‘D’esign – Barriers in NEW & EXISTING Buildings: What Are They For?

FCIA Virtual ‘DIIM’ Firestop & Effective Compartmentation Symposium Middle East

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Rich Walke, Consultant to the FCIA
QUALITY PROCESS

D-DESIGN
Specs, Code, Standards

I-INSTALLATION
FM 4991, UL QFCP, AND Mfr. Education

Maintain Protection
Fire Codes Barrier Management

I – INSPECTION
IBC Ch. 17
NFPA 80
ASTM E2174/2393
Firestopping for Safety ‘DIIM’

• Properly Designed and Specified Firestopping
  • FCIA – 07-84-00 – Specification

• Tested and Listed Systems – ASTM E814 / UL 1479, ULC-S115, FM 4990, ASTM E1966 / UL 2079, ASTM E2307, E2837, E3037

• Professional Installation – FCIA Member, FM 4991 Approved, UL/ULC Qualified Contractors

• Properly Inspected – ASTM E2174 / E2393 Protocol by IAS AC 291 Accredited Inspection Agencies, Inspectors w/FM, UL/ULC, IFC Exam Success

Building & Fire Code Requirements

- UAE Fire and Life Safety Code
  - New and Existing Buildings – Chapter 1
  - Existing Building Maintenance – Chapter 1, Section 21
- International Codes
  - New and Existing Buildings – International Building Code – Chapter 7
  - International Fire Code – Chapter 7
- NFPA
  - New and Existing Buildings – NFPA 5000 & 101 – Chapter 8
  - Fire Code – NFPA 1 – Chapter 12

- Minimum requirements - Construction & Maintaining Protection
IBC Fire and Smoke Protection Features

• Fire-resistance-rated assemblies:
  • Structural Members
  • Exterior Walls
  • Fire Walls
  • Fire Barriers

• Smoke-resistant assemblies:
  • Smoke Barriers – Intended to “… restrict movement of smoke.”
  • Smoke Partitions – Intended to “… limit the transfer of smoke.”
UAE Construction and Fire Compartmentation

• Fire-resistance-rated assemblies:
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  • Exterior Walls
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Fire Resistance SYSTEMS

- Products Become Systems Through Testing ….
- Test Standard References
  - Structural Elements & Assemblies – ASTM E119, UL 263
  - Fire & Smoke Barriers – ASTM E119, UL 263
  - Swinging/Rolling Fire Doors – UL 10B, 10C, NFPA 257
  - Fire Rated Glazing – NFPA 252 / UL 9, ASTM E119 / UL 263
  - Fire/Smoke/Ceiling Radiation Dampers – UL 555, UL 555S, UL 555C
- SYSTEM Testing = Suitability statement for use of a product in a specific system/design application
Tested to ASTM E119 or UL 263
Rating determined using Table 601
Rating of structural element not less than items being supported
Columns (Section 704.2) and primary structural frame other than columns (Section 704.3) require individual encasement
Columns shall be protected for their full height including attachment to beams
Specific requirements for Spray-Applied Fire Resistive Materials (Not applicable to the UAE code)
IBC Chapter 7 Cont.
Exterior Walls Section 705

• Fire-Resistance Rating based on higher of Type of Construction Table 601 or Fire Separation Distance Table 602

• Combination of protected and unprotected openings permitted
## IBC Chapter 7 Cont.
### Exterior Walls Table 602

<table>
<thead>
<tr>
<th>FIRE SEPARATION DISTANCE = X (feet)</th>
<th>TYPE OF CONSTRUCTION</th>
<th>OCCUPANCY GROUP H*</th>
<th>OCCUPANCY GROUP F-1, M, S-1*</th>
<th>OCCUPANCY GROUP A, B, E, F-2, I, R, S-2, U</th>
</tr>
</thead>
<tbody>
<tr>
<td>X &lt; 5</td>
<td>All</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5 ≤ X &lt; 10</td>
<td>IA</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10 ≤ X &lt; 30</td>
<td>IA, IB</td>
<td>2</td>
<td>1</td>
<td>1&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td></td>
<td>IIB, VB</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td>1</td>
<td>1</td>
<td>1&lt;sup&gt;c&lt;/sup&gt;</td>
</tr>
<tr>
<td>X ≥ 30</td>
<td>All</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
IBC Chapter 7 Cont.
705.5 Fire-Resistance Ratings

- Exterior walls with an FSD of 10 feet or less shall be rated for exposure to fire from both sides.
- Exterior walls with an FSD greater than 10 feet shall be rated for exposure to fire from the inside - full required fire resistance rating must be established from the interior membrane and framing per Section 722.6.2.3. For exterior walls with FSD ≥ 10 ft, the outside shall consist of sheathing, sheathing paper and siding as described in Table 722.6.2(3).
### IBC Chapter 7 Cont.
#### 705.8 Openings

<table>
<thead>
<tr>
<th>Fire Separation Distance</th>
<th>unprotected, Sprinklered (UP, S)</th>
<th>protected (P)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 to less than 15 ft.</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>15 to less than 20 ft.</td>
<td>25%</td>
<td>75%</td>
</tr>
<tr>
<td>20 to less than 25 ft.</td>
<td>45%</td>
<td>No Limit</td>
</tr>
<tr>
<td>25 to less than 30 ft.</td>
<td>70%</td>
<td>No Limit</td>
</tr>
<tr>
<td>30 or greater</td>
<td>No Limit</td>
<td>No Limit</td>
</tr>
</tbody>
</table>
Definition of Fire Wall

- A fire-resistance-rated wall having protected openings, which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.

