnace.

Fire and Human Impact Safety Tests

Hose Stream Test

Heated glass and frames are subjected to water from a fire hose. The cooling, impact and erosion created by the hose stream tests the integrity of the glass and frames and eliminates inadequate materials.

Fire-Rated Curtain Wall Testing

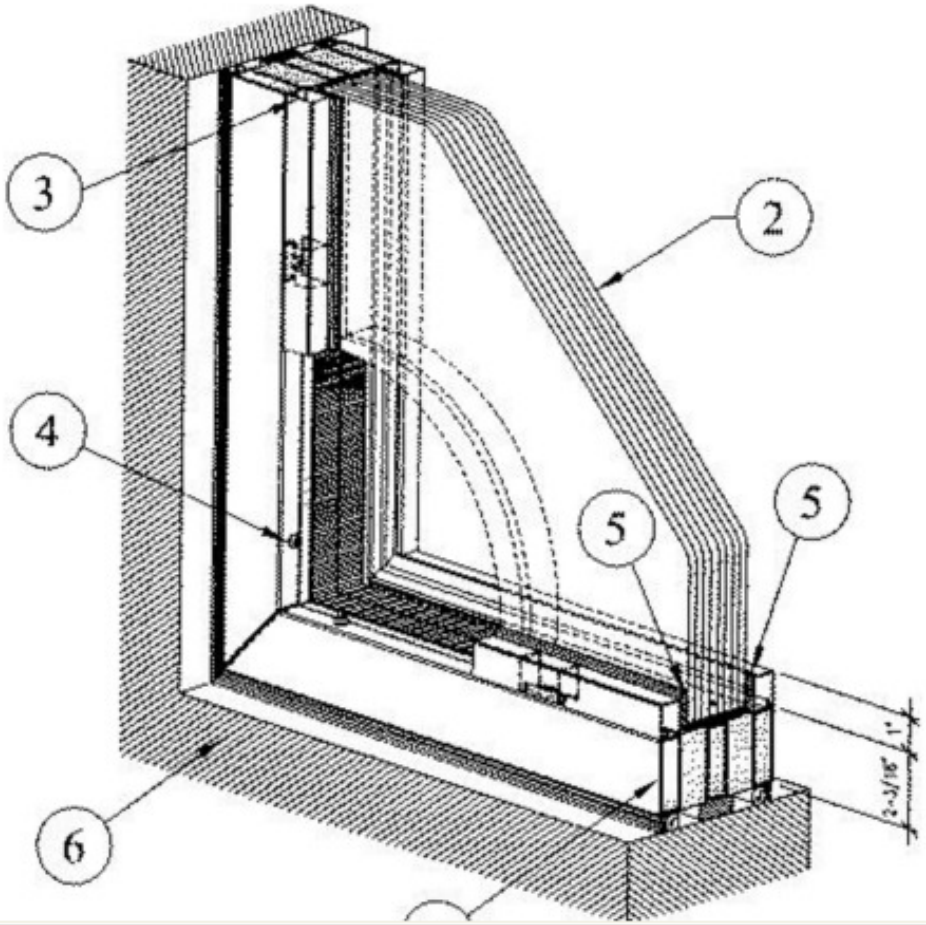
Fire-Rated Curtain Wall:

- 60-120 minute product meets ASTM E119
- Air and water pressure tested
- Approved for interior and exterior use

