Fire-Rated Glazing and Framing Systems for Building Envelopes

Firestop Contractors International Association

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Presented by Chuck Knickerbocker
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
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 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

- 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 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
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 Test

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

- 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)
This blue facade is cantilevered 6" for every 15 feet in height or ~3 degrees.

These two facades should look the same. Clear Glass in a 4 sided captured curtainwall system, but the orange needs to be a 90 minute fire rated system. The yellow does not need to be rated. There is no column to tube steel will be provide at every other floor line to support the curtainwall.
Steel Curtain Walls

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
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
Issues:
- Thermal
- Condensation

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

Spacing insulation off glass
• 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
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
• 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?