Key Changes to the 2015 IBC

Presented by
KH Scott & Associates LLC

Introduction

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Objectives

- Major changes
  - 2015 IBC
  - 2015 IFC
- Many other changes not covered

Food Processing Facilities & Commercial Kitchens §304.1

- Group B ‑ *not* associated with restaurants, cafeterias and similar dining facilities ≤2500 ft²
- Group F-1 ‑ *not* associated with restaurants, cafeterias and similar dining facilities >2500 ft²
Group I-1
§308.3

- Condition 1 ï all persons receiving custodial care are capable of responding to an emergency situation to complete building evacuation without any assistance

- Condition 2 ï any persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation

Group I-2
§308.4

- Condition 1 ï nursing and medical care, but not emergency care, surgery, psychiatric care

- Condition 2 ï nursing and medical care and emergency care and in-patient psychiatric care
Group R-4
§310.6

- Condition 1  "all" persons receiving custodial care are capable of responding to an emergency situation to complete building evacuation without any assistance.
- Condition 2  "any" persons receiving custodial care who require limited verbal or physical assistance while responding to an emergency situation to complete building evacuation.

Applicability of High-Rise Provisions
§403.1

Exceptions:
1. Airport traffic control towers  §412.3
2. Open parking garages  §406.5
3. Group A-5  §303.6
4. Special industrial  §503.1.1
5.1. Group H-1 buildings
5.2. Buildings with Group H-2  §415.8,415.9.2, 415.9.3 or 426.1
5.3. Buildings with Group H-3  §415.8
Atrium – Smoke Control
§404.5

- Atriums connecting only 2 stories do not require smoke control, unless atrium is in a Group I-2, Condition 2 facility

Atrium – Egress Travel
§404.9, §404.10

- Egress travel not through an atrium = §1017
- Egress travel through an atrium on LED = §1017
- Egress travel through an atrium not on LED = 200 ft
- Æ50% of interior exit stairways are permitted to egress through an atrium on LED
Size of Group I-2 Smoke Compartments §407.5

- Smoke compartments required on every story used by ≥50 persons, or persons receiving care, treatment or sleeping
- Group I-2, Condition 1 if smoke compartments ≤2,500 ft²
- Group I-2, Condition 2 if smoke compartments ≤40,000 ft²
- Travel distance in a smoke compartment to a smoke barrier door ≤200 ft

Travel Distance in Aircraft Manufacturing Facilities §412.7

- Exit access travel distance can be increased in buildings used for the manufacturing of aircraft if:
  - Type I or II construction
  - Distance cannot exceed

<table>
<thead>
<tr>
<th>HEIGHT (feet)</th>
<th>150,000</th>
<th>200,000</th>
<th>250,000</th>
<th>500,000</th>
<th>750,000</th>
<th>1,000,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥25</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>700</td>
<td>700</td>
<td>800</td>
</tr>
<tr>
<td>≥50</td>
<td>400</td>
<td>500</td>
<td>600</td>
<td>700</td>
<td>700</td>
<td>800</td>
</tr>
<tr>
<td>≥75</td>
<td>400</td>
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<td>700</td>
<td>1,000</td>
<td>1,000</td>
<td>1,250</td>
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<td>≥100</td>
<td>400</td>
<td>500</td>
<td>750</td>
<td>1,000</td>
<td>1,250</td>
<td>1,500</td>
</tr>
</tbody>
</table>
### Building Height and Number of Stories

#### Tables 504.3 & 504.4

**Table 504.3**

<table>
<thead>
<tr>
<th>Building Area</th>
<th>Building Height in Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>UL</td>
</tr>
<tr>
<td>S</td>
<td>UL</td>
</tr>
<tr>
<td>Type I</td>
<td>A: UL 160 65 55 65 55 65 50 40</td>
</tr>
<tr>
<td>Type II</td>
<td>A: UL 90 65 75 65 75 65 70 60</td>
</tr>
<tr>
<td>Type III</td>
<td>A: UL 160 65 55 65 65 50 40</td>
</tr>
<tr>
<td>Type IV</td>
<td>A: UL 160 65 55 65 65 50 40</td>
</tr>
<tr>
<td>Type V</td>
<td>A: UL 160 65 55 65 50 40</td>
</tr>
</tbody>
</table>

**Footnotes**

- NS = buildings not sprinklered
- S = NFPA 13 sprinklered buildings
- S13R = NFPA 13R sprinklered buildings