Design No. U533

February 11, 2009

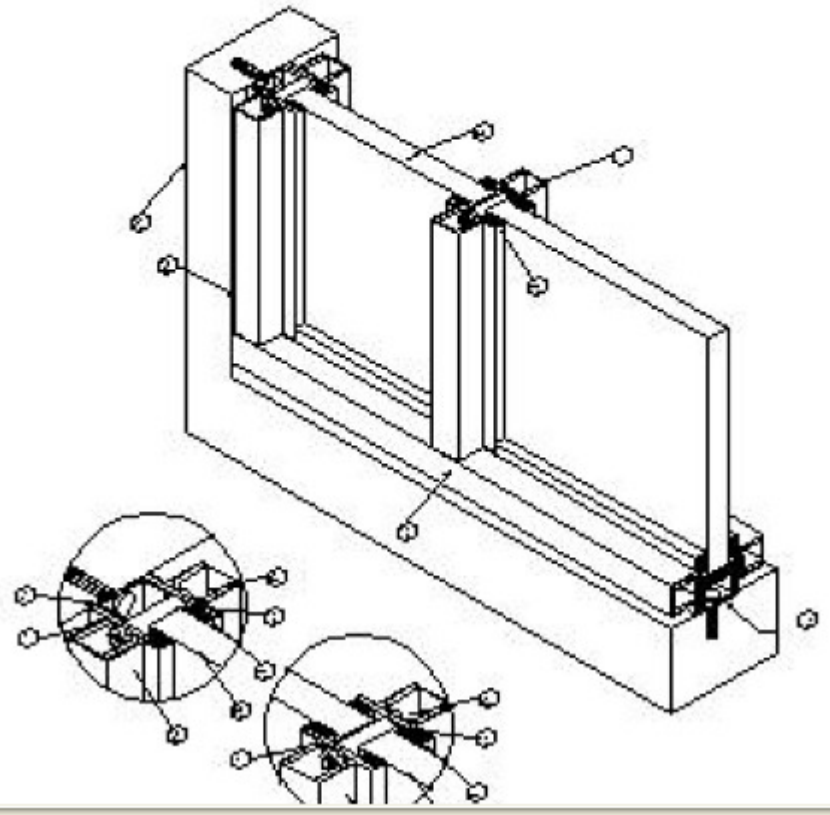
Non-Bearing Wall Rating—1 or 2 Hr (See Items 1, 2 and 6)



