

Fire Resistance Rating = Fire Wall...Right?

Prepared by:

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

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

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

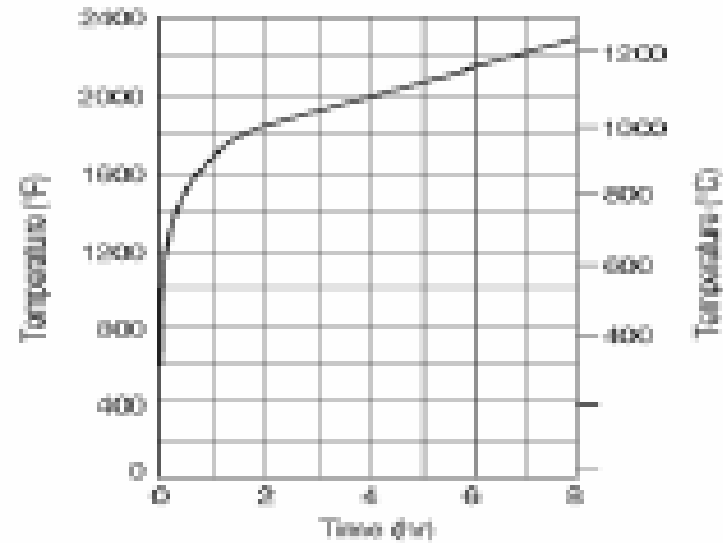
Terminology

- 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



1000°F	(538°C)	.....	at 5 minutes
1300°F	(704°C)	.....	at 30 minutes
1500°F	(813°C)	.....	at 30 minutes
1700°F	(932°C)	.....	at 1 hour
1850°F	(1010°C)	.....	at 2 hours
2000°F	(1100°C)	.....	at 4 hours
2300°F	(1260°C)	.....	at 8 hours or over

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)	(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	(Reserved)	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
Beams: S or T* for Roof-Ceiling	Building Units	(Reserved)	Exposed Grid System	Mineral and Fiber Boards	Metal Lath	Gypsum Board	Mastic and Intumescent Coatings	SFRM+	Unprotected
Wall and Partition: U, V or W	Building or Partition Panel Units	(Reserved)	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	Mat 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



