Course Description

• This seminar addresses the provisions of the 2021 International Building Code® (IBC®) regarding the use of fire and smoke separations.

Objectives

• Upon completion, you will be better able to:
  1. Identify the general types of fire and smoke separations.
  2. Identify those specific components that make up fire and smoke separations.
  3. Determine where separations are required.
  4. Determine where separations are permitted as alternatives to other requirements.
Course Overview

• Module 1 – Fire and Smoke Protection Concepts
• Module 2 – Types of Fire and Smoke Separations
• Module 3 – Fire and Smoke Separation Components
• Module 4 – Fire and Smoke Separation Locations

Fire and Smoke Protection Concepts

 Module 1

• IBC uses fire and smoke assemblies and protectives for a variety of purposes:
  • Structural integrity maintenance.
  • Fire spread limitation.
  • Means of egress protection.
  • Radiant heat (exposure) protection.
  • Smoke movement restriction.
**Structural Integrity**

- Larger and/or high-hazard occupancy buildings require specified fire-resistance levels for structural members.
- IBC Chapter 6 “Type of Construction.”

**Structural Fire Resistance**

- Structural fire resistance is intended to protect structural integrity of building elements during fires.

- Elements include:
  - Structural frame members.
  - Bearing walls.
  - Floor construction.
  - Roof construction.

**Fire Spread Limitation**

- Multiple conditions utilize fire-resistant separations to limit fire spread.
  - Complete and partial fire separations either mandated, or provided as an alternative, to address a variety of issues.
  - Vertical and/or horizontal separations typically require opening protective and other components to achieve full separation.
Protection of Exitways

- As means of egress systems become more complex, fire-resistance-rated and/or smoke-resistant construction is often mandated.
  - “Exit” portion of the means of egress is typically where such protection must be afforded.
  - Means of egress fire protection allows extended travel in large areas or multistory buildings.

Radiant Heat Protection

- As a means to address the spread of fire from building to building due to radiant heat transfer, fire-resistance-rated exterior walls required based on proximity to lot lines and other buildings on the same site.
  - The concept of “fire separation distance” is selectively applied to regulate exterior wall fire resistance and opening prohibition or protection.

Restriction of Smoke Movement

- Smoke-resistant construction often mandated where occupants are incapable of self preservation and protect-in-place methods are employed.
  - Institutional occupancies (health care, areas of restraint)
    - Ambulatory care facilities
    - Refuge areas (accessibility; horizontal exits)
  - Other conditions require separation that includes both smoke- and fire-resistance.
Types of Fire and Smoke Separations

Module 2

Fire-resistance-rated Separations

- IBC has variety of fire-resistance-rated separation "types".
- Each unique separation type serves a distinct purpose as reflected in the details applicable to the wall or horizontal assembly.

The following fire-resistance-rated assemblies are selectively required by the IBC, or in some cases can be provided as an alternative to compliance:

- Fire walls.
- Fire barriers.
- Fire partitions.
- Smoke barriers.
- Exterior walls.
- Horizontal assemblies.
**Fire Walls**

- A fire wall is the most complex and protective fire separation.
  - Selected by the designer to provide an alternative solution to code compliance, a fire wall creates separate buildings in the same structure for purposes of allowable height and area (type of construction).
  - Also selectively permitted to create fire areas, horizontal exits, etc.
  - Fire walls required to be 2-, 3- or 4-hour assemblies, based on construction type(s) and occupancy classification(s).

**Fire Barriers**

- A fire barrier is the most common means of separating portions of a building with fire-resistance-rated construction.
  - Used under both mandatory and optional conditions, fire barriers divide a building into separate areas for a variety of purposes where full separation is desired.
  - Fire barriers are limited to “vertical” assemblies.
  - Fire barriers are selectively required to be 1-, 2-, 3- or 4-hour assemblies.

**Fire Partitions**

- A fire partition is required where a limited degree of fire and smoke protection is warranted.
  - The use of fire partitions is typical in locations where fire separation is important in the initial stages of building evacuation.
  - Fire partitions are required to be minimum 1-hour assemblies, with allowances for ½-hour assemblies under specified conditions.
Smoke Barriers

• A smoke barrier is mandated where a high degree of both fire and smoke protection is desired.

• Used to create refuge compartments that allow occupants to safely await assistance or rescue.

• Must be minimum 1-hour assemblies while also providing a high degree of smoke resistance.

Exterior Walls

• Fire-resistance-rated exterior walls provide separation from internal fire, and in some cases, external fires.

• While commonly rated due to the wall’s proximity to a lot line, exterior walls also can provide for the protection of outdoor egress travel.

• Exterior walls are selectively required to be minimum 1-, 2-, or 3-hour fire-resistance-rated assemblies.