### Building Area

#### §506.2

**Table 506.2**

<table>
<thead>
<tr>
<th>Occupancy Classification</th>
<th>See Footnotes</th>
<th>Type Of Construction (PARTIAL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>NS</td>
<td>UL 15,000 8,500 14,000 8,500 15,000 15,000 8,500</td>
</tr>
<tr>
<td></td>
<td>S1</td>
<td>UL 62,000 34,000 56,000 34,000 60,000 46,000 22,000</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>UL 46,500 25,500 42,500 25,500 45,000 34,500 18,000</td>
</tr>
<tr>
<td>A-2</td>
<td>NS</td>
<td>UL 15,000 9,500 14,000 9,500 15,000 11,500 6,000</td>
</tr>
<tr>
<td></td>
<td>S1</td>
<td>UL 62,000 38,000 56,000 38,000 60,000 46,000 24,000</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>UL 46,500 28,500 42,500 28,500 45,000 34,500 18,000</td>
</tr>
<tr>
<td>A-3</td>
<td>NS</td>
<td>UL 15,000 9,500 14,000 9,500 15,000 11,500 6,000</td>
</tr>
<tr>
<td></td>
<td>S1</td>
<td>UL 62,000 38,000 56,000 38,000 60,000 46,000 24,000</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>UL 46,500 28,500 42,500 28,500 45,000 34,500 18,000</td>
</tr>
<tr>
<td>A-4</td>
<td>NS</td>
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<td>UL 62,000 38,000 56,000 38,000 60,000 46,000 24,000</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>UL 46,500 28,500 42,500 28,500 45,000 34,500 18,000</td>
</tr>
<tr>
<td>A-5</td>
<td>NS</td>
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<td></td>
<td>SM</td>
<td>UL 46,500 28,500 42,500 28,500 45,000 34,500 18,000</td>
</tr>
</tbody>
</table>

**Footnotes**

- NS = buildings not sprinklered
- S = NFPA 13 sprinklered 1-story buildings
- SM = sprinklered multiple-story buildings
### Building Area – Example §506.2

#### Table 506.2

<table>
<thead>
<tr>
<th>Occupancy Classification</th>
<th>See Footnotes</th>
<th>Type I</th>
<th>Type II</th>
<th>Type III</th>
<th>Type IV</th>
<th>Type V</th>
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</thead>
<tbody>
<tr>
<td>A-1</td>
<td>NS</td>
<td>15,500</td>
<td>9,500</td>
<td>14,000</td>
<td>8,500</td>
<td>11,500</td>
</tr>
<tr>
<td></td>
<td>S1</td>
<td>62,000</td>
<td>34,000</td>
<td>56,000</td>
<td>34,000</td>
<td>60,000</td>
</tr>
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<td></td>
<td>SM</td>
<td>46,500</td>
<td>25,500</td>
<td>42,000</td>
<td>25,500</td>
<td>45,000</td>
</tr>
<tr>
<td>A-2</td>
<td>NS</td>
<td>15,500</td>
<td>9,500</td>
<td>14,000</td>
<td>8,500</td>
<td>11,500</td>
</tr>
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<td>56,000</td>
<td>34,000</td>
<td>60,000</td>
</tr>
<tr>
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<td>SM</td>
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</tr>
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<td>11,500</td>
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<td>S1</td>
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<td>34,000</td>
<td>56,000</td>
<td>34,000</td>
<td>60,000</td>
</tr>
<tr>
<td></td>
<td>SM</td>
<td>46,500</td>
<td>25,500</td>
<td>42,000</td>
<td>25,500</td>
<td>45,000</td>
</tr>
</tbody>
</table>

- Single story, sprinklered A-3 Type IIB; no frontage increase
  - $A_a = A_t + (NS \times I_f)$
  - $A_a = 38,000 + (9,500 \times 0) = 38,000 \text{ ft}^2$

### Mezzanines §505.2.3

- Not considered a story
- Less than or equal to 33.3% of floor area in the room where they are located
- Floor area of mezzanine added to floor below
- Mezzanine open to floor below
  - Less than or equal to 42” high wall
  - Can be enclosed if:
    - OL $\leq 10$, or
    - $\geq 2$ exits or exit access stairways, or
    - Floor area $\leq 0\%$
Group H-5 in Unlimited Area Buildings §507.9