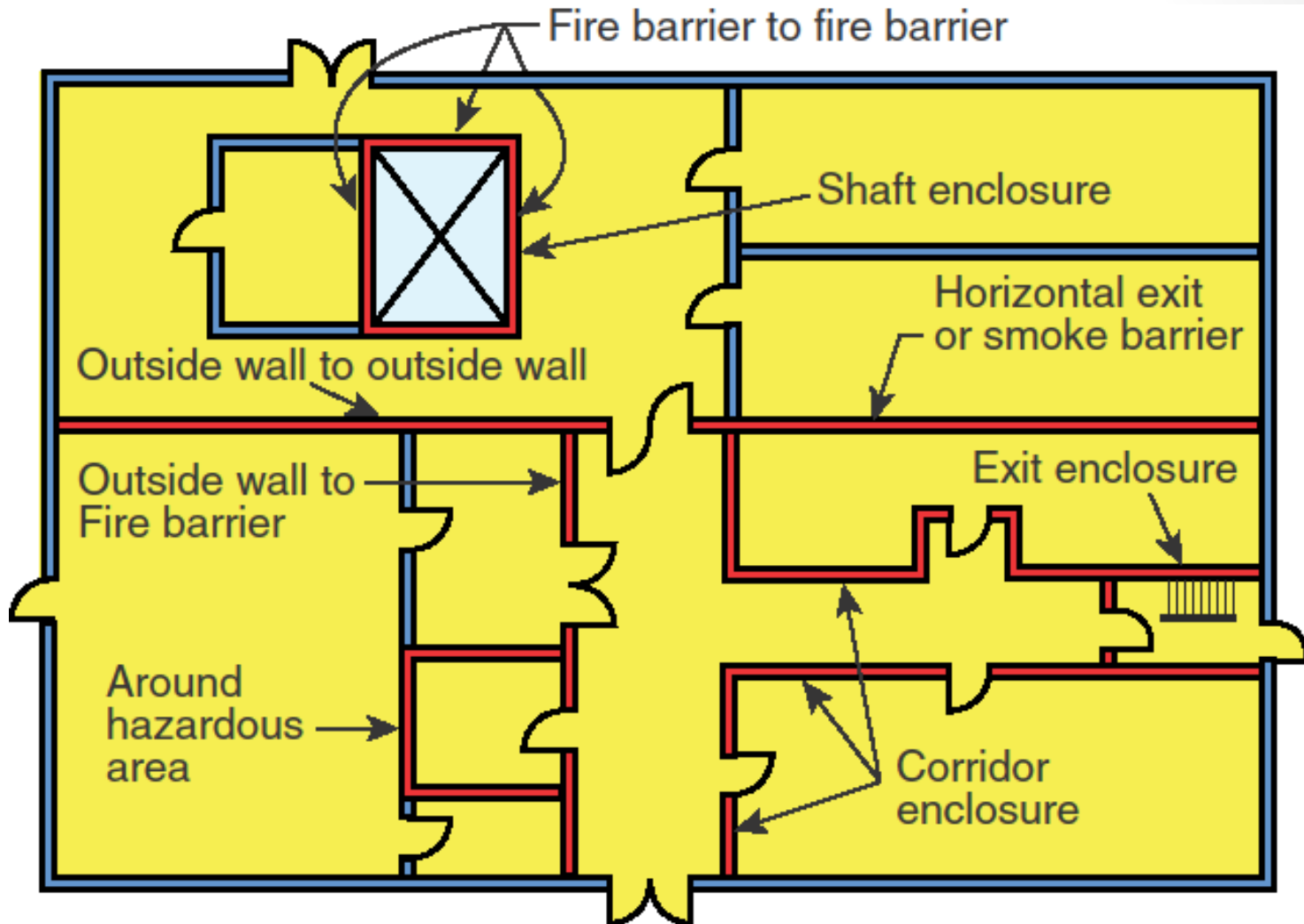
Fire Rated Glazing



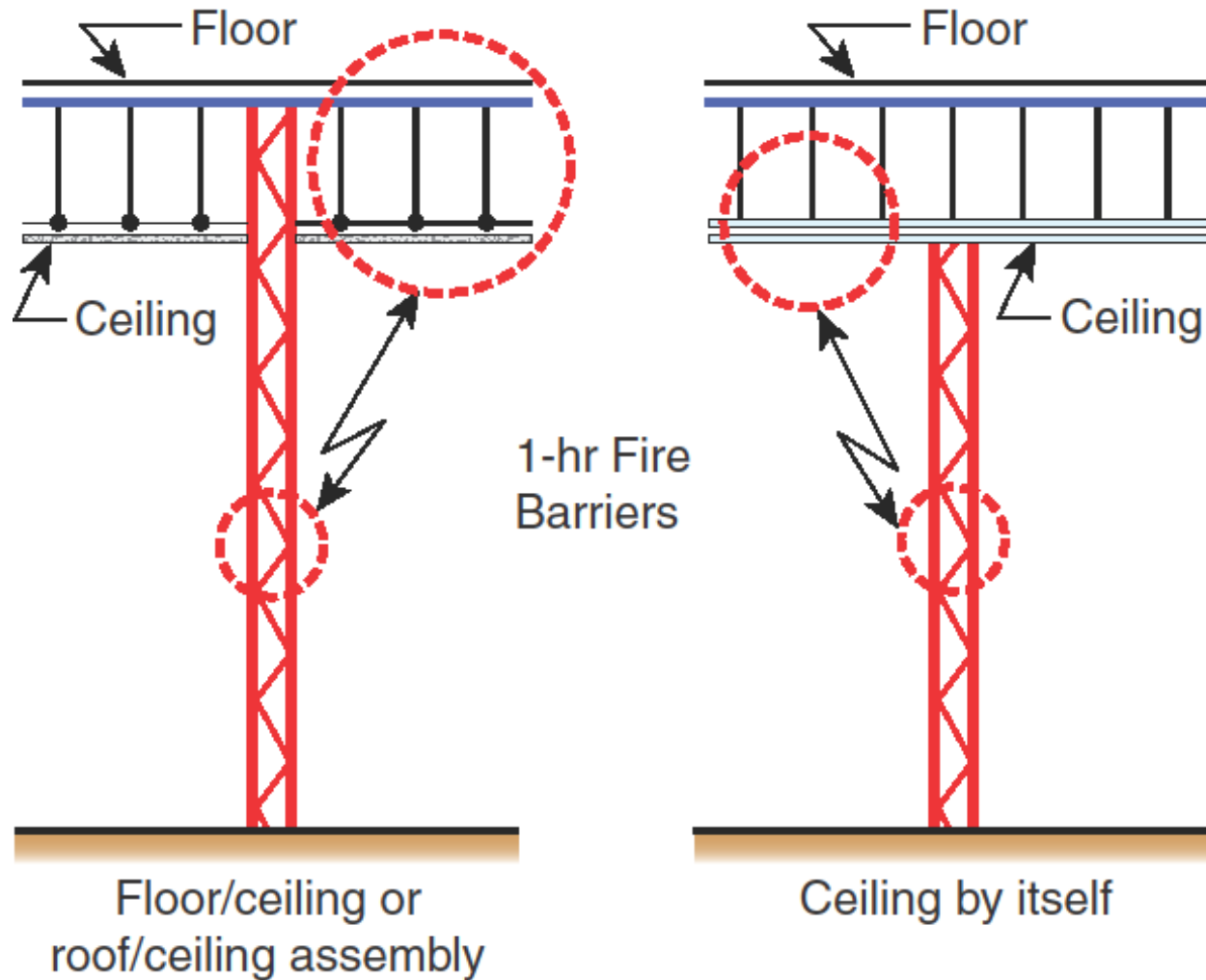
Performance Requirements

- 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



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), $\pm 1/16$ 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 – $\frac{3}{4}$ in. (1.9 cm)
 - Non-combustible sill – $\frac{3}{8}$ in. (0.95cm)
 - Tile – $\frac{5}{8}$ in. (1.6 cm)
 - Class I or II carpeting – $\frac{1}{2}$ in. (1.3 cm)
- Current requirement – $\frac{3}{4}$ in. (1.9 cm)