Horizontal Assemblies

• Horizontal assemblies are typically used with fire-resistance-rated wall assemblies to provide compartmentation in multistory buildings.

• In most cases, the ceiling and floor work together, as well as independently, to provide the intended separation.

• Horizontal assemblies are selectively required to be minimum ½-, 1-, 2-, 3-, or 4-hour fire-resistance-rated assemblies.
Smoke-resistant Separations

- In addition to the use of smoke barriers, the IBC also recognizes smoke partitions as a means to resist the passage of smoke.
- Smoke partitions are required where smoke movement is a concern; however, fire is not primary consideration.
- Smoke partitions are not required to have a fire-resistance rating.

Prescriptive Separations

- Prescriptive separations can also be mandated where a limited degree of separation is desired.
- Although not required to be tested and listed assemblies, these separation elements adequately serve a specific need.
- Applications include the use of:
  - Gypsum board.
  - Nonrated floor construction.
  - Construction capable of restricting smoke migration.
Vertical Elements

• A variety of different walls and partition assemblies are established in the IBC to provide varying degrees of fire and/or smoke separation.

• In addition to vertical assemblies that are tested and listed as fire-resistance-rated, modified assemblies and prescriptive-based separation elements are selectively addressed throughout the code.

Vertical Elements

• Wall assemblies such as fire walls, fire barriers, fire partitions, smoke barriers and exterior walls must be provided with fire-resistance ratings as determined in accordance with ASTM E119 or UL 263, or meet prescriptive specifications.
  • Required fire-resistance ratings vary throughout the IBC and are required based on the intended purpose of the separation.

Vertical Elements

• Partial assemblies based on listed assemblies are recognized in limited applications, typically where the potential hazard is assumed to exist only on one side of the separation element.

• Prescriptive separation elements are also occasionally mandated, where a specific material is identified as the minimum level of separation required.

• Examples of both conditions are found in the protection of enclosures under interior stairways.
**Horizontal Elements**

- *Horizontal assemblies* are tested and listed assemblies that resist the spread of fire vertically.
- Fire-resistance-rated floors and floor/ceiling assemblies can provide varying degrees of fire-resistance.
- Non-rated horizontal elements also provide a significant level of separation and are regulated under a variety of conditions.

**Vertical/Horizontal Combination**

- Vertical and horizontal elements used to completely separate one area from another.

**Doors**

- Typically, door openings require protection as part of the overall package of fire and/or smoke protection.
- In most cases, fire-protection-rated door assemblies are mandated in fire-separation assemblies.
- Although Table 716.1(2) provides the required ratings and markings for most conditions, in some cases they are also individually identified based on the specific separation.
Doors

- In a few cases, a prescriptive means of door protection is mandated.
  - For example, a solid-wood or honeycomb-core door of a specified thickness might be established as the minimum required door.

- At times, the code does not regulate door assemblies in a fire separation element.
  - The most common example is where fire-resistance-rated exterior walls are located where opening protection is not required.

Windows

- Windows and other glazed openings are typically regulated similar to doors, needing to be fire-protection-rated.

- Fire-resistance-rated glazing is also addressed, regulated in much the same manner as fire-resistance-rated wall assemblies, including testing in accordance with ASTM E119 or UL 263.

Windows

- There are situations in the code where nonrated windows are permitted in fire and/or smoke separation walls, such as:
  - where security glazing is needed - Group I-3
  - where smoke is the only concern - corridor walls in Group I-2
  - where fire-resistance-rated exterior walls are permitted with unprotected openings.
Penetrations

- Penetrations must typically be protected by firestop systems rated to the same level as the element penetrated.
  - Through penetration or membrane penetration systems.
- Prescriptive methods of penetration protection are also established.

Joints

- Fire-resistant joint systems are mandated where joints occur in separation elements requiring opening protection.
- Joint protection is also often required at the voids between curtain wall assemblies and:
  - Nonfire-resistance-rated horizontal assemblies
  - Fire-resistance-rated horizontal assemblies

Air Movement

- Fire dampers, smoke dampers, combination dampers, ceiling radiation dampers and corridor dampers are selectively required in ducts and air openings in separation elements.
- Dampers may be omitted in a variety of situations where their use has been determined to be unnecessary.
- Non-rated floor assemblies may still require damper protection at duct penetrations
Fire and Smoke Separation Locations

Module 4

Separation Locations

• Building Size, Use and Components
  • Exitways
  • Fire Limitation Features
  • Special Building Types
  • Special Occupancies and Uses
  • Special Building Features
  • Hazardous Uses
Building Height & Area – 503.1

- Each portion of a building separated by a fire wall to be considered a separate building in the determination of permissible types of construction, allowable building height and area, and number of control areas.
- The use of fire wall is selectively determined by the designer as a means to reduce building size, thus increasing the available types of construction.