- Unlimited area of mixed occupancy of Group B, F, H-5, M or S buildings provided:
  - ≤2 stories above grade plane
  - Automatic sprinkler system throughout
  - Surrounded by public ways or yards ≥60'
  - Type I or II construction
  - Group H-5 separated per §415.11 and §508.4
  - Group H-5 is less than allowable area, OR subdivided into areas by 2-HR fire barriers

Sprinklers for 1-HR Substitution Table 601, Footnote d

- 2012 allowed fire sprinklers as substitute for 1-HR construction, but prohibited any modifications based on sprinklers
- Footnote deleted which allowed 1-HR substitution
- Sprinkler system is no longer allowed as a substitution for 1-HR construction
Vertical Separation of Openings §705.8.5

- Generally, fire-resistance-rated exterior walls are only required to be protected on the interior side when the wall is >10' from property line.
- When building is >3 stories protection required on both sides of exterior wall.

Not required if building is sprinklered.

Fire Walls – Structural Stability §706.2

- Designed to allow collapse on either side without collapse of the fire wall.
  - Single fire wall
  - Double fire wall ⊕ NFPA 221
  - Tied fire wall ⊕ NFPA 221
  - Cantilevered fire wall ⊕ NFPA 221
- Now allowed to utilize any design in NFPA 221.
Ducts Transitioning between Shafts
§717.1.1

- Shafts enclosing vertical openings are fire-resistance-rated

Corridor Dampers
§717.3, §717.5.4.1

- Corridor dampers required at penetration of corridor ceiling constructed as a corridor wall
- Ceiling radiation dampers required at penetration of floor/ceiling or roof/ceiling assembly
- Ratings
  - 1-HR fire-resistance rating
  - Class I or II leakage rating
- If fans are designed to operate during a fire, damper must be specifically listed for such operation
### Occupant Load Factors

**Table 1004.1.2**

- Mercantile occupant load factor revised to a single factor of 60
- Applicable regardless of the story

<table>
<thead>
<tr>
<th>Function of Space</th>
<th>Occupant Load Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mercantile</td>
<td>60 gross</td>
</tr>
<tr>
<td>Storage, stock, shipping areas</td>
<td>300 gross</td>
</tr>
</tbody>
</table>

### Exits – Number and Configuration

**§1006**

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**Table 1006.2.1 – Spaces with One Exit or Exit Access Doorway**

<table>
<thead>
<tr>
<th>OCCUPANCY</th>
<th>MAXIMUM OCCUPANT LOAD OF SPACE</th>
<th>MAXIMUM COMMON PATH OF TRAVEL DISTANCE (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Without Sprinkler System (feet)</td>
<td>With Sprinkler System (feet)</td>
</tr>
<tr>
<td></td>
<td>Occupant Load</td>
<td>≤30</td>
</tr>
<tr>
<td>A, E, M</td>
<td>49</td>
<td>75</td>
</tr>
<tr>
<td>B</td>
<td>49</td>
<td>100</td>
</tr>
<tr>
<td>F</td>
<td>49</td>
<td>75</td>
</tr>
<tr>
<td>H-1, H-2, H-3</td>
<td>3</td>
<td>NP</td>
</tr>
<tr>
<td>H-4, H-5</td>
<td>10</td>
<td>NP</td>
</tr>
<tr>
<td>I-3, I-2, I-4</td>
<td>10</td>
<td>NP</td>
</tr>
<tr>
<td>I-3</td>
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<td>NP</td>
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<tr>
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<td>10</td>
<td>NP</td>
</tr>
<tr>
<td>R-2</td>
<td>10</td>
<td>NP</td>
</tr>
<tr>
<td>R-3, R-4</td>
<td>10</td>
<td>NP</td>
</tr>
<tr>
<td>S</td>
<td>29</td>
<td>100</td>
</tr>
<tr>
<td>U</td>
<td>49</td>
<td>100</td>
</tr>
</tbody>
</table>
Measurement of Exit Separation
§1007.1.1.1, Item 1

- Distance between doorways measured to any point in doorway width

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Measurement of Exit Separation
§1007.1.1.1, Item 2

- Distance between exit access stairways measured to closest riser

Separation distance measured to closest risers at floor level

Separation distance must be maintained
Two-Way Communication Systems
§1009.8

- 2-way communication at all elevators except at LED
- Exceptions:
  - Not required on floors with exit ramps
  - Service elevators
  - Freight elevators
  - Private residence elevator
- Written directions and visual character sign required

