Description

- This course provides an overview of the 2018 IBC Section 705 provisions for the application of the code requirements addressing exterior wall and opening protection.
- Other code provisions applicable to an understanding of exterior wall and opening protection will also be addressed.

Goal

- This seminar is designed to familiarize and assist code officials in locating, describing and applying applicable code requirements of the IBC regarding exterior wall and opening protection.
Objectives

- Upon completion, participants will be better able to:
  - Understand differing concepts regarding fire protection requirements for exterior walls and openings.
  - Identify conditions under which exterior walls and openings in such walls must be protected.
  - Determine appropriate fire-resistance ratings and/or fire-protection ratings based on various conditions.

Course Overview

Module 1: Roles of Fire-resistance-rated Exterior Wall Protection
Module 2: Fire-resistance-rated vs. Fire-protection-rated Elements
Module 3: Common Conditions under which Exterior Walls are to be Protected
Module 4: Projections and Parapets
Module 5: Miscellaneous Conditions and Elements Related to Exterior Wall and Opening Protection
**Exterior Wall Protection**

- The required fire-resistance rating of exterior walls can be based on a variety of factors:
  - Structural integrity during a fire event
  - Radiant heat exposure to adjacent buildings and lots
  - Protection of exit paths
  - Miscellaneous protection purposes

**Structural Integrity**

- Exterior walls are regulated differently depending on their contribution to the structural integrity of the building.
- Bearing walls must be fire-resistance-rated in buildings of Types IA, IB, IIA, IIIA, IIIB, IV and VA construction.
  - Degree of fire-resistance established in Table 601.
- Nonbearing walls require no fire-resistance when solely addressing structural protection.

**Radiant Heat Exposure**

- Fire-resistance of exterior walls is required where a building’s location on the lot creates concerns of radiant heat exposure to:
  - Adjacent lots
  - Other buildings on the same lot.
- Spatial separation can be substituted for fire-resistance as a means of protection based on distances established in Table 602.
Protection of Exit Paths

- Exterior walls sometimes require fire-resistance in order to protect exterior exit paths in:
  - Exit courts
  - Exterior exit stairways
  - Interior exit stairways
  - Exterior areas of assisted rescue.

Miscellaneous Protection

- Exterior wall protection is required for a variety of other purposes throughout the code
  - Continuity of fire wall separation
  - Vertical separation of openings
  - Special provisions for special building types:
    - Group H occupancies
    - Aircraft hangars
    - Unlimited area buildings
    - Opening parking garages
    - Penthouses

Openings in Exterior Walls

- Based on the protective role the wall plays, openings in exterior walls are regulated differently.
  - Bearing walls (opening protection not required)
  - Location on lot (opening protection may be required)
  - Protection of exitways (opening protection always required)
  - Miscellaneous locations (opening protection varies based on each specific condition)
**Additional Exterior Wall Protection**

- Joints in or between exterior walls are required by Section 705 to be fire-resistance rated to comply with Section 715.
- Exceptions for walls permitted to have unprotected openings.
- Penetration by an air duct or air transfer opening in fire-resistance-rated exterior wall is to be provided with a fire damper where the wall is required to have protected openings.

**Fire-protection-rated Elements vs. Fire-resistance-rated Elements**

Module 2

Ratings for Exterior Walls and Openings

Fire protection of exterior walls and openings are typically based on the procedures set forth in:

- ASTM E119 or UL 263 for wall assemblies, including glazed wall assemblies
- NFPA 252 or UL 10C for swinging fire door assemblies, including glazing in doors
- NFPA 257 or UL 9 for fire window assemblies
Fire-resistance Ratings
Section 703.2
The fire-resistance ratings of building elements shall be determined in accordance with:
- The procedures set forth in ASTM E119 (Test Methods of Fire Tests for Building Construction and Materials, or UL 263 (Standard for Fire Test of Building Construction and Materials), or
- The alternative methods for determining fire resistance as established in Section 703.3.

Wall Assembly Fire Test
ASTM E119 Fire Test for Wall Assemblies

Assembly must:
- Sustain an applied load.
- Have no passage of flame or gas hot enough to ignite cotton waste.
- Have an average temperature rise on unexposed surface not more than 250°F (121°C) above initial temperature or more than 325°F (163°C) at any point.
- Allow no water to pass through during hose stream test.