Fire wall creates separate buildings for purposes of:
- Allowable heights
- Allowable areas
- Types of construction
- Number of control areas

Plan View

Building Height & Area – 503.1

For 1 in = 300.0 mm, 1 square in = 6.45 sq ft.

Party Walls – 706.1.1, Exc. 2

- Required use of a party wall (fire wall) at the lot line between two adjacent buildings where there is joint service between the buildings is not required where:
  1. The aggregate height and area of the portions of the building located on both sides of the lot line do not exceed the maximum allowed, and
  2. Dedicated easements and contractual agreements that allow either owner access to the other portion of the building to maintain fire and safety systems are provided to the building official.
**Party Walls – 706.1.1, Exc. 2**

- Applicable where building is divided by one or more party walls (fire walls) for ownership purposes.

**Fire Wall Ratings – Table 706.4**

- Rating requirements based on the buildings’ construction type(s) and occupancy classification(s).

<table>
<thead>
<tr>
<th>GROUP</th>
<th>FIRE-RESISTANCE RATING (hours)</th>
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<tr>
<td>A, B, E, H-1, I, R-1, R-2, U</td>
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<td>F-1, H-3, H-5, M, S-1</td>
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<td>H-1, H-2</td>
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<td>F-2, S-2, R-3, R-4</td>
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</table>

* a. In Type II or V construction, walls shall be permitted to have a 2-hour fire-resistance rating.

* b. For Group H-1, H-2 or H-3 buildings, also see Sections A.7.5.7 and A.7.5.8.

**Fire Walls**

- In addition, fire walls provide variety of other alternative solutions to the designer:
  - Allows increased height in feet and number of stories in Groups R-1 and R-2 for buildings of Types IIA and IIIA
  - In Appendix B of IFC, fire walls may be used to reduce fire flow requirements (create separate fire-flow calculation areas).
  - As one of two methods used to create a horizontal exit.
Separated Occupancies – 508.4.4.1

• In a mixed-occupancy building, **fire barriers and/or horizontal assemblies** are utilized under the separated occupancies method.

  • Mass timber elements separating occupancies in Type IV-B and IV-C buildings to be provided with thermal barriers of minimum ½”-thick gypsum board or equivalent

  • Table 508.4 establishes the minimum required fire-resistance for pairs of incompatible occupancies.

Separated Occupancies – Table 508.4

<table>
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<tr>
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</table>

Incidental Uses – 509.4.1

• Where an incidental use as listed on Table 509.1 is present, it must selectively be separated from other portions of the building by a **fire barrier and/or horizontal assembly** as established by Table 509.1.

• In many cases, an alternative method of protection using sprinklers and enclosure by smoke-resistant construction is permitted.
Incidental Uses – Table 509.1

- When Table 509.1 permits sprinklers as a means of protection rather than a fire barrier, the incidental use must be separated by construction capable of resisting the passage of smoke.
- Doors/air openings regulated for smoke resistance.

Incidental Uses – 509.4.2

Horizontal Building Separation

Section 510.2, #1

- Where separate and distinct buildings are created one above the other, the buildings shall be separated with a minimum 3-hour horizontal assembly. -- Podium/platform construction
- When separated and compliant with several other conditions, buildings can be regulated independently for allowable area and number of stories, type of construction, and fire wall continuity.
Horizontal Separation - 510.2

1. Exterior exit stairways in Type IIA building permitted to be of combustible materials when two conditions met:
   - adjoins exterior or internal exit stairway
   - not in occupancies having special fire-resistance requirements

2. Type III construction

3. Multi-story ramp

4. Elevation View

5. Occupancies can include Group A (R-800), G, M, R-2, and II A

6. Fully sprinklered below horizontal assembly and permitted to be all occupancies except Group H.

7. One hour fire rating (exception for 3 hr./1 hr. condition)

Parking Beneath Group R
Section 510.4

- Where maximum of one story above grade plane Group S-2 parking garage is provided under building of Group R, the number of stories used to determine type of construction to be measured from floor above parking area.
- Floor assembly between garage and Group R above to be of:
  - Type I construction (or Type IV for open parking garage)
  - Provided with a minimum fire separation based on Table 508.4:
    - 1 hour if fully sprinklered above and below separation
    - 2 hours if not fully sprinklered
Type IIIA Group R-1 and R-2 Buildings - 510.5

- Where special height increases are applied for Type IIIA Group R-1 and R-2 buildings:
  - Minimum 2-hour fire walls are required to create areas of 3,000 square feet maximum, and
  - First floor assembly over basement to have minimum 3-hour fire-resistance rating.

- Allows height increase of 10 feet and one story over Tables 504.3 and 504.4, respectively.

