Significant Changes to the 2024 IFC

Based on the 2024 International Fire Code® (IFC®)

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GOAL & OBJECTIVES

1) Participants should be able to identify significant changes in the 2024 IFC.
2) Participants should be able to identify new chapters in the 2024 IFC.
3) Participants should be able to understand the intent of the changes.
4) Participants should be able to explain the application of the changes.
REALITY CHECK

Why Does This Matter?

- Is valet trash collection allowed by the IFC?
- What are the new/revised fire sprinkler requirements?
- What are the current requirements for lithium-ion and lithium metal batteries?
- How can a puzzle room (escape room) comply with the egress requirements?

COURSE OUTLINE

- Course will use the general format of the IFC
- Chapter 1 to Appendix O
- No revisions to Part VI – Referenced Standards
- Code sections and chapters without significant changes are not included

Part I

Administrative
Chapters 1 – 2
104 Duties & Powers of the Fire Code Official

- Section completely rewritten
- Same text in all I-Codes, so the codes are consistent when dealing with an alternate method that affects multiple codes
- Includes technical assistance and peer review
- Alternative methods clarified and guidance added for review and approval

104.2 Determination of Compliance

- Three paths to demonstrate compliance with the code:
  1. Comply with the specific requirements
  2. Submit a Request for use of an Alternative Method or Materials.
  3. Where specific code requirements cannot be met, the Fire Code Official (FCO) has the authority to modify code requirements.

104.2.3.4 Equivalency criteria

An alternative material, design or method of construction shall, for the purpose intended, be not less than the equivalent of that prescribed in this code with respect to all of the following, as applicable:

1. Quality
2. Strength
3. Effectiveness
4. Durability
5. Safety, other than fire safety
6. Fire safety

- Request for approval of an alternative method can be submitted for any code requirement
- Alternative must show equivalency in 6 characteristics
- Safety is listed separately from Fire Safety
Where there are practical difficulties involved in carrying out the provisions of this code, the fire code official shall have the authority to grant modifications in accordance with Section 104.2.4.1 or 104.2.4.2.

104.2.4 Modifications

- Modifications are different than alternative methods
- The FCO is authorized to modify the code requirements where there are practical difficulties in complying with the code

104.2.4 Modifications

- §104.2.4.1 addresses modifications that are applicable to individual cases
  - Permanent in nature
  - Do not set precedent
- §104.2.4.2 addresses modifications that are necessary during, or in preparation for, a natural disaster
  - Temporary; end date established
  - Pandemic: dining tables in the street

104.7 Official Records

- Whether approved or disapproved, written response is required for:
  - Plans
  - Request to use an alternative method
  - Request for modification
  - Records retained for 5 years or for as long as the structure or activity remains in existence
202 Emergency Responder Communications Enhancement System

- Same system with an upgrade to enhance enforcement
- Several terms revised and defined to clarify application
- Uplink and downlink defined to ensure proper application

202 Flammable Gas Definition

A material which is a gas at 68°F or less at 14.7 psia subdivided as follows:
1. Category 1A. A gas that meets either of the following:
   1.1. A gas which is ignitable at 14.7 psia when in a mixture of 13% or less by volume with air; or
   1.2. A gas with a flammable range at 14.7 psia with air of not less than 12%, regardless of the lower limit, unless data shows compliance with Category 1B.
2. Category 1B. A gas which meets the flammability criteria for Category 1A, is not pyrophoric or chemically unstable, and meets one of more of the following:
   2.1. A lower flammability limit of more than 6% by volume of air; or
   2.2. A fundamental burning velocity of less than 3.9 inches/second.

The limits specified shall be determined at 14.7 psi and a temperature of 68°F in accordance with ASTM E681.

Where not otherwise specified, the term “flammable gas” includes both Category 1A and 1B.

- Flammable gas split into 2 categories
  - Traditional flammable gas (CNG, hydrogen)
  - Slow flame spread (difluoromethane, A2L refrigerants)
  - Correlates with Global Harmonization System (GHS)

202 Occupiable Roof

An exterior space on a roof that is designed for human occupancy, other than maintenance or repair, and which is equipped with a means of egress system meeting the requirements of this code.

- Occupiable roof is not considered a floor
- Occupiable roof does not change the building height
- Occupiable roof must meet egress requirements applicable to the occupancy classification
- Occupiable roof must meet all egress and accessibility requirements
- Elevator required if the occupiable roof is above the 3rd floor above the LED
203 Occupancy Classification

- Occupancy classifications moved from definitions to §203
- Text duplicated out of IBC Ch 3

203.10 Storage of Alcoholic Beverages

- Storage of beverages with an alcohol content >20% is Group S-1
- Storage of beverages with an alcohol content ≤20% is Group S-2