Fire-resistance Ratings
Section 705.5
Exterior walls are required to be rated for exposure to fire from:
- Both sides where the separation distance is 10 feet or less.
- Only the inside where the fire separation distance exceeds 10 feet.
**Fire-resistance Ratings**

**Section 705.5**

![Diagram of fire-resistance ratings and construction details.]

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**Key Points**

- Provisions of Section 705.5 are to be applied regardless of the reason that the exterior wall requires a fire-resistance rating.
- An exterior wall rated for exposure to fire from the inside only must be tested as a complete wall assembly.

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**Nonsymmetrical Wall Construction**

**Section 703.2.1**

![Diagram of nonsymmetrical wall construction.]

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Calculation of Exterior Wall Ratings
Section 722.6.2.3

- Calculation of fire-resistance ratings for wood-framed exterior walls permitted under the provisions of Section 722.6.2.3.
- Limited to 1-hour assemblies
- Applicable to "Fire Side"-only assemblies as well as full assemblies

Fire-resistance-rated Glazing
Section 703.6

- Fire-resistance-rated glazing permitted for use where:
  - Tested in accordance with ASTM E119 or UL 263
  - Permanently labeled or identified per Table 716.1(1)
  - Installed in accordance with listing
Fire Door Assemblies  
Section 716.2
- Side-hinged or pivoting doors must comply with NFPA 252 or UL 10C.
- Fire-protection rating must comply with Table 716.1(2).
- Glazing in door assembly and/or adjacent to door assembly shall be further regulated.

Fire Window Assemblies  
Section 716.3
- Fire-protection-rated glazing for fire window assemblies shall meet acceptance criteria of NFPA 257 or UL 9.
- Protected openings may be required in nonfire-resistance-rated exterior walls under the provisions of Sections 705.8.5 and 705.8.6.
  - Vertical separation of openings
  - Vertical exposure
- A minimum fire-protection rating of 45 minutes shall be required for such openings.

Common Conditions under which Exterior Walls are to be Protected
Where Regulated
Exterior walls are to be regulated under the following conditions:
- Type of construction (bearing walls)
- Location on lot (radiant heat transfer)
- Multiple buildings on the same lot
- Protection of exitways

Type of Construction
Chapter 6
- Bearing walls regulated for fire-resistance because of structural integrity conditions are addressed by Chapter 6 and Table 601.
- Nonbearing walls are not regulated for type of construction purposes
- Fire-resistance shall be required because of its:
  - Contribution to structural stability/integrity
  - Types IA, IB, IIA, IIIA, IV and VA
  - Perimeter containment/resistance under fire conditions
  - Types IIIA, IIIB and IV

Type of Construction
Chapter 6

<table>
<thead>
<tr>
<th>Noncombustible</th>
<th>Exterior and interior (bearing and nonbearing) walls, floors, roofs and structural frame elements to be of noncombustible materials</th>
</tr>
</thead>
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<tr>
<td>I</td>
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</tr>
<tr>
<td>II</td>
<td>A</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Combustible and/or noncombustible</th>
<th>Exterior walls to be of noncombustible materials</th>
<th>III</th>
<th>A</th>
<th>B</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>IV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any materials permitted by the code</td>
<td></td>
<td>V</td>
<td>A</td>
<td>B</td>
</tr>
</tbody>
</table>
Type of Construction
Section 602.1

- Exterior walls to have a fire-resistance rating not less than that specified in Table 601.

<table>
<thead>
<tr>
<th>Type of Construction</th>
<th>Exterior walls to be of noncombustible materials</th>
<th>Exterior walls to be of combustible and/or noncombustible materials</th>
<th>Exterior walls to be of noncombustible materials permitted by the code</th>
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</thead>
<tbody>
<tr>
<td>Noncombustible</td>
<td>I A B</td>
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</tr>
<tr>
<td></td>
<td>B A B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>II A B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>III A B</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV HT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>V A B</td>
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<td></td>
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</table>

Table 601

<table>
<thead>
<tr>
<th>Type of Construction</th>
<th>Fire Resistance Rating (FRR)</th>
<th>FRR</th>
<th>FRR</th>
<th>FRR</th>
<th>FRR</th>
<th>FRR</th>
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</thead>
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<td>B</td>
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<td>B</td>
<td>B</td>
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<td>A</td>
<td>B</td>
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<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>

Notes:
- Type of construction to be based on the occupancy and the fire resistance requirements of the building and the environment.
- Exterior walls to be of noncombustible materials for Noncombustible construction.
- Exterior walls to be of noncombustible materials permitted by the code for V A B construction.