Type IIA Group R-1 and R-2 Buildings - 510.6

- Where special height increases are applied for Type IIA Group R-1 and R-2 buildings:
  - Minimum 2-hour fire walls are required to segregate exits,
  - First floor assembly over basement to have minimum 1½-hour fire-resistance rating, and
  - Minimum 50-foot separation required from lot lines and other buildings on the same lot.

- Allows height increase to nine stories and 100 feet.
  - General requirement of 85 feet and five stories maximum in sprinklered building.
Type IIA Group R-1 and R-2 Buildings – 510.6

- 9 stories, 100 feet

Open Parking Beneath Groups A, I, B, M and R – 510.7.1

- Where special height and area allowances are permitted for open parking garages below Group A, I, B, M and R occupancies, means of egress for the upper occupancy shall be separated from the parking by minimum 2-hour horizontal assemblies or fire barriers.

Group B or M with Group S-2 Open Parking Garage – 510.8, #1 and #7

- Where a Group B or M occupancy is located above an open parking garage and considered as separate buildings for type of construction purposes, in addition to other requirements, the buildings and exits must be separated by a minimum 2-hour horizontal assembly.
Buildings on Same Lot – 503.1.2

• Where two or more buildings are located on the same lot, they shall be regulated as separate buildings, or as portions of a single building.

• If regulated as separate buildings, the opposing exterior walls must be evaluated based on fire separation distance.
Exterior Walls – 705.5

- For separation purposes, exterior walls near lot lines, or other buildings on the same lot, are required to be fire-resistance-rated as set forth in Table 705.5.

- The primary concern is radiant heat transfer from one building involved in a fire event to an adjacent building.

Exterior Walls – Table 705.5

<table>
<thead>
<tr>
<th>FIRE SEPARATION (Feet)</th>
<th>RATED EXPOSURE</th>
<th>REQUIRED FIRE-RESISTANCE RATING</th>
<th>EXTERIOR WALL</th>
<th>RATED EXPOSURE</th>
<th>REQUIRED FIRE-RESISTANCE RATING</th>
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<td>Inside</td>
<td>5</td>
</tr>
</tbody>
</table>

- The required fire-resistance rating of exterior walls with a fire-separation distance of more than 10 feet shall be rated for exposure from fire from the inside.

- The required fire-resistance rating of exterior walls with a fire-separation distance of less than or equal to 10 feet shall be rated for exposure from fire from both sides.
Shaft Enclosures – 713

- Shaft enclosures are a permissible method of protecting openings and penetrations through floor/ceiling and roof/ceiling assemblies.

- Shaft enclosures shall be constructed as fire barriers and/or horizontal assemblies.
Shaft Enclosure Fire Ratings – 713.4
• Shaft enclosures shall have a minimum fire-resistance rating of:
  • 2 hours where connecting 4 or more stories.
  • 1 hour where connecting 3 or fewer stories.
  • 2 hours where penetrating a floor assembly of two or more hours.

Chute Access and Discharge Rooms – 713.13.3 and 713.13.4
• Waste and linen chutes access openings must be located in rooms or compartments enclosed by not less than 1-hour fire barriers and/or horizontal assemblies.
• Discharge rooms shall be separated from the remainder of the building by fire barriers and/or horizontal assemblies having a rating equal to the shaft enclosure.

Hoistway Opening Protection – 3006.3, #1 and #2
• Where elevator lobbies are required by Sections 3006.2 and 3006.2.1, they shall be constructed with fire partitions.
• Where the building is fully sprinklered, smoke partitions may be used to separate the elevator lobby at each floor.
Exit Access Stairways – 1019.3

• Shaft enclosure construction is not required where at least one of eight conditions allow exit access stairways to be unenclosed.

• Otherwise, exit access stairways to be enclosed by shaft enclosures (fire barriers) having a minimum fire-resistance ratings in accordance with Section 713:
  • 2-hour serving 4 stories or more.
  • 1-hour serving fewer than 4 stories.

Exit Access Ramps – 1019.3

• Exit access ramps are required to be enclosed with shaft enclosures (fire barriers) under the same conditions as for exit access stairways.
  • Due to the limited use of ramps connecting 3 or more stories, the application of this provision is very limited.
Interior Exit Stairways and Ramps – 1023.2

- Enclosures for interior exit stairways and ramps shall be fire barriers and/or horizontal assemblies, with a minimum rating of:
  - 2 hours where connecting 4 or more stories.
  - 1 hour where connecting 3 or fewer stories.
- The enclosure shall have a fire-resistance rating not less than the floor assembly penetrated, but need not exceed 2 hours.

Extension of Interior Exit Stairways and Ramps - 1023.3.1

- A horizontal extension of an interior exit stairways or ramp, where required, shall be by an exit passageway constructed with fire barriers and/or horizontal assemblies.
- The exit passageway shall have a minimum fire-resistance rating equal or greater to that of the connected interior exit stairway or ramp.

