FIRE/SMOKE BARRIER
FUNDAMENTALS FOR HEALTH CARE FACILITIES

William E. Koffel, P.E., FSFPE
President
Koffel Associates, Inc.
www.koffel.com
wkoffel@koffel.com

Expertly Engineering Safety From Fire
OBJECTIVE

• Identify the different types of barriers used in health care facilities
• 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
FIVE POINTS

• 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
CONTINUITY

FIRE RESISTANCE RATED FLOOR/CEILING ASSEMBLY

NONFIRE RESISTANCE RATED FLOOR/CEILING ASSEMBLY

FIRE BARRIER

FLOOR OR ROOF DECK

FIRE RESISTANCE RATED FLOOR/CEILING ASSEMBLY

FIRE RESISTANCE RATED FLOOR/CEILING ASSEMBLY

FIRE BARRIER
• Supported by construction with the same fire-resistance rating as the fire barrier

• Some exceptions
  ▪ Vary between NFPA and ICC
<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>
</tbody>
</table>
| Required continuity                              | Horizontal: Outside wall to outside wall  
Vertical: Floor to slab or deck above, continuous through interstitial spaces  
Supporting construction may be required based upon the applicable codes |
| Openings                                         | 20 minutes – but not a true fire door in NFPA 101  
Smoke- and draft-controlled doors tested in accordance with UL 1784 – IBC only                                                             |
| Types of materials                               | As required for the type of construction                                                                                                  |
| Robustness of structural system                 | If load bearing, fire tested with load                                                                                                   |
• 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>
Blue dashed line clearly indicates extent of zones.
• 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 5,000 sq ft) and non-sleeping (max 10,000 sq ft) – CMS Memorandum dated August 30, 2013
• 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
    - NFPA 3, NFPA 4, ASHE documents, pending ICC std.
  - Complete SOC documentation while contractor still on site
  - Use of certified inspectors or special inspectors
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

  justask

  2013-2014 TEAM MEMBER