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Openings in Bearing Walls
Section 602.1

- Openings in exterior walls require no fire-resistance-rated or fire-protection-rated protection where wall rating only required per Table 601.
- Opening protection may be required by other provisions of the code, such as Table 602 regulating its location on the lot.
- Most restrictive provisions apply

Lot Line Concept

- Use of the lot line as controlling factor based on the concern that control is only possible on own lot
- Lot line concept is used as means of protecting one building from another as far as exposure is concerned
- Exposure is deemed as a potential for heat to be transmitted from one building to another during fire conditions
- Radiation is considered a primary means of heat transfer
- Lot line concept is also utilized where multiple buildings are located on the same lot

Exterior Wall Ratings
Chapter 6

- Section 602.1 and Table 602 regulate fire resistance of exterior walls because of proximity to adjacent lot lines or other buildings on the same lot
- Fire separation distance is determined to be “distance measured from building face to closest interior lot line, to centerline of street, alley or public way, or to imaginary line between two buildings on lot. Distance to be measured at right angles from face of wall”
Fire Separation Distance
Section 202

Fire Ratings of Exterior Walls
Table 602

Fire Ratings of Exterior Walls
Table 602
Fire Ratings of Exterior Walls

Example

Table 601 Structural Frame

Table 601 Exterior Bearing Wall

Table 602 for Fire Separation Distance

Structural Frame Members

Section 704.10

- Structural frame members in exterior wall shall be provided with highest fire-resistance rating in accordance with:
  - Table 601 Structural Frame
  - Table 601 Exterior Bearing Wall
  - Table 602 for Fire Separation Distance

Structural Frame Members

Example

Minimum Fire-resistance Rating for Load-bearing Structural Members within Nonbearing Exterior Wall

| Table 601 Structural Frame | 2 hours | Not applicable |
| Table 601 Exterior Bearing Wall | 2 hours | Not applicable |
| Table 602 Fire Separation Distance | 1 hour | 1 hour |

Therefore, columns and other primary structural frame members shall be minimum 2-hour fire-resistance-rated. Nonbearing exterior wall to be minimum 1-hour fire-resistance-rated because of FSD.
Openings in Exterior Walls
Section 705.8.1

- Area of protected and unprotected openings permitted in exterior wall in any story are limited by Table 705.8
- Openings prohibited where limited or no fire separation distance is provided
- As fire separation distance increases, openings are permitted in increasing amounts

Maximum Area of Exterior Openings
Table 705.8

<table>
<thead>
<tr>
<th>Fire Separation Distance</th>
<th>Openings, Transom (R, Rk)</th>
<th>Transom &amp; Vertical (R, Rk)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ft or less</td>
<td>0%</td>
<td>No Limit</td>
</tr>
<tr>
<td>1-5 ft</td>
<td>0%</td>
<td>No Limit</td>
</tr>
<tr>
<td>6-10 ft</td>
<td>0%</td>
<td>No Limit</td>
</tr>
<tr>
<td>11-15 ft</td>
<td>0%</td>
<td>No Limit</td>
</tr>
<tr>
<td>16-20 ft</td>
<td>0%</td>
<td>No Limit</td>
</tr>
<tr>
<td>21-25 ft</td>
<td>0%</td>
<td>No Limit</td>
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<tr>
<td>26-30 ft</td>
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<tr>
<td>31-35 ft</td>
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<tr>
<td>36-40 ft</td>
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<tr>
<td>41-45 ft</td>
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<tr>
<td>46-50 ft</td>
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<td>51-55 ft</td>
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<td>56-60 ft</td>
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<td>61-65 ft</td>
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<td>66-70 ft</td>
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<td>71-75 ft</td>
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<tr>
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<td>81-85 ft</td>
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<tr>
<td>86-90 ft</td>
<td>0%</td>
<td>No Limit</td>
</tr>
<tr>
<td>91-95 ft</td>
<td>0%</td>
<td>No Limit</td>
</tr>
<tr>
<td>96-100 ft</td>
<td>0%</td>
<td>No Limit</td>
</tr>
</tbody>
</table>

For SI: 1 ft = 0.305 m.
1. All openings in building not supported by or connected to an automatic sprinkler system in accordance with Section 903.3.1.1.
2. Openings in building supported by or connected to an automatic sprinkler system in accordance with Section 903.3.1.1.
3. Openings permitted where protected by a smoke control system in accordance with Section 903.3.2.5.
4. For openings protected by a smoke control system in accordance with Section 903.3.2.5.
5. For openings protected by a smoke control system in accordance with Section 903.3.2.5.
6. Area of openings in an occupancy where a fire separation distance of 15 ft (4.5 m) or less is to be maintained.
Openings in Exterior Walls
Section 705.8.1, Exception 2

- Buildings whose exterior wall, exterior nonbearing wall and exterior structural frame are not required to be fire-resistance rated (by Tables 601 and 602) are permitted to have unlimited unprotected openings.