Protective Plate



Window Assemblies in Fire Barriers

- Permitted in ≤ 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 Partitions



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



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



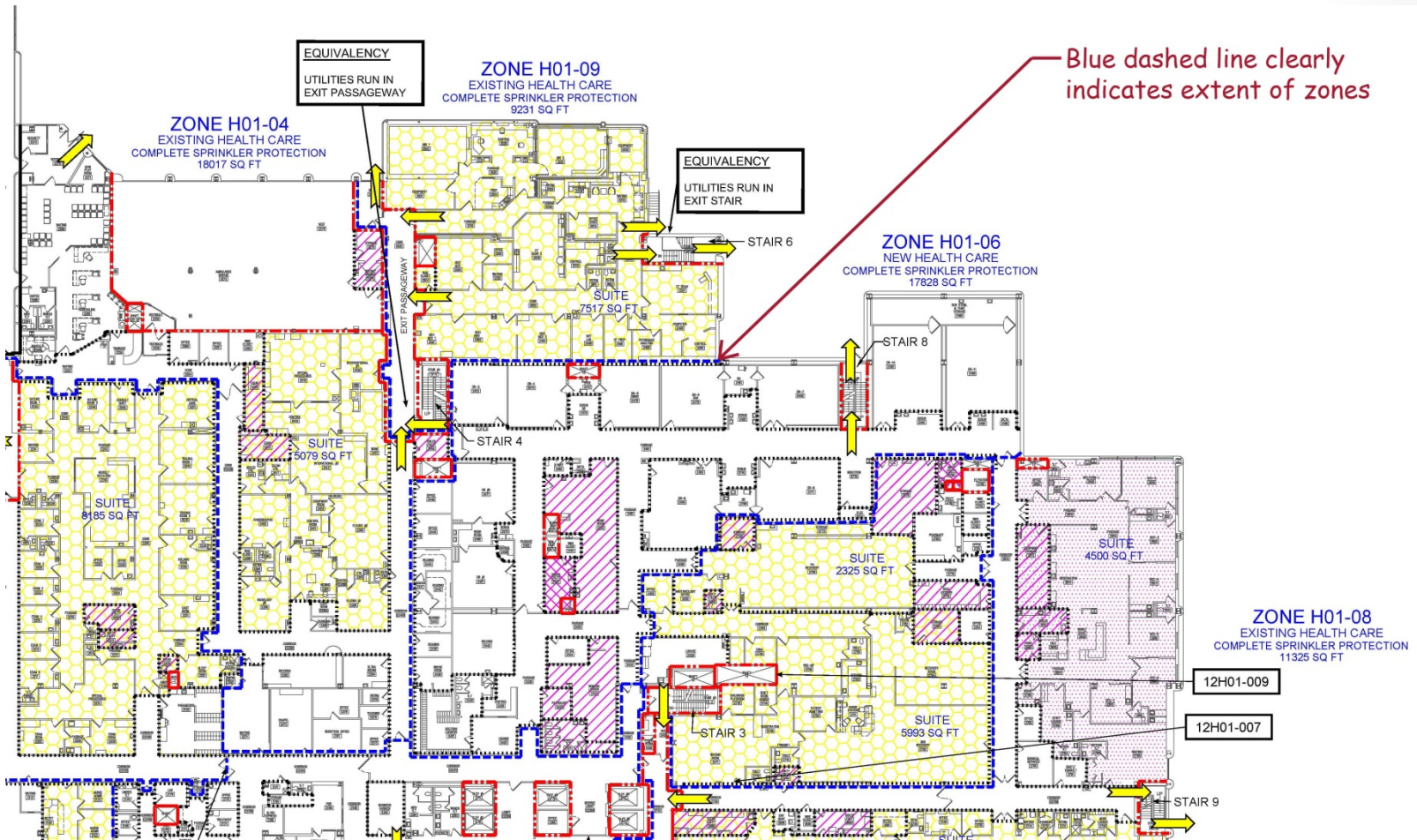
Exterior Walls



Exterior Walls

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

Inventory



Objectives

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Questions?

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