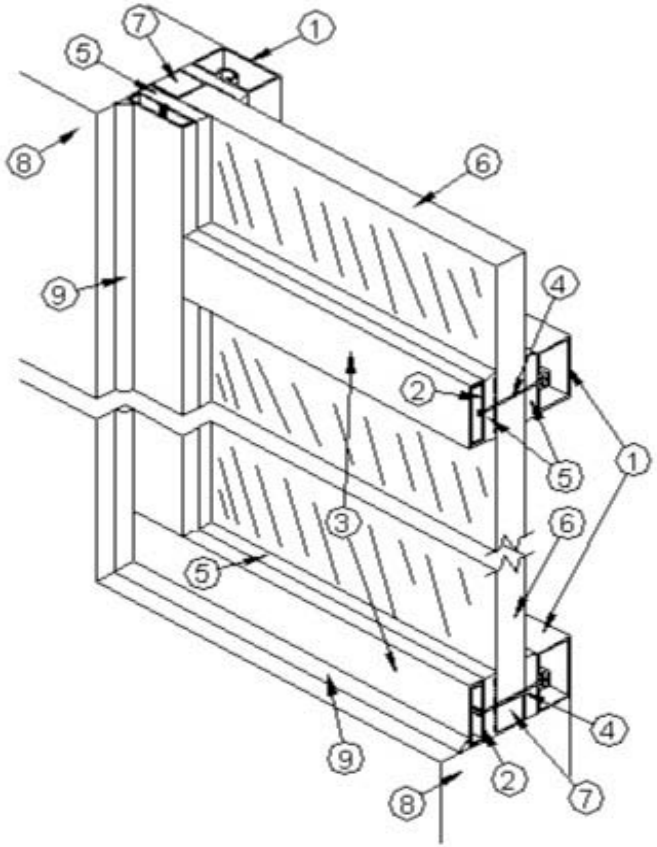
Design No. U545

July 22, 2009

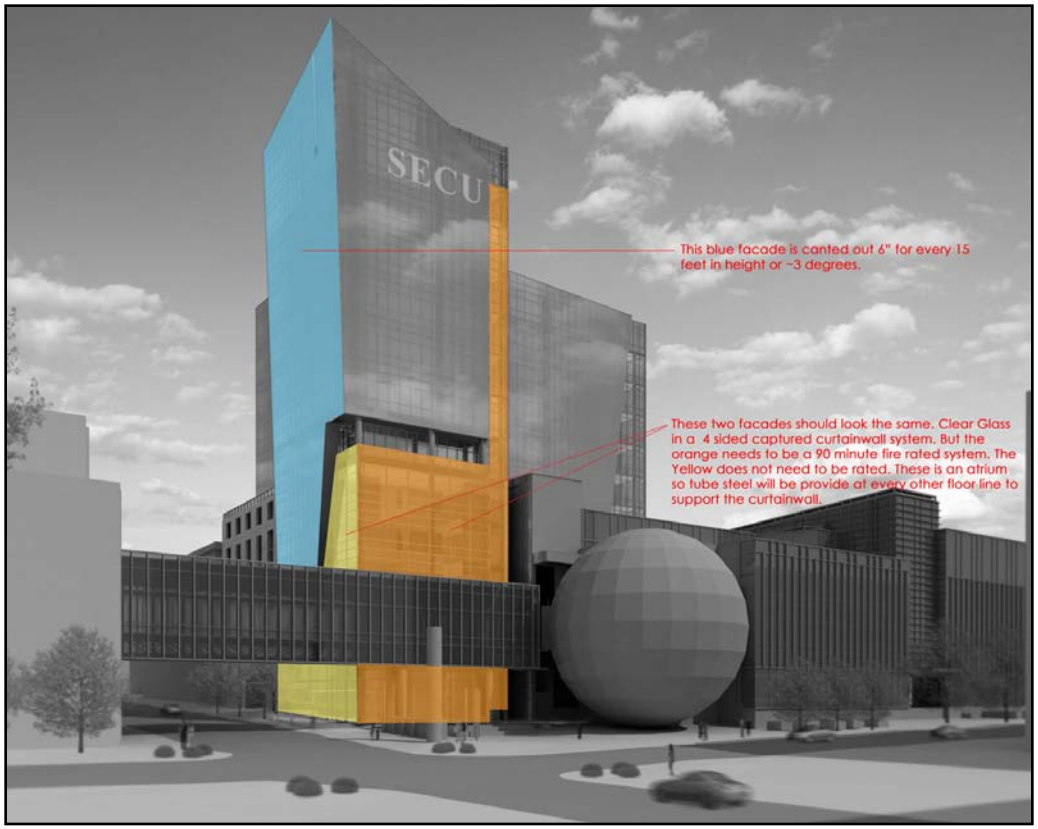
Non-Bearing Wall Rating - 1 hr.