- There shall be a fire barrier with a rating equivalent to the interior exit enclosure and fire door assembly between the exit passageway and exit stairway.
  - See two exceptions
Smokeproof Enclosures and Pressurized Stairways and Ramps – 1023.12.1

- Where required for high-rise buildings, underground buildings or aircraft-related occupancies, smokeproof enclosures and pressurized stairways may be extended by an exit passageway.
- Fire barriers and/or horizontal assemblies must have a minimum 2-hour fire-resistance rating.

Exit Passageways – 1024.3

- Exit passageways, where provided, shall be enclosed by fire barriers and/or horizontal assemblies with a minimum 1-hour fire-resistance rating.
  - The rating cannot be less than that required for any connected interior exit stairway or ramp.

Horizontal Exits – 1026.2

- Horizontal exits, where provided, shall be constructed with fire walls or fire barriers with a minimum 2-hour fire-resistance rating.
  - The separation shall extend vertically through the entire building unless floor assemblies have a minimum 2-hour fire-resistance rating.
  - A horizontal exit creates refuge areas such that smoke protectives are also selectively required.
Exterior Exit Stairways and Ramps – 1027.6

- Exterior exit stairways and ramps shall be separated from the interior of the building consistent with the protection required for interior exit stairways and ramps.
- In addition, fire-resistance-rated construction is required for those exterior walls adjacent to the exterior stairway or ramp.

Rating comes from Section 1023.2

- 1-hr w/ ¾-hr prot openings
- 1-hr or 2-hr w/ egress door as only opening
- ≥ 1-hr w/ ¾-hr prot openings

< 10 ft

< 10 ft
Spaces under Grandstands and Bleachers – 1030.1.1.1

- Usable spaces must be separated from grandstands and bleachers above by minimum 1-hour fire barriers and/or horizontal assemblies.
- Not applicable to:
  - toilet rooms
  - small ticket booths
  - accessory area < 1000 sf. where sprinklered

Corridors – 1020.2

- Corridors shall be fire-resistance rated in accordance with Table 1020.2.
- Corridor walls are required to be constructed as fire partitions.
- Where interrupted by a lobby, foyer or reception area, the fire partition protection shall extend behind such spaces.

Corridor Construction – Table 1020.2

<table>
<thead>
<tr>
<th>OCCUPANCY</th>
<th>LOAD IMPEDING CORRIDOR PERFORMANCE</th>
<th>REQUIRED FIRE-RESISTANCE</th>
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<tr>
<td>I, II, III, IV</td>
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</tbody>
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* IBC Use of Fire and Smoke Separations

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Egress Balconies – 1021.2

- Exterior egress balconies shall be separated from the interior of the building by fire partitions and openings as required for corridors.
- Separation is not required where two specified conditions are met:
  - Two available stairways, and,
  - Dead-ends do not pass unprotected opening.

Areas of Refuge – 1009.6.4

- Each area of refuge in an accessible means of egress shall be separated from the remainder of the story by a smoke barrier or horizontal exit.
- Areas of refuge must be designed to minimize the intrusion of smoke.

Exterior Area for Assisted Rescue – 1009.7.2

- Exterior walls separating an exterior area for assisted rescue from the interior of the building shall have a minimum fire-resistance rating of 1-hour, rated for exposure from the interior.
- Wall rating and opening protectives not required where building fully sprinklered.
Exterior Area for Assisted Rescue – 1009.7.2

- Provide signs - Sections 1009.9 & 1009.11
- 30" x 48" Wheelchair space - Section 1007.6.1

Egress Courts – 1029.3

- Exterior walls adjacent to an egress court shall have a minimum 1-hour fire-resistance rating for at least 10 feet above the walking surface where the court is less than 10 feet in width.
  - Exception for an egress court that:
    - serves an occupant load less than 10, or
    - serves a Group R-3 occupancy.

Egress Courts – 1029.3

- When an egress court serving an occupant load of 10 or more is less than 10 feet in width:
  - The court walls shall be protected up to 10 feet by a minimum of 1-hour fire-resistance rated construction.
  - Openings in the court walls shall be protected by assemblies having a minimum 1-hour fire-resistance rating.
Enclosures under Interior Stairways – 1011.7.3

- Walls and soffits within enclosed usable spaces under enclosed and unenclosed interior stairways shall be protected by minimum 1-hour fire-resistance-rated construction, or the rating of the enclosure, whichever is greater.

Enclosures under Residential Interior Stairways 1011.7.3, Exception

- Spaces under stairways serving an individual Group R-2 or R-3 dwelling unit are required, at a minimum, to be protected on the enclosed side of the stairway with minimum ½-inch gypsum board.