Door Locking Systems
§1010.1.9

- Egress doors must be readily openable, EXCEPT:

<table>
<thead>
<tr>
<th>New Locking Method</th>
<th>Old Locking Method</th>
<th>2015 Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controlled Egress Doors in Groups I-1 and I-2</td>
<td>Special Locking Arrangements in Group I-2</td>
<td>§1010.1.9.6</td>
</tr>
<tr>
<td>Delayed Egress</td>
<td>Delayed Egress Locks</td>
<td>§1010.9.7</td>
</tr>
<tr>
<td>Sensor Release of Electrically Locked Egress Doors</td>
<td>Access-Controlled Egress Doors</td>
<td>§1010.1.9.8</td>
</tr>
<tr>
<td>Electromagnetically Locked Egress Doors</td>
<td>Electromagnetically Locked Egress Doors</td>
<td>§1010.1.9.9</td>
</tr>
<tr>
<td>Locking Arrangements in Correctional Facilities</td>
<td>Locking Arrangements in Correctional Facilities</td>
<td>§1010.1.9.10</td>
</tr>
<tr>
<td>Stairway Doors</td>
<td>Stairway Doors</td>
<td>§1010.1.9.11</td>
</tr>
</tbody>
</table>
Travel Distance in Groups F-1 and S-1
§1017.2.2

- Exit access travel distance in F-1 and S-1 is:
  - 200 feet not sprinklered
  - 250 feet sprinklered
  - 400 feet:
    - Sprinklered
    - Building is limited to 1 story
    - Minimum of 24 feet from floor to underneath side of roof or ceiling above

Corridor Width and Capacity
§1020.2

- Corridor width is based on use and OL

**Table 1020.2 – Minimum Corridor Width**

<table>
<thead>
<tr>
<th>OCCUPANCY</th>
<th>WIDTH (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any facilities not listed below</td>
<td>44 inches</td>
</tr>
<tr>
<td>Access to and utilization of mechanical, plumbing or electrical systems or equipment</td>
<td>24 inches</td>
</tr>
<tr>
<td>With an OL &lt;50</td>
<td>36 inches</td>
</tr>
<tr>
<td>Within a dwelling unit</td>
<td>36 inches</td>
</tr>
<tr>
<td>In Group E with a corridor having an OL ≥100 more</td>
<td>72 inches</td>
</tr>
<tr>
<td>In corridors and areas serving stretcher traffic in ambulatory care facilities</td>
<td>72 inches</td>
</tr>
<tr>
<td>Group I-2 in areas where required for bed movement</td>
<td>96 inches</td>
</tr>
</tbody>
</table>
§1023.3.1
Stairway Extension

- Interior exit stairway can connect to an exit passageway without a fire-rated door, if NO other openings into the exit passageway.

Structural Glued Cross-Laminated Timber
§2303.1.4

- "A prefabricated engineered wood product consisting of at least three layers of solid-sawn lumber or structural composite lumber where the adjacent layers are cross-oriented and bonded with structural adhesive to form a solid wood element."  
- Referred to as CLT  
- ANSI/APA PRG 320-2011
Engineered Wood Rim Board
§ 2303.1.13

- A full-depth structural composite lumber, wood structural panel, structural glued laminated timber, or prefabricated wood I-joist member designed to transfer horizontal (shear) and vertical (compression) loads, provide attachment for diaphragm sheathing, siding and exterior deck ledgers, and provide lateral support at the ends of floor or roof joists or rafters.

- ANSI/APA PRR 410
- ASTM D 7672

Gypsum Panel Products
Chapter 25

- "The general name for a family of sheet products consisting essentially of gypsum."
- Essentially gypsum sheet products that are manufactured unfaced or with a facing other than paper
  - Glass mat-faced
  - Unfaced gypsum sheet materials
Plastic Composites
§2612

- **Plastic Composite** – A generic designation that refers to wood/plastic composites and plastic lumber.
- **Plastic Lumber** – A manufactured product made primarily of plastic materials (filled or unfilled) which is generally rectangular in cross-section.
- **Wood/Plastic Composite** – A composite material made primarily from wood or cellulose-based materials and plastic.
- Flame spread index ≤ 200

Photo courtesy of Peter Kulczyk

Allowed for exterior deck boards, stair treads, handrails and guards in Type VB buildings

Elevator Hoistway Venting
§3004

- Requirement for elevator hoistway venting in §3004 has been deleted
- Elevator hoistways are no longer required to be vented to the exterior