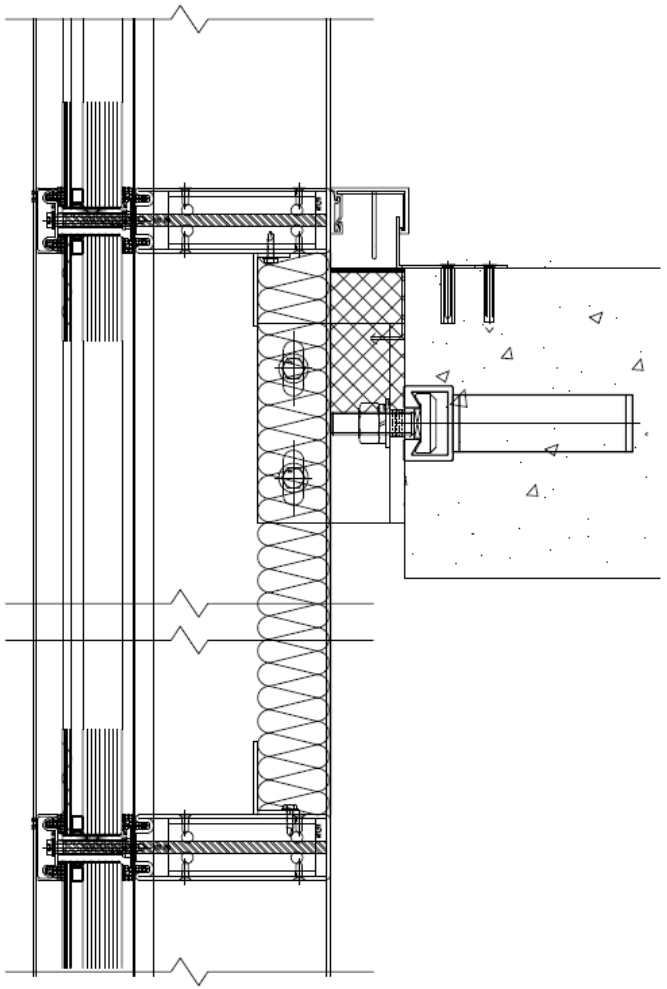


- **Design No. U537**
- February 18, 2010
- **Non-Bearing Wall Rating - 1, 1-1/2 or 2 Hr (See Items 4, 6, 7 and 8)**



Projects / Detail Examples





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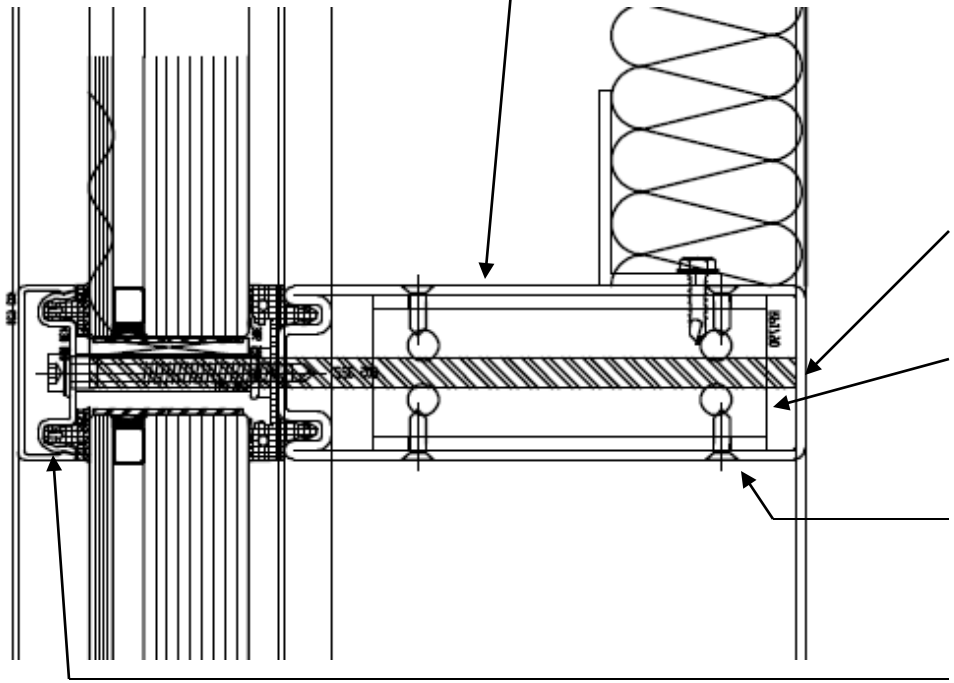


Tested Assemblies

Rolled profiles 45 mm (1 ¾”) and 60 mm (2 3/8”) widths

Six different depths 1-7/8” to 7-1/8”