Openings in Exterior Walls
Section 705.8.1, Exception 2

Example

![Diagram showing an example of openings in exterior walls with specified clearances and ratings.]

Therefore, there is no limit to the amount of openings permitted in the wall wall and the openings are not required to have a fire protection rating.
Openings in Exterior Walls
Example #1

- Group B
- Type IIIB Construction
- Non-sprinklered
- Minimum 1-hour fire separation
- Minimum 1-hour fire protection
- Unlimited unprotected
- No rating required

Openings in Exterior Walls
Example #2

- Group B
- Type IIIB Construction
- Fully sprinklered
- Minimum 1-hour fire separation
- Unlimited unprotected
- 25% UP or 25% PR

Openings in Exterior Walls
Section 705.8.1, Exception 1

- In other than Group H, unlimited unprotected openings are permitted in the first story of exterior walls facing:
  - A street with fire separation distance > 15 feet
  - An unoccupied space ≥ 30 feet in width and accessible from a street by a posted fire lane
  - Unoccupied space to be located on same lot or dedicated for public use
**Openings in Exterior Walls**

**Section 705.8.1, Exception 1**

- Where both protected and unprotected openings are located in an exterior wall in any story, total area of openings shall comply with the following formula (only applicable to nonsprinklered buildings):

\[
\left(\frac{A_p}{a_p}\right) + \left(\frac{A_u}{a_u}\right) < 1.0
\]

- where:
  - \(A_p\) = actual area of protected openings
  - \(a_p\) = allowable area of protected openings
  - \(A_u\) = actual area of unprotected openings
  - \(a_u\) = allowable area of unprotected openings

---

**Mixed Openings in Exterior Walls**

**Section 705.8.4**

- Where both protected and unprotected openings are located in an exterior wall in any story, total area of openings shall comply with the following formula (only applicable to nonsprinklered buildings):

\[
\left(\frac{A_p}{a_p}\right) + \left(\frac{A_u}{a_u}\right) < 1.0
\]

- where:
  - \(A_p\) = actual area of protected openings
  - \(a_p\) = allowable area of protected openings
  - \(A_u\) = actual area of unprotected openings
  - \(a_u\) = allowable area of unprotected openings

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**Mixed Openings in Exterior Walls Example**

*Given:* A nonsprinklered Group S-1 building of Type III-B construction. The exterior wall shown is located 12 feet from an interior lot line.

*Determine:* The maximum area permitted for unprotected openings.

*Solution:*

\[
\left(\frac{A_p}{a_p}\right) + \left(\frac{A_u}{a_u}\right) < 1.0
\]

\[
\frac{83}{324} + \frac{81}{108} = 1.0
\]

Up to 81 sq ft of unprotected openings are permitted.
Protected Openings
Section 705.8.2
Where openings are required to be protected, fire doors, fire shutters and fire windows to comply with Section 716.
- Opening protective not required where:
  - Building is provided with sprinkler system throughout, and
  - Exterior openings are protected by water curtain.
- Use of exception not applicable to Table 705.8
- Allowance applicable where other provisions require protected openings, such as:
  - Exterior areas of assisted rescue
  - Exterior exit stairway protection
  - Egress courts

Section 705.8.3
Unprotected Openings
Where unprotected openings are permitted, windows and doors shall be constructed of any approved materials.
- Glazing shall conform with Chapters 24 and 26

Fire Door Assemblies
Section 716.2
- Table 716.1(2) identifies minimum fire door and fire shutter assembly ratings based on
  - Type of wall assembly where the door/shutter is located
  - Required wall assembly rating
- Table also identifies:
  - Door vision panel size
  - Fire-rated glazing marking of door vision panels
  - Minimum sidelight/transom assembly rating
  - Fire-rated glazing marking of sidelight/transom panel
Table 716.1(2)

<table>
<thead>
<tr>
<th>Type of Wall Assembly</th>
<th>Type of Opening</th>
<th>Required Rating</th>
<th>Required Glazing Marking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Center walls</td>
<td>2</td>
<td>L1000</td>
<td>Not Permitted</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1</td>
<td>L1000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 716.1(3)

- Table 716.1(3) identifies minimum fire window assembly ratings based on:
  - Type of wall assembly where door/shutter located
  - Required wall assembly rating
- Table also identifies:
  - Fire-rated glazing marking of fire windows
Section 705.3
Buildings on the Same Lot

- For purposes of required wall/opening protection and projections, buildings on the same lot shall be assumed to have an imaginary line between them.