2012 required venting in elevator shafts penetrating >3 stories
2015 venting is not required
Elevator Lobbies
§3006

- Design of elevator lobbies
  - High-rise elevator door protection only for elevators traveling >750'
  - Area of refuge lobby separated by smoke barriers or horizontal exit
  - Fire service access elevator
  - Occupant evacuation elevator

Existing Buildings
Chapter 34

- Ch 34 deleted
- §101.4.7 provisions of the IEBC shall apply
- Repairs, alterations, change of occupancy, additions, relocations
Key Changes to the 2015 IFC

Emergency Preparedness §403

- Fire Safety and Evacuation Plans
- Required for
  - Group A, other than church with OL <2,000
  - Buildings with both Group A and atrium
  - Group B, F, M with OL >500, or >100 on floor other than LED
  - Groups R-1, R-4, R-2 college/univ dormitories
  - High-rise
  - Mall buildings >50,000 ft²
  - Occupant evacuation elevators

IBC §1001.4 requires that the FS&E Plan is submitted as part of MoE review
Combustible Materials in Plenums
§315.6, §605.12

- Storage is prohibited
  - It must be removed
- Abandoned wiring is deemed to be storage
  - It must be removed in the accessible areas
  - Unless the wiring is tagged for future use

Protection of Elevators
§607.6

- Design must keep water from fire sprinklers outside of lobby from reaching
  - Fire service access elevators, and
  - Occupant evacuation elevators

Requirement does not apply to water from fire sprinklers inside lobby
Type I Hood – Commercial Cooking Appliances

§609.2

- New exception eliminates Type I hood over electric cooking appliances based on a test in UL 710B
  - Emissions Test
  - Effluent from cooking contains <5mg/m³ or less
  - Does *NOT* need to be listed to UL 710B; only must meet this particular test

If Type I hood is not required, neither is fire-extinguishing system in that hood

Fire Sprinklers in Group A

§903.2.1

- Fire sprinklers installed on entire floor and all floor levels to *all* LEDs

Fire sprinkler system installed on story with Group A
Fire sprinkler system installed on all stories to all levels of exit discharge
Assembly Occupancies on Roofs
§903.2.1.6

- **WHEN:**
  - Rooftop is used for assembly, AND
  - Assembly OL > 100 for Group A-2 uses, OR
  - OL > 300 for other Group A uses

- **THEN:**
  - Sprinklers required in all floors below the roof, down to and including the level of exit discharge

Multiple Group A Fire Areas
§903.2.1.7

- Sprinklers required where multiple fire areas contain Group A-1, A-2, A-3 or A-4 occupancies that share egress components and OL ≥ 300

- All occupancies separated by 2-HR fire barriers
- Aggregate occupant load = 309
- Therefore, sprinklers are required
Buildings ≥55’ in Height
§903.2.11.3

- Height measured to finished floor with occupant load of 30 or more
  - Now includes a mezzanine

If ≥55" from LLFDVA; then sprinklers are required

If mezzanine has OL ≥30; measure to that floor level

Buildings ≥55’ in Height
§903.2.11.3

- Airport traffic control towers are no longer including in the exceptions
- IBC §412.3.6 contains sprinkler criteria for airport control towers
  - Sprinklers required where an occupied floor is >350 above the LLFDVA
Sprinklers in Elevator Machine Rooms

§903.3.1.1.1

- Elevator shunt trip is specifically prohibited in both fire service access elevators and occupant evacuation elevators
- New exempt sprinkler locations have been added to protect the elevator hoistway
  - Machinery rooms
  - Machinery spaces
  - Control rooms
  - Control spaces

Sprinklers in Elevator Machine Rooms

§903.3.1.1.1

- Sprinklers *not* required in:
  - Machine rooms
  - Machinery spaces
  - Control rooms
  - Control spaces

- A room outside the hoistway with an elevator machine
- A space where a machine and motor controller are located inside the hoistway
- A room outside the hoistway with a motor controller and not a machine
- A space outside the hoistway with a motor controller and not a machine
**Exempt Locations for NFPA 13 Sprinklers §903.3.1.1.2**

- Sprinklers not required in Group R-1, R-2, R-3 bathrooms ≤5 ft² provided they are located within individual dwelling units or sleeping units

- Walls and ceilings must be of noncombustible or limited-combustible materials with a 15-minute thermal barrier rating

