Fire Resistance Rating = Fire Wall...Right?

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Overview

- Fire resistance rated construction is used for:
  - Confine the fire
  - Contain the effects of the fire and the products of combustion
  - Protect people and property
  - Provide structural stability
  - Will follow Chapter 7 of the IBC – 2015 Edition

Fire Resistance Rating = Fire Wall...WRONG!
Objectives

• Upon completion of the seminar the participant will be able to:
  • Distinguish the difference between fire resistance and fire protection ratings
  • Identify the performance characteristics of different types of fire-rated construction

Terminology

• Fire resistance rating – The period of time a building element, component or assembly maintains the ability to confine a fire, continues to perform a given structural function, or both, as determined by the tests, or the methods based on tests, prescribed in Section 703.
  • ASTM E119

• Fire protection rating – The period of time that an opening protective assembly will maintain the ability to confine a fire as determined by tests prescribed in Section 715. Ratings are stated in hours or minutes.
  • NFPA 252, NFPA 257
Fire Tests – Fire Resistance Rating

- ASTM E 119 Conditions of Acceptance
  - Average temperature rise and maximum temperature rise on exposed surface or of the element
  - For barriers, flame and hot gases do not pass to ignite cotton waste
  - Maintain the structural load
  - Pass a hose stream test depending on the element and the fire resistance rating

Fire Tests

Fire Resistance Ratings
### UL Fire Resistance – Volume I
Numbering System for Fire Rated Assemblies

#### TYPES OF PROTECTION
- Membrane Protection
- Direct Applied Protection
- Unprotected

#### Groups of Construction
- 000‐099
- 100‐199
- 200‐299
- 300‐399
- 400‐499
- 500‐599
- 600‐699
- 700‐899
- 900‐999

### Floors‐Ceilings:
- A or B*
- Concrete and Cellular
- Steel
- Floor C – Glazing Systems
  - Concealed Grid Sys.
  - (Reserved)
  - Exposed Grid System
  - (Reserved)
  - Metal Lath
  - Gypsum Board
  - Misc. SFRM+
- Unprotected

### D, E* or F*
- Concrete and Steel
- Floor Units
  - Concealed Grid Sys.
  - (Reserved)
  - Exposed Grid System
  - Mineral and Fiber Boards
  - Metal Lath
  - Gypsum Board
  - Mastic and Intumescent Coatings
  - SFRM+
  - Unprotected

### G or H*
- Concrete and Steel Joists
  - Concealed Grid Sys.
  - (Reserved)
  - Exposed Grid System
  - Mineral and Fiber Boards
  - Metal Lath
  - Gypsum Board
  - Misc. SFRM+
  - Unprotected

### I
- Non‐load‐bearing Horizontal Barrier
  - (Reserved)
  - (Reserved)
  - (Reserved)
  - Gypsum Board
  - (Reserved)
  - (Reserved)
  - (Reserved)

### J or K
- Concrete
  - Concealed Grid Sys.
  - (Reserved)
  - Exposed Grid System
  - Mineral and Fiber Boards
  - Metal Lath
  - Gypsum Board
  - Misc. SFRM+
  - Unprotected

### L or M
- Wood Joist or Combination Wood and Steel Assemblies
  - Concealed Grid Sys.
  - (Reserved)
  - Exposed Grid System
  - Metal Lath
  - Gypsum Board
  - Misc. SFRM+
  - Unprotected

### Beams:
- N or O* for Floor‐Ceiling
  - Concealed Grid Sys.
  - (Reserved)
  - Exposed Grid System
  - Batts and Blankets or Mineral and Fiber Boards
  - Metal Lath
  - Gypsum Board
  - Mastic and Intumescent Coatings
  - SFRM+
  - Unprotected

### Roof‐Ceiling:
- P, Q* or R*
  - Concealed Grid Sys.
  - (Reserved)
  - Exposed Grid System
  - Mineral and Fiber Boards
  - Metal Lath
  - Gypsum Board
  - Misc. SFRM+
  - Unprotected

### Walls and Partitions:
- U, V or W
  - Building or Partition Panel Units
  - Insulating Concrete
  - Wood Stud, Gypsum Board, Lath &/or Plaster
  - Metal Stud, Gypsum Board, Lath &/or Plaster
  - Misc. Metal Panels, Gypsum Board, Lath &/or Plaster
  - SFRM+
  - Masonry

### Columns:
- X, Y or Z*
  - Building Units
  - Prefabricated Matted Materials
  - Batts and Blankets or Mineral and Fiber Boards
  - Metal Lath & Plaster
  - Gypsum Board
  - Mastic and Intumescent Coatings
  - SFRM+
  - Masonry