- Fire walls not used in the UAE code.
IBC Chapter 7 Cont.
Fire Walls Section 706 Cont.

- 503.1: Fire Walls can be used to create separate buildings for purposes of height, area, or types of construction
- Table 706.4
- Horizontal Continuity
- Vertical Continuity
Table 706.4

<table>
<thead>
<tr>
<th>GROUP</th>
<th>FIRE-RESISTANCE RATING (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A, B, E, H-4, I, R-1, R-2, U</td>
<td>3&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>F-1, H-3&lt;sup&gt;b&lt;/sup&gt;, H-5, M, S-1</td>
<td>3</td>
</tr>
<tr>
<td>H-1, H-2</td>
<td>4&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>F-2, S-2, R-3, R-4</td>
<td>2</td>
</tr>
</tbody>
</table>
Definition of Fire Barrier

- A fire-resistance-rated wall assembly of materials designed to restrict the spread of fire in which continuity is maintained.
IBC Chapter 7 Cont.
Fire Barriers Section 707 Cont.

• Fire Barrier used to separate
  • Exits, shafts, incidental use areas, hazardous material control areas and fire areas
• Table 707.3.10
• Continuity
• Voids at Intersections shall be filled and comply with Section 707.8 and 707.9

<table>
<thead>
<tr>
<th>OCCUPANCY GROUP</th>
<th>FIRE-RESISTANCE RATING (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-1, H-2</td>
<td>4</td>
</tr>
<tr>
<td>F-1, H-3, S-1</td>
<td>3</td>
</tr>
<tr>
<td>A, B, E, F-2, H-4, H-5, I, M, R, S-2</td>
<td>2</td>
</tr>
<tr>
<td>U</td>
<td>1</td>
</tr>
</tbody>
</table>
IBC Chapter 7 Cont.
Fire Partitions Section 708

• Definition of Fire Partition
  • A vertical assembly of materials designed to restrict the spread of fire in which openings are protected.
• Fire partitions not used in the UAE and NFPA codes.
Fire Partitions

- Separation walls in I-1, R-1, R-2, and R-3 (Section 420.2)
- Walls separating tenant spaces in open and closed malls (Section 402.4.2.1)
- Corridor walls (Section 1020.1)
- Elevator lobby separation (Section 3006.3)
- Egress balcony (Section 1021.2)
IBC Chapter 7 Cont.
Fire Partitions Section 708 Cont.

• Fire rating not less than 1-hour

• Exceptions:
  • Group R corridors ½ hour (Table 1020.1)
  • Dwelling/Sleeping unit separation ½ hour with sprinklers (in Type IIB, IIB and VB Construction)

• Termination
  • Ceiling of rated assembly, or bottom of roof or floor deck above
Definition Smoke Barrier

- A continuous membrane, either vertical or horizontal, such as a wall, floor, or ceiling assembly that is designed and constructed to restrict the movement of smoke.
Commonly found in I-2 and I-3 Occupancies

- Allows evacuation to another part of building
- 1-Hour fire-resistance rating
• Continuity
  • Outside wall to outside wall
  • Top floor/ceiling to underside of floor or roof sheathing
  • Areas of refuge and elevator lobbies shall terminate at fire barrier wall of not less than 1-hour, another smoke barrier wall or an exterior wall
  • Protected Openings
Smoke Partition

- Walls that limit the transfer of smoke for an unspecified time
- Unless required by another section of the Code not required to have a fire-resistance rating

Continuity

- Top of floor/ceiling to underside of floor or roof deck
- May terminate at ceiling if ceiling constructed to limit transfer of smoke
Definition Horizontal Assembly

- A fire-resistance-rated floor or roof assembly of materials designed to restrict the spread of fire in which continuity is maintained.
• Tested to ASTM E119 or UL 263
• Fire-resistance rating
  • Table 601 is the minimum
• Applications
  • Mixed occupancies separation 508.4
  • Fire area separation 707.3.10
  • Dwelling and Sleeping unit separation 420.3
    • Exception: (711.2.4.3) can be $\frac{1}{2}$ hour if IIB, IIIB or VB with sprinkler in compliance with 903.3.1.1
Smoke compartment separation 709
Incidental uses separation 509
Where required by other sections of the code

Continuity
Continuous without vertical openings except as provided in 712

Ceiling panels require clips if less than 1 psf
IBC Chapter 7 Cont.
Shaft Enclosures Section 713

• Protects openings and penetrations of floor/ceiling & roof/ceiling assemblies

• Fire-Resistance Rating
  • 4 Stories or more – 2 hour rating
  • Less than 4 stories – 1 hour rating

• Continuity
  • Same as fire barriers 707 or horizontal assembly 711
• Bottom enclosure
  • Applies to shafts that do not extend to the bottom of building. Must comply with one of the following:
    • Enclosed on lowest level, same fire resistance rating as lowest floor but not less than the shaft or
    • Terminate in a room having a related use to the purpose of shaft, room separated by fire barriers and/or horizontal assemblies, fire-resistance rating not less than shaft
    • Shaft shall be protected by approved fire damper at lowest floor level within enclosure
  • With Exceptions
Questions??
Thanks for Attending!!!

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