Enclosures under Exterior Stairways – 1011.7.4

- No enclosed usable space is permitted under an exterior exit stairway unless it is completely enclosed in 1-hour fire-resistance-rated construction.
Interior Exit Discharge – 1028.2, Exception 1

• Where an interior exit stairway is permitted to egress through a discharge level lobby or similar space, as one condition the discharge level must be separated from areas below by construction conforming to the fire-resistance rating of the enclosure.

Interior Exit Discharge – 1028.2, Exception 2

• Where an interior exit stairway is permitted to egress through a discharge level vestibule, as one condition the discharge level must be separated from areas below by construction conforming to the fire-resistance rating of the enclosure.
• In addition, the vestibule must be separated from the remainder of the level of exit discharge by fire partitions.
Fire Limitation Features

Fire Areas – 901.7

- Many of the sprinkler thresholds are based on size of fire area
- Where buildings are divided into fire areas so as not to exceed the limits of Section 903 for requiring an automatic sprinkler system, the fire areas shall be separated by fire barriers and/or horizontal assemblies having a minimum fire-resistance rating as set forth in Table 707.3.10.

Fire Areas – 901.7

- Fire areas can be established by use of
  - fire walls
  - fire barriers
  - horizontal assemblies
  - or a combination of the above
Smokeproof Enclosures – 909.20.2

- A smokeproof enclosure shall be separated from the remainder of the building by minimum 2-hour fire barriers and/or horizontal assemblies.
- In addition, the vestibule must be separated from the stairway by minimum 2-hour fire barriers and/or horizontal assemblies.
Stair Pressurization Alternative – 909.20.6.1

• Smokeproof enclosure ventilation systems shall be isolated from the remainder of the building by minimum 2-hour fire barriers and/or horizontal assemblies.
  • Protection shall be provided for equipment, control wiring, power wiring and ductwork.

Fire Command Center – 911.1.2

• Fire command centers, where required, shall be separated from the remainder of the building by minimum 1-hour fire barriers and/or horizontal assemblies.

Fire Pump Rooms – 913.2.1

• Fire pumps shall be located in rooms separated from all other portions of the building by minimum 2-hour fire barriers and/or horizontal assemblies.
  • In other than high-rise buildings, where the building is fully sprinklered, the fire barriers and/or horizontal assemblies must have a minimum 1-hour fire-resistance rating.
Fire Pump Rooms – 913.2.1

- Minimum 1-hour fire barrier

Fire pump room in sprinkler building

Fire Alarm Systems in Group R Occupancies – 907.2.8.1 & 907.2.9.1

- In select Group R occupancies not exceeding two stories, an otherwise-mandated fire alarm system may not be required where the units are separated from each other and the public and common areas by minimum 1-hour fire partitions.
- In addition, all units must exit directly to a public way, egress court or yard.

Smoke Control Systems – 909.5

- Where construction elements are used as a part of a smoke control system, smoke barriers shall be provided.
- The maximum allowable leakage area is to be calculated and reviewed for compliance.
- Smoke barriers required for:
  - Passive smoke control
  - Smoke control system using pressurization method
Mall/Anchor Building Separation – 402.4.2.2

- An anchor building shall be separated from a covered or open mall building by a fire wall.
- Where the anchor building is 3 stories or less, minimum 2-hour fire barriers are permitted.

Mall/Parking Garage Separation – 402.4.2.3

- An attached parking garage shall be separated from a covered mall building, open mall building or anchor building by a minimum 2-hour fire barrier and/or horizontal assembly.
Mall Tenant Separations – 402.4.2.1

• Each tenant space within a mall building shall be separate from other tenant spaces by a fire partition.

• No separation wall is required between the tenant space and the mall.

Standby Power Protection in High-rise Buildings – 403.4.8.1

• If a generator within a high-rise building is used for standby power purposes, it shall be located in a separate room enclosed with minimum 2-hour fire barriers and/or horizontal assemblies.

Atrium Sprinkler Protection Section 404.3, Exception 1

• The sprinkler required for a building containing an atrium is not required for those areas adjacent and above the atrium space provided that portion is separated from the atrium by minimum 2-hour fire barriers and/or horizontal assemblies.
Atrium Separation – 404.6

• Atrium spaces shall be separated from adjacent spaces by a minimum 1-hour fire barrier and/or horizontal assembly.

• The 1-hour separation is not required under one of six exceptions,
  1. where glazed atrium enclosure is protected by an automatic sprinkler system,
  2. ¾ hour glass block is utilized as the enclosure, or
  3. atrium open to no more than 3 stories
  4. atrium not required to have a smoke control system
  5. openings for escalators complying with Section 712.1.3
  6. openings for exit access stairways complying with Section 1019.3, Item 4

Atrium Separation – 404.6, Exception 1

Underground Building Compartmentation – 405.4

• A building with a floor level more than 60 feet below the lowest discharge level must be divided into at least two compartments, created through the use of smoke barriers.