Buildings on Same Lot
Option #1

Buildings 1 and 2 regulated as two separate and distinct buildings.
Buildings on the Same Lot
Section 705.3

- Where a new building is erected on the same lot as an existing building, the location of the assumed imaginary line with relation to the existing building to be such that the exterior wall and opening protection of the existing building comply.

Buildings on the Same Lot
Section 705.3

- Imaginary line must be located such that wall and openings in exterior wall of existing building are in compliance.

Buildings on the Same Lot
Section 705.3, Exception 1

- As an alternative, multiple buildings on the same lot are permitted to be considered as portions of a single building if the aggregate area of such buildings are within limits specified in Chapter 5 for single building.
- Where buildings contain different occupancy groups or are of different types of construction, areas shall be that allowed for the most restrictive occupancy or construction.
- Provisions of the IBC applicable to aggregate building shall be applicable to each building (Section 503.1.2).
Buildings on the Same Lot
Option #2

Buildings 1 and 2 regulated as portions of a single building

Buildings on the Same Lot
Section 705.3

Buildings on the Same Lot
Section 705.3, Exception 2

- Special provisions for exterior wall openings are available for a Type I or IIA Group S-2 parking garage on the same lot as a Group R-2 building.
- Adjoining exterior walls between buildings are permitted to have occupant use openings in accordance with Section 706.8.
Buildings on the Same Lot
Section 705.3, Exception 2

Interior Exit Stairway Exterior Walls
Section 1023.7

- Exterior walls of interior exit stairways and ramps shall:
  - Comply with Section 705
  - Where nonrated walls or unprotected openings enclose the exterior of the stairway, protection shall be provided at adjacent walls and openings where exposed at less than 180 degrees.
Exterior Stairway Protection
Section 1027.6

- Exterior stairways and ramps shall be separated from the interior of the building per Section 1023.2.
- Openings limited to those necessary for egress from normally occupied spaces.
- Exceptions include where:
  - Stairway serves two stories maximum (not R-1 or R-2)
  - Access to 2nd exit is provided
  - Complying open-ended corridors are provided
  - Group R-3 not more than 4 stories in height

Exterior Stairway Protection
Section 1027.6

- Exterior stairways and ramps shall be separated from the interior and comply with provisions for interior exit stairways and ramps (Section 1023.2).
- Separation to be:
  - Minimum 1-hour where a stairway/ramp serves three or fewer stories
  - Minimum 2-hour where a stairway/ramp serves four or more stories

Exterior Stairway Protection
Section 1027.6

- In addition to protection required in an exterior wall common to an exterior stairway/ramp, additional projection is required in walls adjacent to a stairway.
Exterior Stairway Protection
Section 1027.6

> 1-hr w/ ¾-hr prot. openings

≥ 10 ft

1-hr or 2-hr w/ eggn. door as only opening

> 1-hr w/ ¾-hr prot. openings

≥ 10 ft

Separation from the interior of building is not required where exterior stairways/ramps are connected to open-ended corridors, provided:

- Building is fully sprinklered
- Open-ended corridors comply with Section 1020
- Open-ended corridors connect to complying exterior exit stairways/ramps
- Exterior walls and openings adjacent to an exterior stairway/ramp comply with Section 1023.7
- Changes in direction of open-ended corridors are provided with clear openings to minimize accumulation of smoke and toxic gases

Open-ended Corridors
Section 1027.6, Exception 3

Separation not required

Corridor

Sprinklered (throughout)

Exterior exit corridor

Provide min. 35 sq. ft. of open area incl. less than 42 in. above floor level

Clear opening 35°

30 sq. ft. or side-by-side stairway remodeled
Exit Discharge
Section 1028

- Egress court less than 10 feet in width to be separated from building with:
  - Walls with minimum 1-hour fire-resistance-rated construction to a minimum height of 10 feet
  - Openings protected a minimum ¾-hour