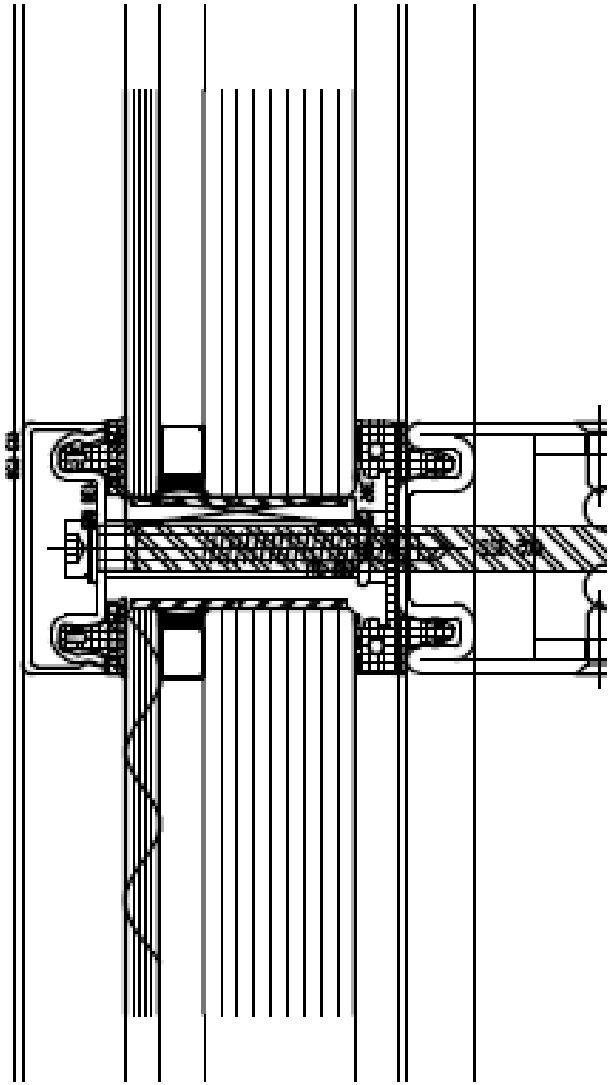
Steel glazing platforms, welded to frames

Steel shear clip welded to frames

Exposed fasteners

Stainless steel exterior pressure plate required

Fire-Rated Glass Construction



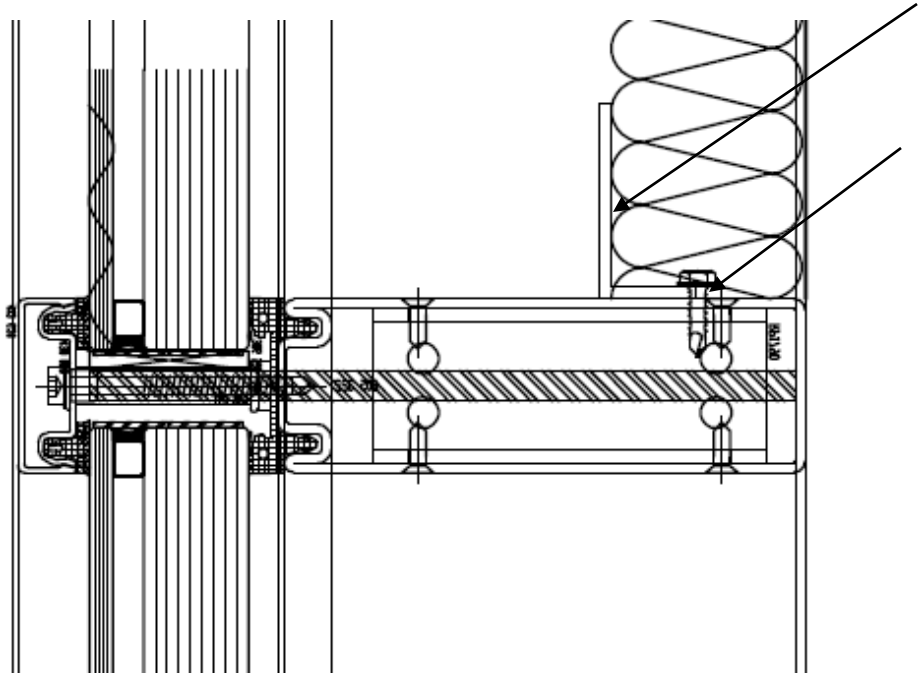
IGU (Shown) or Monolithic

- Outboard Lite: opacified or reflective, usually tempered
- Pilkington Pyrostop®: glass, sodium silicate interlayer
- FireLite®: monolithic clear ceramic

