FIRE/SMOKE BARRIER FUNDAMENTALS

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OBJECTIVE

• Identify the different types of barriers used in buildings on higher education campuses
• Identify the key characteristics for each barrier
  ▪ Continuity
  ▪ Protection of openings
• List at least three strategies that can be used to improve a barrier management program
TYPES OF WALL ASSEMBLIES

- Exterior walls
- Fire walls
- Fire barriers
- Fire partitions – No such assembly in NFPA
- Smoke barriers
- Smoke partitions
FIRE TESTED WALL ASSEMBLIES

• In accordance with ASTM E119/UL263
• Resist passage of heat and hot gases
• Structural integrity during the test fire
• Have something left at the end of the test
• Required fire-resistance rating
• Continuity
• Openings and penetrations
• Types of materials
• Structural robustness
• Fire barriers are used in the following applications:
  ▪ Fire area separations
  ▪ Mixed occupancy separations
  ▪ Incidental use areas
  ▪ Hazardous area separations
  ▪ Exit enclosures
  ▪ Shaft enclosures
  ▪ Horizontal exits
  ▪ Corridor walls – NFPA only
• Supported by construction with the same fire-resistance rating as the fire barrier
• Some exceptions
  ▪ Vary between NFPA and ICC
## SUMMARY OF FIRE BARRIERS

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Fire-Resistance Rating</td>
<td>Depends upon specific use</td>
</tr>
<tr>
<td>Required continuity</td>
<td>Floor/ceiling below to deck above</td>
</tr>
<tr>
<td>Openings</td>
<td>General: Aggregate glazing area (or width) &lt;25% wall area/length; maximum size 120 sf. Specific: Rules based on use of barrier</td>
</tr>
<tr>
<td>Types of materials</td>
<td>As required for the type of construction</td>
</tr>
<tr>
<td>Robustness of structural system</td>
<td>If load bearing, fire tested with load</td>
</tr>
</tbody>
</table>
• Fire partitions are used in the following applications:
  ▪ Dwelling units separations
  ▪ Sleeping units in Group R-1, R-2 and I-1
  ▪ Tenant separation in covered malls
  ▪ Exit access corridor walls
  ▪ Elevator lobby separation
• Remember, NFPA does not use this phrase
<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Fire-Resistance Rating</td>
<td>1 hour, with exceptions, depending on use. For corridors see Table in Chapter 10 – IBC only</td>
</tr>
<tr>
<td>Required continuity</td>
<td>Floor/ceiling below to deck above or tight to underside of fire-resistance rated assembly. Supported by fire-resistance rated construction, except in corridors, tenant, and guestroom separations in Types IIIB and VB construction</td>
</tr>
<tr>
<td>Openings</td>
<td>20 minutes (w/o hose stream) for corridors 45 minutes for all others</td>
</tr>
<tr>
<td>Types of materials</td>
<td>As required for the type of construction</td>
</tr>
<tr>
<td>Robustness of structural system</td>
<td>If load bearing, fire tested with load</td>
</tr>
</tbody>
</table>
• Smoke barriers are used in the following applications:
  ▪ Group I-2
  ▪ Group I-3
  ▪ Areas or refuge
  ▪ Other specific applications
## SUMMARY OF SMOKE BARRIERS

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Fire-Resistance Rating</td>
<td>1-hour with the exception that a construction of a minimum 0.1” thick steel in Group I-3 buildings is allowed</td>
</tr>
<tr>
<td>Required continuity</td>
<td>Horizontal: Outside wall to outside wall</td>
</tr>
<tr>
<td></td>
<td>Vertical: Floor to slab or deck above, continuous through interstitial spaces</td>
</tr>
<tr>
<td></td>
<td>Supporting construction may be required based upon the applicable codes</td>
</tr>
<tr>
<td>Openings</td>
<td>20 minutes – but not a true fire door in NFPA 101</td>
</tr>
<tr>
<td></td>
<td>Smoke- and draft-controlled doors tested in accordance with UL 1784 – IBC only</td>
</tr>
<tr>
<td>Types of materials</td>
<td>As required for the type of construction</td>
</tr>
<tr>
<td>Robustness of structural system</td>
<td>If load bearing, fire tested with load</td>
</tr>
</tbody>
</table>
Smoke partitions are used in the following applications:

- Corridor walls in Group I-2 – IBC only
- Sprinkler protected hazardous areas – NFPA
## SUMMARY OF SMOKE PARTITIONS

<table>
<thead>
<tr>
<th>Issue</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required Fire-Resistance Rating</td>
<td>Not required (unless otherwise required)</td>
</tr>
<tr>
<td>Required continuity</td>
<td>Floor/ceiling below to deck above or tight to underside of ceiling membrane designed to limit passage of smoke - Difference between NFPA/ICC for ceiling tiles</td>
</tr>
<tr>
<td>Openings</td>
<td>Windows: Sealed to resist free passage of smoke</td>
</tr>
<tr>
<td></td>
<td>Doors: No louvers</td>
</tr>
<tr>
<td></td>
<td>Air leakage rated (UL 1784) – IBC???</td>
</tr>
<tr>
<td></td>
<td>Self closing, or automatic closing by smoke detectors</td>
</tr>
<tr>
<td>Types of materials</td>
<td>As required for the type of construction</td>
</tr>
<tr>
<td>Robustness of structural system</td>
<td>If load bearing, fire tested with load</td>
</tr>
</tbody>
</table>
• A legend that clearly identifies features of fire safety
• Areas of the building that are fully sprinklered (if the building is partially sprinklered)
• Locations of all hazardous storage areas
• Locations of all rated barriers
• Locations of all smoke barriers
• Suite boundaries, including the size of the identified suites—both sleeping (max 10,000 sq ft) and non-sleeping (max 10,000 sq ft) – Locations of designated smoke compartments
• Locations of chutes and shafts
• Any approved equivalencies or waivers
SUCCESSFUL STRATEGIES

• BUILD IT CORRECTLY
  ▪ Thorough plan review process
  ▪ Contractor qualifications
  ▪ Commissioning systems and buildings
    o NFPA 3, NFPA 4, ASHE documents
    o Complete code compliance documentation while contractor still on site
  ▪ Use of certified inspectors or special inspectors
BUILD IT CORRECTLY!!
SUCCESSFUL STRATEGIES

• Make sure all rehabilitation work is done correctly
  ▪ Refer to previous slides
• Above ceiling work permits
  ▪ Means to identify “approved” individuals
• Proper identification
  ▪ Labels
  ▪ Marking
  ▪ Life Safety Drawings
ADDITIONAL RESOURCES

• Visit www.koffel.com for links to a LinkedIn Life Safety Code Discussion Group

• NFPA
  ▪ www.NFPA.org/###

• ASHE
QUESTIONS AND DISCUSSION