Exceptions for egress courts serving:
- Occupant load of less than 10, or
- Group R-3 occupancies

Inaccessible Exit Discharge
Section 1009.7.2

- If exit discharge is not accessible, one of the following components must be provided:
  - Interior area of refuge, or
  - Exterior area of rescue assistance.
  - Required fire separation creates ‘protect-in-place’ condition.
  - Fire-resistance rating and opening protectives not required where building is sprinklered throughout
Fire Walls
Section 706
- Fire walls separate a single building into two or more buildings as a design choice.
- Among other requirements, fire walls are regulated for:
  - Horizontal continuity
  - Conditions where the intersection of the fire wall and exterior wall is less than 180 degrees
  - Horizontal projecting elements

Fire Wall Horizontal Continuity
Section 706.5
- Fire walls shall extend a minimum of 18 inches beyond the exterior surface of exterior walls.
- Several exceptions allow for an alternative means of protection.
Fire Wall Horizontal Continuity
Section 706.5, Exception 1

For SI: 1 foot = 304.8 mm.

Fire Wall Horizontal Continuity
Section 706.5, Exception 2

Fire Wall Horizontal Continuity
Section 706.5, Exception 3
Fire Walls at Exterior Walls
Section 706.5.1

- Where a fire wall intersects exterior walls and an angle of less than 180 degrees is formed, fire-resistance rating and opening protection of exterior walls shall meet one of two conditions:
  - Protection of wall and openings for distance on each side of intersection, or
  - Assumption of imaginary lot line at fire wall and extending beyond the exterior of the fire wall
    - Regulated in similar manner to that used for two or more buildings on the same lot
Horizontal Projecting Elements Section 706.5.2

- Fire walls to extend to outer edge of horizontal projecting elements that are within 4 feet of fire wall
- Intent is to restrict fire spread around the fire wall at exterior wall surface
- Three exceptions establish alternative means of protection
Projections and Parapets
Sections 705.2 and 705.11

- While projections are only regulated where they are provided at exterior walls, parapets may be required based on varying conditions.
- Projections are regulated to the increased hazard they may pose because of their proximity to a lot line or another building on the same lot.
- Parapets are mandated in those cases where roof protection is required because of proximity to a lot line or another building on the same lot.

Projections
Sections 705.2 and 1405

- Cornices, eave overhangs, exterior balconies and similar projections extending beyond the floor area shall conform to the requirements of Sections 705.2 and 1405.

Projection Limits at Exterior Walls
Section 705.2

- Projections beyond exterior walls are strictly limited where such walls are in close proximity to adjacent lot lines.
- Some degree of open space to the sky is required between the edge of the projection and the line used to establish fire separation distance.
Projection Limits at Exterior Walls
Section 705.2

- Table 705.2 sets forth the limitations regarding the permitted extent of projections.
- Assuming a projection adjacent to an interior lot line, no projection beyond the building's exterior wall is permitted where the exterior wall is less than 2 feet from the lot line.

### Projection Limits

**Table 705.2**

<table>
<thead>
<tr>
<th>FIRE SEPARATION DISTANCE-PSD (feet)</th>
<th>MINIMUM DISTANCE FROM LINE USED TO DETERMINE PSD</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to less than 2</td>
<td>Projections not permitted</td>
</tr>
<tr>
<td>2 to less than 3</td>
<td>24 inches</td>
</tr>
<tr>
<td>3 to less than 5</td>
<td>24 inches plus 8 inches for every foot of PSD beyond 3 feet or fraction thereof</td>
</tr>
<tr>
<td>5 or greater</td>
<td>30 inches</td>
</tr>
</tbody>
</table>
Projections
Section 705.2

- Projections from walls of Type I or II construction shall be of noncombustible materials or combustible materials where allowed by Sections 705.2.3.1 and 705.2.4
- Projections from walls of Type III, IV or V construction shall be of any approved material
- Combustible projections extending to within 5 feet of fire separation distance line shall be:
  - 1-hour fire-resistance-rated construction, or
  - heavy-timber construction, or
  - fire-retardant-treated wood, or
  - as permitted by Section 705.2.3.1

Combustible Projections
Section 705.2.3

Combustible projection to be:
- Minimum 1-hour construction, or
- Heavy timber construction, or
- Fire-retardant-treated wood, or
- As permitted by Section 705.2.3.1
Protection of Projections vs. Roof Construction

- Section 705.2.3.1 regulates combustible projections on the exterior side of exterior walls, including balconies and similar elements such as porches, decks and exterior stairways.
- Combustible balconies and similar projections to be of FRT wood, Type IV materials, or fire-resistance rated per Table 601 for floor construction (with exceptions).
- Section 705.4 deals with combustible bay and oriel windows.