• Elevators that serve more than one compartment shall be provided with an elevator lobby separated from each compartment by a smoke barrier.
Special Occupancies and Uses

Private Garage Buildings – 406.3.1

• Multiple 1,000-square-foot private garages are permitted within the same structure where each private garage is separated by minimum 1-hour fire barriers, horizontal assemblies, or both.

Garage Dwelling Separations – 406.3.4.1

• A private garage shall be separated from the dwelling unit by minimum ½-inch gypsum board on the garage side.
• Garages with habitable rooms above shall be separated by not less than 5/8-inch Type X gypsum board.
Group I-1, Condition 2 and I-2 Smoke Compartments – 407.5, 420.6

• Every story in a Group I-1, Condition 2 or Group I-2 occupancy where persons receive care or those having an occupant load of 50 or more shall be divided into at least two smoke compartments by smoke barriers.

Group I-2 Smoke Compartments – 407.5

- Corridor walls in a Group I-2 occupancy shall be constructed as smoke partitions.
- Waiting areas and similar spaces constructed as required for corridors are permitted to be open to the corridor.
- Doors require no closing device but shall be positive latching and limit smoke.
Group I-2 Corridors – 407.3

Group I-2 Care Suites – 407.4.4.2
- Care suites shall be separated from other portions of the building by smoke partitions.

Group I-3 Smoke Compartments – 408.6
- Every story in a Group I-3 occupancy shall be divided into at least two smoke compartments by smoke barriers when:
  - used by residents for sleeping, or
  - those stories have an occupant load of 50 or more
Group I-3 Interior Exit Stairways – 408.3.8

• One interior exit stairway in each Group I-2 building is permitted to have *glazing installed in doors and walls* at each landing providing access to the stairway.
  • The total glazing is limited to 5,000 square inches per floor level (maximum 1,296 square inches per panel).
  • Sprinkler protection is required to wet the glazing completely.

Group I-3 Subdivision of Resident Housing Areas – 408.8

• In Occupancy Conditions 3 and 4, each sleeping area shall be separated from adjacent common spaces by a *smoke-tight partition* where distance of travel from sleeping area to corridor exceeds 50 feet.
• In Occupancy Condition 5, each sleeping area shall be separated from adjacent sleeping areas, corridors and common areas by *smoke-tight partitions*.

Aircraft Hangar Fire Areas – 412.4.6.2

• When determining the fire suppression requirements for aircraft hangars, established fire areas shall be separated by minimum 2-hour *fire walls*.
  • Creates fire areas established in accordance with hangar classification and construction type per Table 412.3.6.
Aircraft Hangar Fire Areas – 412.4.6.2

• Support areas, such as offices, shops and storage rooms, which are separated from the aircraft servicing area by minimum 1-hour fire barriers are not required to be included in the determination of fire area size.

Aircraft Hangar Heating Equipment – 412.3.4

• Heating equipment in an aircraft hangar shall be:
  ➢ placed in a separate room, and
  ➢ separated by minimum 2-hour fire barriers and/or horizontal assemblies.

Residential Aircraft Hangar Separation – 412.4.1

• An aircraft hangar attached to a dwelling must be separated by a minimum 1-hour fire barrier.
Residential Unit Wall Separations – 420.2

- In Group I-1, R-1, R-2 and R-3, R-4, walls separating dwelling and sleeping units in the same building, as well as separating such units from other occupancies in the building, shall be constructed as fire partitions.
- Minimum required fire rating of 1-hour may be reduced to ½-hour in buildings of Type IIB, IIIB and VB construction provided building is fully-sprinklered with NFPA 13 system (Section 708.3).

Residential Unit Floor Separations – 420.3

- In Group I-1, R-1, R-2, R-3 and R-4 occupancies, floor assemblies separating dwelling and sleeping units in the same building, as well as separating such units from other occupancies in the building, shall be constructed as horizontal assemblies.
- Minimum required fire rating of 1-hour may be reduced to ½-hour in buildings of Type IIB, IIIB and VB construction provided building is fully-sprinklered with NFPA 13 system (Section 711.2.4.3).

Ambulatory Care Facilities Separation – 422.2

- Ambulatory care facilities where there are 4 or more individuals incapable of self-preservation shall be separated from adjacent spaces, corridors and tenants by fire partitions.
Ambulatory Care Facilities Smoke Compartments – 422.3

• Where the aggregate area of one or more ambulatory care facilities exceeds 10,000 square feet, smoke barriers are required to create smoke compartments.
• No individual compartment is permitted to exceed 22,500 square feet.
Stage Proscenium Wall – 410.2.4

• Where the stage height exceeds 50 feet, all portions of the stage shall be separated from the seating area by a proscenium wall with a minimum 2-hour rating, extending from the foundation to the roof (fundamentally a fire barrier).
• Proscenium opening to be protected by a fire curtain or other acceptable method.