### Fire Tests – Fire Protection Rating
- NFPA 252/NFPA 257 Conditions of Acceptance
- Remain in place
- Minimal openings
- Limits on flaming on unexposed surface
- Pass the hose stream test on most assemblies

### Fire Protection Ratings
Fire Rated Glazing

Performance Requirements
- Fire Walls
- Fire Barriers
- Fire Partitions
- Shaft Enclosures
- Horizontal Assemblies
- Exterior Walls

Compartmentation
Floor/Ceiling vs. Ceiling Assembly

Other Performance Factors
• Structural support
• Protection of openings
• Projection of penetrations
• Protection of joints

Fire Walls
• Purpose
  • Create separate buildings
  • Establish fire compartment
    • Maximum foreseeable loss (MFL)
Fire Wall Performance Criteria

- Allow collapse on either side without collapse of wall
- Noncombustible except Type V construction
- Fire resistance ratings
  - Range from two hours to four hours
- Continuity
  - At least to the exterior wall or roof
  - Some instances require parapets or wing walls
- Limitations on openings
  - 156 sq. ft. or sprinkler protection
  - 25% of the length of the wall
- Penetrations and joints

Fire Barriers

- Purpose (Uses)
  - Shaft enclosures
  - Exit enclosures
  - Horizontal exits
  - Atrium
  - Incidental use areas
  - Control areas
  - Occupancy separations
  - Fire areas
Fire Barrier Performance Criteria

- Fire resistance ratings
  - Generally range from one hour to four hours
  - May allow one hour reduction for sprinklers
- Continuity
  - Outside wall to outside wall
  - Floor to floor/roof above
- Structural support
  - Required except for non-rated building construction types
- Openings
- Penetrations
- Joints

Doors in Fire Barriers

- Tested in accordance with NFPA 252
- Installed in accordance with NFPA 80
- Automatic or self-closing
- Self-latching
- Varying ratings from 20 minute to 60 minute depending on application

Fire Door
NFPA 80, Fire Doors and Windows

- Frames
- Labeled
- Clearance (between doors and between door and frame)
  - Steel – 1/8 in. (0.32 cm), +1/16 in. (0.16 cm)
  - Wood – 1/8 in. (0.32 cm)

NFPA 80, Fire Doors and Windows

- Historical clearance (between doors and floor)
  - No sill – ½ in. (1.9 cm)
  - Non-combustible sill – 3/8 in. (0.95 cm)
  - Tile – 5/8 in. (1.6 cm)
  - Class I or II carpeting – ½ in. (1.3 cm)
  - Current requirement – ¾ in. (1.9 cm)

Protective Plate
Window Assemblies in Fire Barriers

- Permitted in \( \leq 1 \) hr fire barriers
- \( \leq 25\% \) of fire barrier area
- Tested in accordance with NFPA 257
- Installed in accordance with NFPA 80

Types of Fire-Rated Glazing Materials

- Wired Glass
  - Typically limited in size
  - Caution if area subject to human impact
- Ceramic Glass
  - Typically limited to 45 minutes
  - Category II safety glazing material
- Special Tempered Glass
  - Typically limited to 20 minutes without hose stream (doors)
  - Category II safety glazing material

Penetrations in Fire Barriers
Penetrations in Fire Barriers

Fire Partitions

- Purpose (Use)
  - Dwelling and sleeping room separation
  - Tenant separations
  - Corridors
  - Elevator lobbies
Fire Partition Performance Criteria

- Fire resistance rating
  - Generally range from 30 min to 1 hr
- Continuity
  - Floor to floor/roof above or fire-resistance rated assembly
- Structural support
  - Required except for certain fire partitions in non-rated building construction types
- Openings
- Penetrations

Shaft Enclosures

- Fire barrier with modifications
- Openings
  - Limited for exit enclosures
- Penetrations
  - Limited for exit enclosures
Smoke Barriers

- Building compartmentation typically found in health care and detention and correctional occupancies
- Typically one-hour fire resistance rating
- Continuity
  - Floor to floor/roof above
- Structural support
  - Required except for non-rated building construction types
- Openings – L-rating requirements
- Penetrations – L-rating requirements

Smoke Partitions

- Limited applications
  - Corridor walls in health care occupancies
  - Typically non-rated walls
- Continuity
  - Floor to floor/roof above or ceiling capable of resisting the passage of smoke
- Structural support – no requirements
- Openings – approved material
- Penetrations – approved material

Horizontal Assemblies

- Fire resistance ratings
- Continuity
- Openings/penetrations
Horizontal Assemblies

Exterior Walls

• Fire resistance rating
• Type of construction if load bearing
• Fire separation distance
• Special situations
• Continuity
• Openings
• Penetrations
Inventory

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Questions?

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