Balconies and Similar Projections Sections 705.2.3.1 and 705.2.4

- Section 705.2.3.1 regulates combustible projections on the exterior side of exterior walls, including balconies and similar elements such as porches, decks and exterior stairways.
- Combustible balconies and similar projections to be of FRT wood, Type IV materials, or fire-resistance rated per Table 601 for floor construction (with exceptions).
- Section 705.4 deals with combustible bay and oriel windows.

Combustible Materials on the Exterior Side of Exterior Walls Section 1405

- Section 1405 regulates combustible wall coverings on the exterior side of exterior walls.
- On buildings of other than Type V construction, the coverings are limited to:
  - 10% of the wall surface where fire separation distance is less than 5 feet
  - 40 feet in height above grade plane
- No limit on surface area and allowed to 60 feet in height where of fire-retardant-treated wood.
Parapets
Section 705.11

- Parapet wall is defined as "a part of any wall completely above the roof line."
- As a base requirement, parapets shall be provided on all exterior walls unless specifically exempted.
- Multiple exceptions eliminate the mandate for parapets.
- Where one or more exceptions are met, the provisions of Section 705.11 do not apply.

Parapet Exceptions
Section 705.11 – Exceptions 1-3

- Parapets need not be provided on exterior walls of buildings where any of the following conditions exist:
  1. The wall is not required to be fire-resistance rated in accordance with Table 602 because of fire separation distance.
  2. The building has an area of not more than 1,000 square feet (93 m²) on any floor.
  3. Walls that terminate at roofs of not less than 2-hour fire-resistance-rated construction or where the roof, including the deck and supporting construction, is constructed entirely of noncombustible materials.

Parapet Exceptions
Section 705.11, Exception 4

- Parapets are not required on one-hour exterior walls that terminate at underside of roof sheathing, deck or slab, where:
  - Roof has minimum Class B roof covering, are
  - Openings in roof do not occur within 10 feet of exterior wall (5 feet in Groups R and U), and
  - Where roof/ceiling framing elements are of minimum 1-hour construction for minimum:
    - 10 feet (4 feet in Groups R and U) where framing is parallel to exterior wall
    - Full span where framing not parallel to exterior wall
Parapet Exceptions
Section 705.11, Exception 4

No openings within 5 ft for Group R and U occupancies
10 ft for all others

Parapet Exceptions
Section 705.11, Exception 5

- Parapets to be provided on exterior walls of Group R-2 and R-3 buildings, except where:
  - Roof has minimum Class C roof covering;
  - Walls terminate at roof deck, and
  - Building is of Type III, IV or V construction; and
  - Roof deck is of noncombustible materials or fire-retardant-treated wood, for a distance of 4 feet;
  or
  - Roof protected with \( \frac{5}{8} \)-inch Type X gypsum board directly beneath underside of deck, for a distance of 4 feet.

Parapet Exceptions
Section 705.11, Exception 6

Where the wall is permitted to have at least 25 percent unprotected openings based on fire separation distance in accordance with Table 705.8

- For fully sprinklered buildings, this distance would be 5 feet (1524 mm) or greater.
- For nonsprinklered buildings, this distance would be 15 feet (4572 mm) or greater.
Parapet Exceptions
Section 705.11 – Exception 6

Parapet Construction
Section 705.11.1

- Parapets shall have the same fire-resistance rating as required for supporting wall.
- Noncombustible faces for the uppermost 18 inches.
- Minimum height of 30 inches.