Glass size limited by testing, not codes

Intumescing Tape - full perimeter of each lite of glass

Best Practices / Spandrel Insulation



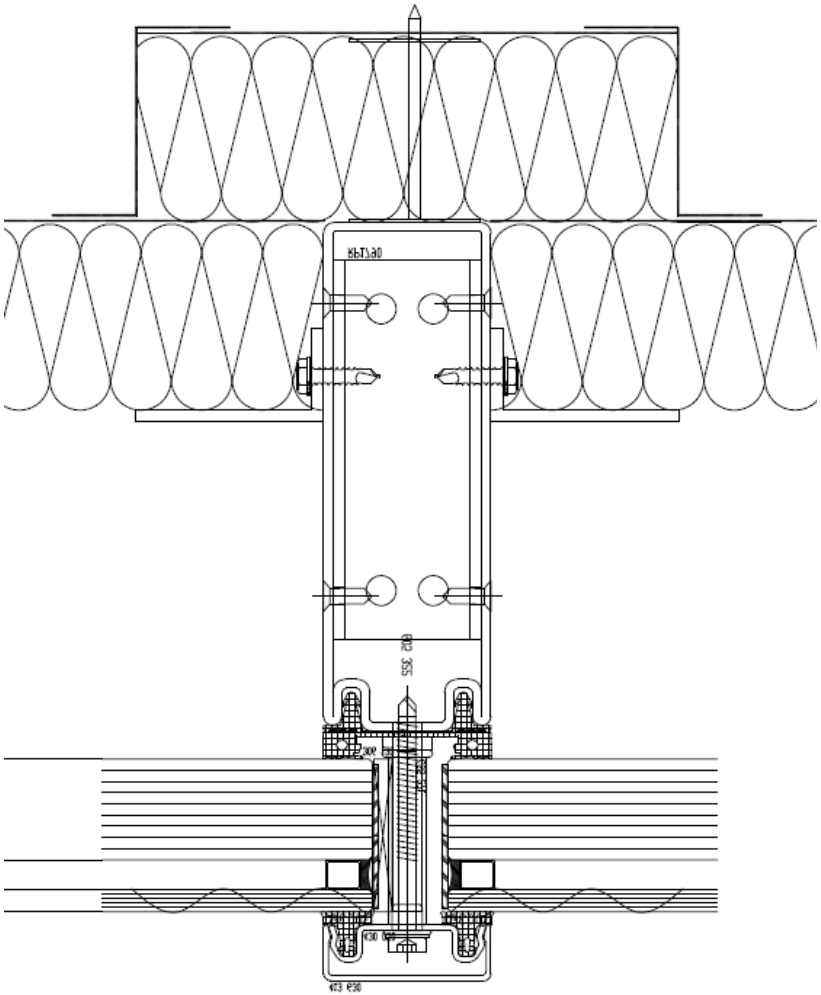
Support around perimeter of opening

Can be screwed directly to framing - confirm with manufacturer

Foil faced insulation

Foil tape on joints, full perimeter