**NFPA 13R Sprinkler Systems §903.3.1.2**

- NFPA 13R applicable to:
  - Group R buildings ≤4 stories
  - Group R buildings ≤60 ft height
Water Mist Systems
§904.2, §904.11

- Must comply with NFPA 750
- When used as alternative to fire sprinkler system, building is considered "NOT sprinklered throughout"
- When 2nd water is required for building, water mist must have 2nd water supply

Fire Alarm Shop Drawings
§907.1.2

- Minimum audibility level for occupant notification
  - New item to be included with fire alarm drawings
- Public Operating Mode
  - 5dB above the average ambient sound or 5dB above the maximum sound
- Private Operating Mode
  - 0dB above the average ambient sound or 5dB above the maximum sound

Maximum of 110 dBA
Manual Fire Alarm System in Group E
§907.2.3

- Group E requires a manual fire alarm system with emergency voice/alarm communications
- Exceptions:
  1. Alarm not required when OL $\leq 50$
  2. EVAC system not be required when OL $\leq 100$
  3. Manual fire alarm boxes not required when corridors, shops, labs, auditoriums, gymnasiums have heat or smoke detection
  4. Manual fire alarm boxes not required when building is sprinklered

Fire Detection in Atriums
§907.2.14

- Atriums with >2 stories
- Smoke detection design in accordance with:
  - Rational analysis in §909.4
  - System operation requirements in §909.17
Elevator Hoistway Pressurization
§909.21

- Elevator hoistway pressurization in lieu of elevator lobby
- Lobby for fire service access elevators and occupant evacuation elevators is still required
- Pressure differential of 0.1 to 0.25 inches of water column

Smoke and Heat Removal
§910

- Smoke & heat removal required:
  - Groups F-1 & S-1 with more than 50,000 ft² of undivided area
  - High-piled storage areas where required by Table 3206.2
- Smoke & heat vents OR mechanical smoke removal system

- Not required in areas with ESFR sprinkler system
- Not required in areas with CMSA sprinkler system, if RTI is 50 or less
- Not required in frozen food warehouses with Class I or II commodities
Smoke and Heat Removal §910

- Selection of smoke & heat removal method

<table>
<thead>
<tr>
<th>Method of Smoke &amp; Heat Removal</th>
<th>Sprinklered Building</th>
<th>Nonsprinklered Building</th>
<th>1st Story with Stories Above</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoke/Heat Vents</td>
<td>Option 1</td>
<td>Required</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Mechanical Smoke Removal</td>
<td>Option 2</td>
<td>Not allowed</td>
<td>Required</td>
</tr>
</tbody>
</table>

Smoke and Heat Removal §910

- Smoke/heat vents
  - Calculation for sprinklered building
    - \[ A_{VR} = \frac{V}{9000} \]
  - Calculation for unsprinklered building
    - \[ A_{VR} = \frac{V}{50} \]
Smoke and Heat Removal
§910

- Mechanical smoke removal
  - 2 air changes per hour
  - Based on empty building
  - Makeup air openings Ø6” of floor
  - Automatic shutdown upon sprinkler operation
  - Manual controls in room accessible from the exterior with 1-HR separation

Electric Circuits Supplying Fire Pumps
§913.2.2

- Circuits for electric fire pumps must be designed and listed for survivability
- UL 2196
  - 2” concrete covering
  - 2-HR rated assembly
  - Cable with a fire-resistance rating of 2-HR
- Cable and installation method tested

Graphic courtesy of Pentair Thermal Management
Carbon Monoxide Detection
§915.1.1

- CO detection required in Groups I-1, I-2, I-4 and R occupancies, and Group E classrooms
- CO detection is only required when the following potential sources of CO exist:
  - Fuel-burning appliances in the space or building
  - Fuel-burning fireplace in the space or building
  - Fuel-burning, forced air furnace
  - Attached private garage

LP-gas Dispensing
§2307.4

- Point of transfer
  - 25\(\text{ft}\) from wall <1-HR
  - 25\(\text{ft}\) from combustible eave
  - 25\(\text{ft}\) from property line
  - 25\(\text{ft}\) from centerline of RR
  - 10\(\text{ft}\) from public street, driveways, sidewalks
- Self-service into vehicles allowed
  - Special nozzle required
Class I Commodities
§3203.2
- Class I commodities stored on plastic pallets are no longer classified as Class I
- NFPA 13 §5.6.2.2
  - 1 classification level increase for unreinforced PE or PP pallets
  - 2 classification level increase for reinforced PE or PP pallets
- Listed plastic pallets are equivalent to wood pallets