Parapet Construction
Section 705.11.1
Additional parapet height may be required for roofs sloping toward the parapet at a slope greater than 2:12
Miscellaneous Conditions and Elements Related to Exterior Wall and Opening Protection

Module 5

Miscellaneous Conditions

- Vertical separation of openings
- Vertical exposure
- Group H occupancies
- Aircraft hangars
- Unlimited area buildings, covered mall buildings
- Open parking garages
- Penthouses

Vertical Separation of Openings
Section 705.8.5

- Openings in adjacent stories to be separated vertically to restrict exterior fire spread from story to story
- Applies where:
  - openings are within 5 feet of each other horizontally, and
  - opening in lower story does not have a minimum ¾-hour fire protection rating
**Vertical Separation of Openings**

**Section 705.8.5**

- Two methods available to restrict the spread of fire:
  - Vertical separation of 3 feet minimum with spandrel construction of at least 1-hour construction, or
  - Horizontal flame barriers of at least 1-hour construction that extend a minimum of 30 inches beyond exterior wall
- Vertical separation not required for:
  - Buildings no more than three stories in height above grade plane
  - Fully-sprinklered buildings
  - Open parking garages

**Vertical Exposure**

**Section 705.8.6**

- For buildings of different roof heights located on the same lot, minimum ¾-hour fire protection rating, opening shall be for openings in exterior wall of building adjacent to a lower building where the:
  - openings in the taller wall are less than 15 feet above roof of the lower building
  - fire separation distance is less than 15 feet.
Vertical Exposure
Section 705.8.6

- Requirements do not apply where:
  - Buildings are regulated as portions of a single building per Section 705.3, or where
  - Roof assembly of the lower building has a minimum 1-hour fire-resistance rating.

Group H Occupancies
Section 415.6.1

- Regardless of any other provisions, buildings containing Group H occupancies shall be set back a minimum fire separation as set forth in Sections 415.5.1.1 through 415.5.1.4.
  - Group H-1 75 feet minimum
  - Group H-2 30 feet minimum (where Group H-2 exceeds 1000 sf)
    - 50 feet if a detached building*
  - Group H-3 50 feet if a detached building*
  - *no wall and opening protection required based on fire separation distance

*no wall and opening protection required based on fire separation distance
Group H Occupancies
Section 415.6.1

- Exterior walls shall have a minimum 2-hour fire-resistance rating where located less than 30 feet from lot lines or a public way
  - Measurement not necessarily related to fire separation distance
  - Provision not applicable to opposing walls of hangars where two or more hangars occur on same lot.
  - Other applicable provisions still apply:
    - NFPA 409 addresses clusters of hangars
    - IBC Sections 503.1.2 and 705.3 address multiple hangars on the same lot

Aircraft Hangars
Section 412.3.1

- Exterior walls shall have a minimum 2-hour fire-resistance rating where located less than 30 feet from lot lines or a public way
  - Measurement not necessarily related to fire separation distance
  - Provision not applicable to opposing walls of hangars where two or more hangars occur on same lot.
  - Other applicable provisions still apply:
    - NFPA 409 addresses clusters of hangars
    - IBC Sections 503.1.2 and 705.3 address multiple hangars on the same lot

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Unlimited Area Buildings
Section 507.2.1

- Reduction in the required open space surrounding the perimeter of unlimited area buildings is permitted provided:
  - Exterior walls have a minimum 3-hour fire-resistance rating, and
  - Openings in exterior walls have a minimum 3-hour fire-resistance rating.
- The base requirement of a minimum of 60 feet of open space may be reduced to not less than 40 feet for a maximum of 75 percent of the perimeter.

Covered and Open Mall Buildings
Section 402.2, Exception

- Reduction in required open space also permitted in a similar manner for covered mall buildings and open mall buildings.
Open Parking Garages
Section 406.5.6
 Based on Note c to Table 602, exterior walls of open parking garages are not required to have a fire-resistance rating based on fire separation where such distance is 10 feet or more.
 Unlimited unprotected openings are permitted where fire separation distance is at least 10 feet.
 Provisions are applicable to all construction types.

Open Parking Garages
Table 602, Note c
Unprotected exterior wall and unlimited unprotected openings permitted

Penthouses
Section 1510.2.4
 General provisions require penthouse exterior walls to be constructed consistent with the type of construction of the building.
 Exceptions address three conditions:
   Type I buildings
   Type I buildings no more than two stories in height and all Type II buildings
   Type III, IV and V buildings
 Exceptions only need be applied where other provisions mandate a higher degree of protection.
Conclusion

- This concludes the presentation addressing exterior wall and opening protection.
- The fire-resistance requirements are intended to address a variety of hazards and concerns, including:
  - Structural integrity
  - Radiant heat transfer to adjoining lots and buildings
  - Protection of exitways
  - Miscellaneous conditions

Final Reflection

This slide will help the learner to reflect on the day and what they will take back to the job and apply.

- **What?** What happened and what was observed in the training?
- **So what?** What did you learn? What difference did this training make?
- **Now what?** How will you do things differently back on the job as a result of this training?
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