Best Practices / Insulation



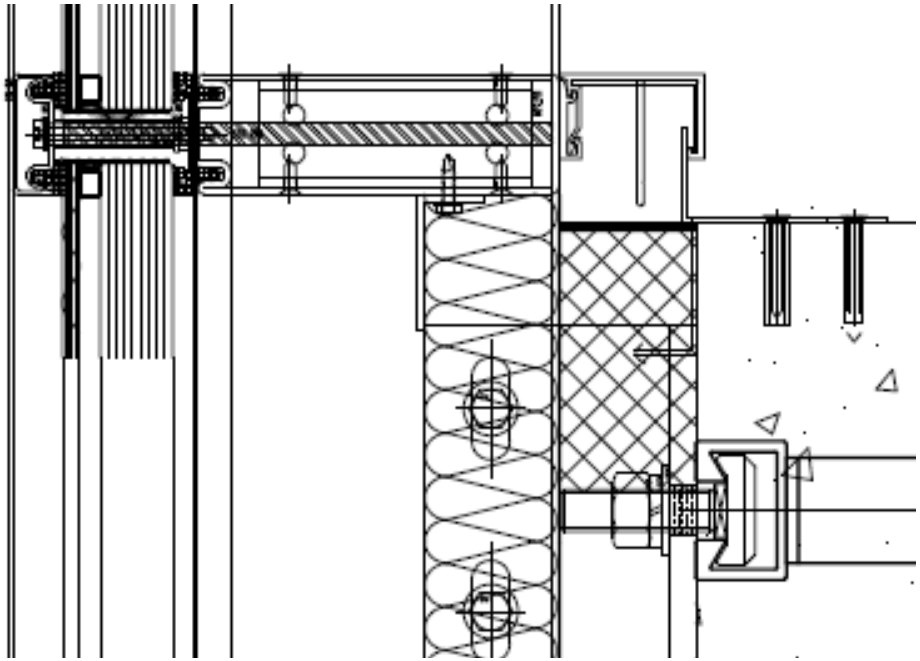
Issues:

- Thermal
- Condensation

Mullion wrapped in spandrel insulation – thermal or condensation considerations, not fire safety

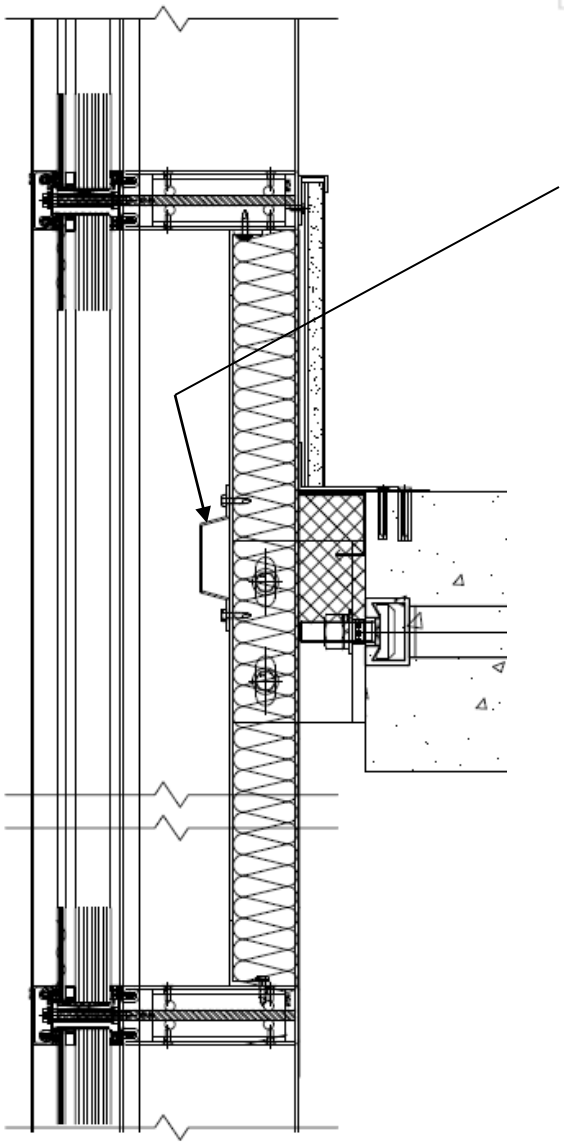
Spacing insulation off glass

Best Practices / Safing (1)