Dead-end Aisles in High-piled Storage
§3206.9.3
- Limitations for dead-end aisle lengths are now specifically addressed in high-piled storage areas
- Maximum length of dead-ends
  - Group S = 50\(\text{ft}\)
  - Group M = 20\(\text{ft}\)
Dead-end Aisles in High-piled Storage
§3206.9.3, Exception

- If length of aisle < 2.5 times the width, then not considered dead-end aisle

Cleaning Piping Systems with Flammable Gas
§3306.2

- Significant gas explosions have occurred when cleaning/purging gas piping
  - 2/7/2010: Kleen Energy power plant in Middletown, CT: 6 workers killed and 50 others injured
Cleaning Piping Systems with Flammable Gas §3306.2

- New piping and systems need to be cleaned and purged prior to operation
- Using the gas product is a handy and convenient cleaning media

Cleaning Piping Systems with Flammable Gas §3306.2

- Flammable gas shall not be used as the cleaning media
- Cleaning and purging of flammable gas piping systems must comply with NFPA 56
  - Fuel gas piping in accordance with IFGC©
  - Compressed gas piping in accordance with IFC Ch 53
  - LP-gas piping in accordance with IFC Ch 61
### MAQs Table 5003.1.1(1)

**Maximum Allowable Quantity Per Control Area Of Hazardous Materials Posing A Physical Hazard**

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>CLASS</th>
<th>GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED</th>
<th>STORAGE</th>
<th>USE-CLOSED SYSTEMS</th>
<th>USE-OPEN SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solid pounds (cubic feet)</td>
<td>Liquid gallons (pounds)</td>
<td>Gas (cubic feet at NTP)</td>
<td>Solid pounds (cubic feet)</td>
</tr>
<tr>
<td>Combustible fiber</td>
<td>Loose Baled</td>
<td>H-3</td>
<td>(100)</td>
<td>(1,000)</td>
<td>NA</td>
</tr>
<tr>
<td>Fireworks</td>
<td>Consumer</td>
<td>1.4G</td>
<td>125</td>
<td>≤1</td>
<td>NA</td>
</tr>
<tr>
<td>Cryogenic inert</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inert gas</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unstable (reactive) 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>H-1</td>
<td>1</td>
<td>25</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>2</td>
<td>H-2</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>NA</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Footnotes**

- The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers ≤1.3 gal.
- In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, or consumer or industrial products, and cosmetics containing ≤50% by volume of water-miscible liquids with the remainder of the solutions not being flammable shall not be limited, provided that such materials are packaged in individual containers ≤1.3 gallons.
- MAQ shall be increased 100% when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms, exhausted enclosures, or listed safety cans. Listed safety cans shall be in accordance with §5003.9.10. Where Note d also applies, the increase for both notes shall be applied accumulatively.
- The following shall not be included in determining the maximum allowable quantities:
  1. Vehicle fuel tanks on vehicles; motorized equipment; regulated by IFGC or IMC
  5. Alcohol based hand rubs classified as Class I or II liquids in dispensers that are installed in accordance with §§5705.5 and §5705.5.1. The location of the alcohol based hand rub (ABHR) dispensers shall be provided in the construction documents.

---

**MAQs Table 5003.1.1(1) – Footnotes**

c. The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers ≤1.3 gal. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, or consumer or industrial products, and cosmetics containing ≤50% by volume of water-miscible liquids with the remainder of the solutions not being flammable shall not be limited, provided that such materials are packaged in individual containers ≤1.3 gallons.

e. MAQ shall be increased 100% when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms, exhausted enclosures, or listed safety cans. Listed safety cans shall be in accordance with §5003.9.10. Where Note d also applies, the increase for both notes shall be applied accumulatively.

p. The following shall not be included in determining the maximum allowable quantities:

1. Vehicle fuel tanks on vehicles; motorized equipment; regulated by IFGC or IMC

5. Alcohol based hand rubs classified as Class I or II liquids in dispensers that are installed in accordance with §§5705.5 and §5705.5.1. The location of the alcohol based hand rub (ABHR) dispensers shall be provided in the construction documents.
CO₂ Systems in Beverage Dispensing §5307