Stage Support Areas Separation – 410.4.1

• The stage shall be separated from support areas, such as dressing rooms, workshops and storerooms, by fire barriers and/or horizontal assemblies.
  • Minimum 2-hour separation required for stage heights exceeding 50 feet.
  • Minimum 1-hour separation required for stage heights of 50 feet or less.

Stage Support Areas Separation – 410.5.2

• Support areas, such as dressing rooms, workshops and storerooms, shall be separated from each other by fire barriers and/or horizontal assemblies.
  • Minimum 1-hour separation required.
Platform Construction – 410.3

- Where space beneath a permanent platform is used for storage, or any other purpose other than equipment, plumbing or wiring, the floor assembly shall be at least one-hour construction.

Elevator Machine Rooms – 3005.4

- Elevator machine rooms and spaces shall be enclosed with fire barriers and/or horizontal assemblies.
- The fire-resistance rating shall be not less than the required rating of the hoistway enclosure served by the machinery.
Fire Service Access Elevator Lobby – 3007.6.2

- In high-rise buildings provided with fire service access elevators, the elevator shall be provided with a lobby enclosed by a smoke barrier.
  - Elevator lobbies are not required at the level of exit discharge.

Occupant Evacuation Elevator Lobby – 3008.6.2

- In high-rise buildings provided with occupant evacuation elevators, the elevator shall be provided with a lobby enclosed by a smoke barrier.
  - Elevator lobbies are not required at the level of exit discharge.

Pedestrian Walkways – 3104.5

- Pedestrian walkways shall be separated from the interior of the attached buildings by minimum 2-hour fire barriers and/or horizontal assemblies.
  - An alternate separation method addresses the walkway/building connections, including the use of a tempered, wired or laminated glass wall.
Tunnels – 3104.10

• Separation between a tunneled walkway and the building to which it is connected shall be not less than 2-hour fire-resistant construction.

Hazardous Uses

Combustible Storage
Section 413

• Attic, under-floor and concealed spaces used for storage of combustible materials shall be:
  ✓ protected on the storage side as required for 1-hour fire-resistance-rated construction with
  ✓ openings protected by self-closing non-combustible or 1 ½" thick solid wood core door

Exceptions: Fire-resistance construction and opening protectives not required in:
1. sprinklered spaces
2. Group R-3 and U occupancies
Control Areas - Section 414.2.4

• Where control areas are provided for the use or storage of hazardous materials, they shall be separated by fire barriers in accordance with Table 414.2.2 (1-hour or 2-hour).

• The floor assemblies separating control areas shall be minimum 2-hour horizontal assemblies, including supporting construction.

• Exception for IIA, IIIA and VA construction permits 1-hour assemblies in sprinklered buildings no more than three stories above grade plane.

Control Areas – Table 414.2.2

Grinding Rooms – 426.1.2

• Rooms used for grinding or other operations that produce combustible dusts shall be enclosed with fire barriers and/or horizontal assemblies.

• The required fire-resistance rating is based on the floor area of the room:
  - 2 hours, where 3,000 square feet or less.
  - 4 hours, where more than 3,000 square feet.
Group H-3 and H-4 Gas Rooms – 415.10.2

• Where Group H-3 or H-4 gas rooms are provided, they shall be separated from other areas by minimum 1-hour fire barriers and/or horizontal assemblies.

Highly Toxic Solids and Liquids – 415.10.4

• Where highly toxic solids and liquids are not stored in approved hazardous materials storage cabinets, they shall be isolated from other hazardous material storage by minimum 1-hour fire barriers and/or horizontal assemblies.

Group H-5 Fabrication Areas – 415.11.1.2

• Fabrication areas in Group H-5 occupancies shall be separated from:
  1. each other,
  2. from corridors, and
  3. from other parts of the building by minimum 1-hour fire barriers and/or horizontal assemblies.
Flammable Finish Spray Rooms – 416.2

• In buildings used for the application of flammable finishes, spray rooms shall be enclosed with minimum 1-hour fire barriers and/or horizontal assemblies.

Manufacturing of Organic Coatings – 418

• In buildings used for the manufacture of organic coatings, a variety of fire separations are required using fire barriers and/or horizontal assemblies:
  • Storage areas for flammable and combustible liquid tanks: 2 hours
  • Nitrocellulose storage rooms: 2 hours
  • Storage rooms for finished products that are flammable or combustible liquids: 2 hours

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