- Fill / friction fit to gap to maximum 4”. Nominal gap set by architect in design - 1 ½” is absolute minimum – determined by construction tolerances
- Impaling clips 24” O.C. (typical)
- 22 gauge galvanized steel back pan supported off structure-for gaps over 4”
- Smoke seal

Best Practices / Safing (2)

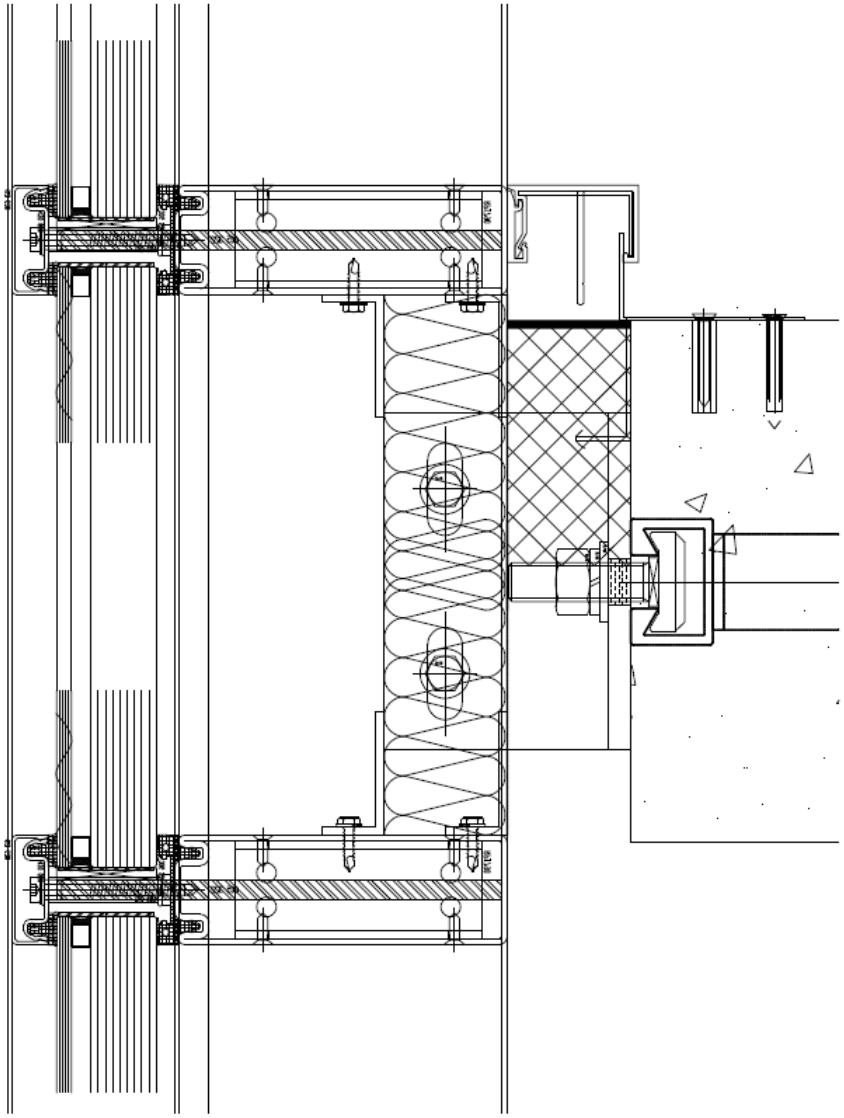


If curtain wall horizontal is more than 8” from floor, curtain wall insulation MUST be continuously supported at safing location

Coordination:

1. Wall installation complete, glass installed
2. Curtain wall insulation is installed
3. Safing installed
4. Inspection BEFORE interior trades cover it up

Short Spandrel Heights



- Install curtain wall insulation before glazing / coordinate with glazing subcontractor
- Two sets of retention angles required
- Taping at inside becomes difficult – but required for thermal / condensation issues
- Does safing have to be installed prior to glazing, also, due to limited access???

Questions?