- Multiple small gaseous CO₂ cylinders are being replaced with single larger vessels which contain liquefied CO₂
- Accidental release can fill an enclosed space
  - Odorless and colorless gas
  - Heavier than air
- Systems >100 pounds (≈9.5 gallons) are regulated

CO₂ Systems in Beverage Dispensing §5307

- Operational permit required >100 pounds
- Protection required
  - Continuous gas detection system, or
  - Mechanical ventilation
- External fill connections
Hydrogen Fuel Gas Rooms

§5808

- $H_2$ shall not exceed the MAQ

$H_2$ gas detectors at high points in the room

Supply air inlets low in exterior walls

Exterior wall

Supply air inlets in roof/ceiling, or high in exterior wall

Mechanical ventilation system:
- Maintains a negative pressure compared to adjacent rooms
- Minimum ventilation rate of 1 cfm/12 ft$^3$ of room volume
- Failure of ventilation system results in shutdown of $H_2$ fueling operation

audible/visual device connected to gas detection system:
- Activates when 25% LFL of $H_2$ gas is detected
- Alarm inside and outside hydrogen fuel gas room

Fire-resistance rating of walls and ceiling:
- Comply with IBC Table 509.1, and
- 1-HR minimum

No Smoking signs

Fire-flow

Appendix B

- Revision of fire-flow tables

Table B105.2

Required Fire-flow for Buildings Other Than 1- and 2-family Dwellings, Group R-3 and R-4 Buildings and Townhouses

<table>
<thead>
<tr>
<th>AUTOMATIC SPRINKLER SYSTEM (Design Standard)</th>
<th>MINIMUM FIRE-FLOW (gallons per minute)</th>
<th>FLOW DURATION (hours)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No automatic sprinkler system</td>
<td>Value in Table B105.1(2)</td>
<td>Duration in Table B105.1(2)</td>
</tr>
<tr>
<td>Section 903.3.1.1</td>
<td>25% of the value in Table B105.1(2)</td>
<td>Duration in Table B105.1(2) at reduced flow rate</td>
</tr>
<tr>
<td>Section 903.3.1.2</td>
<td>25% of the value in Table B105.1(2)</td>
<td>Duration in Table B105.1(2) at reduced flow rate</td>
</tr>
</tbody>
</table>

- Required water supply for sprinklered buildings shall meet the greater of:
  - Sprinkler demand with hose 860 GPM @ 45 PSI
  - Required fire-flow 2,250 GPM @ 20 PSI
Existing Ambulatory Care Facilities
Appendix K

- When ≥4 patients, separated from remainder of building with 1-HR fire partitions
- When >10,000 ft² must be separated into 2 smoke compartments
- Sprinklers in IIB, IIIB or VB construction with:
  - ≥4 patients incapable of self-preservation, OR
  - 1 patient incapable of self-preservation on floor other than LED
- Smoke detection system
  - Detectors can be eliminated if building is sprinklered

Fire-fighter Air Replenishment Systems
Appendix L

- Appendix L does not require a FF Air Replenishment System, but it provides design criteria when FARS is installed
- SCBA bottle refilling stations
  - 5th floor above or below grade
  - Every 3rd floor thereafter
- Refilling stations consist of either:
  - Bottle refill with secondary containment
  - RIC/UAC quick fill connections

Photo courtesy of Rescue Air Systems, Inc.
Fire-fighter Air Replenishment Systems
Appendix L

- Source of air
  - On-site air storage system
  - External mobile air connection
- Quality of air
  - NFPA 1989
  - Constantly monitored on-site
  - Air sample tested quarterly

Sprinklers in Existing High-rise Buildings
Appendix M

- Fires in high-rise buildings are difficult to fight
  - Longer evacuation times
  - Often cannot fight the fire from the ground
  - Delayed access time for FFs to reach the fire
  - Time required for FFs moving equipment to upper floors
Sprinklers in Existing High-rise Buildings
Appendix M

- Automatic sprinkler system is required in existing high-rise buildings
  - High-rise is a building with an occupied floor level >75 feet above LLFDVA
  - Exceptions for:
    - Airport traffic control towers
    - Open parking garages
    - Group U
    - Group F-2

Sprinklers in Existing High-rise Buildings
Appendix M

- Automatic sprinkler system must meet current requirements
  - 2015 IFC
  - 2013 NFPA 13

- Compliance schedule
  - Develop schedule within 365 days
    - Design
    - Plan review & permit
  - Installation completed within 12 years
Thank you for participating

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