Part II

General Safety Provisions
Chapters 3 – 4
304.1.1 Valet Trash

- Valet trash collection is an intermediary service that removes trash or recycling materials placed outside of dwelling units or sleeping units for final collection
  - Includes collection of recyclable materials
- Valet trash collection is only allowed where specifically approved
  - No permit
  - Only guidance/requirements are in Appendix O

304.3 Trash Containers

- Requirements for containers for combustible rubbish are revised
- Containers >40 gallons must be of non-combustible materials or low heat release materials
  - Peak heat release ≤300 kW/m²
  - Exceptions
    - Dumpsters in sprinklered areas
    - Containers in dedicated storage buildings of Type I or IIA construction

304.3.6 Waste/Linen Containers – Group I

- Waste and linen containers in Groups I-1, I-2 and I-3 and ambulatory care facilities must be of noncombustible materials or low heat release materials
- Containers >32 gallons must be in waste or linen collection rooms
  - Incidental use
    - Waste or linen collection rooms >100 ft² must be of 1-HR construction or sprinklered
304.3.7 Waste Containers – Group R-2

- Waste containers ≥20 gallons in Group R-2 college and university dormitories must be of noncombustible materials or low heat release materials
- Portable waste containers >32 gallons must be in waste collection rooms
  - Incidental use
  - Waste or linen collection rooms >100 ft² must be of 1-HR construction or sprinklered

314.4 Indoor Vehicle Display

- Ignition batteries must be disconnected if required by FCO
- Fuel tanks cannot exceed:
  - 5 gallons for Class I, II or III liquid fuel
  - ½ tank or 6.6 gallons for LPG
  - ¾ tank or 630 ft³ for CNG
  - ¾ tank or 2,000 ft³ for hydrogen

317 Vegetative and Landscaped Roofs

- Landscaped roof is an area over a roof assembly incorporating planters, vegetation, hardscaping or other similar decorative appurtenances that are not part of the roof assembly
- Vegetative roof is a roof assembly of interacting components designed to waterproof a building’s top surface that includes, by design, vegetation and related landscape elements
317.2 Vegetative and Landscaped Roofs

- IBC covers design and construction
  - New standard – ANSI/SPRI VF-1 External Fire Design for Vegetative Roofs
  - Separations and maximum areas did not change, but are now in standard
- IFC covers maintenance
  - Maintenance plan
  - Removal of dead material

320 Storage of Lithium Batteries

- Storage of lithium-ion and lithium metal batteries regulated
- Exceptions:
  - New or refurbished batteries installed in equipment, devices or vehicles they are designed to power
  - New or refurbished batteries packed for use with equipment, devices or vehicles they are designed to power
  - Batteries in original retail packaging with a rating ≤ 300 watt-hours for lithium-ion or contain ≤ 25 grams of lithium metal for lithium metal batteries
320 Storage of Lithium Batteries

- Permit required for lithium battery storage ≥ 15 ft³
- Fire safety and evacuation plan required
- 3 storage configuration options
  - A single facility may use more than one storage configuration
    1. Containers
    2. Indoor storage room
    3. Outdoor storage room

322.4.1 Battery Storage in Containers

- Maximum of 15 ft³ of lithium-ion or lithium metal batteries can be stored in containers
- Containers shall be:
  - Open-top with a capacity of ≤ 7.5 ft³
  - Containers of noncombustible materials or approved for battery collection
  - Groups of containers ≤ 7.5 ft³
  - Groups of containers separated by ≥ 3' of open space, OR ≥ 10' of space that contains combustible materials
  - Containers shall be located ≥ 5' from exits or exit access doors

Collection Containers: 55-gallon drums

- 55-gallon drum = 7.35 ft³
- Aggregate quantity in containers ≤ 15 ft³
Collection Containers: 55-gallon drums

Container is full, so moved to storage area

55-gallon drum = 7.35 ft³
Aggregate quantity in containers ≤ 15 ft³

EXIT

35

Collection Containers: 55-gallon drums

Container is full, so moved to storage area

55-gallon drum = 7.35 ft³
Aggregate quantity in containers ≤ 15 ft³

EXIT

36

Indoor Battery Storage Room

EXIT

37
320.4.2.2 Indoor Battery Storage Areas

- In mixed-use buildings, the battery storage area shall be separated from the remainder by 2-HR fire barriers

320.4.2.1 Technical Opinion and Report

- Technical opinion and report to evaluate the fire and explosion risks associated with the indoor storage of lithium-ion and lithium metal batteries and evaluate:
  - The potential for deflagration of flammable gases released during a thermal runaway event
  - The basis of design for sprinkler system or other approved fire suppression system
  - Sprinkler design shall be based on full-scale fire testing or another approved method of demonstrating sufficiency of the recommended design

320.4.2 Indoor Battery Storage Areas

- Indoor battery storage areas for lithium-ion or lithium metal batteries must be protected with:
  - Sprinklers or fire-extinguishing system
  - Design based on the technical opinion and report
  - Fire detection and alarm system
  - Detection shall be air-aspirating smoke detection or radiant energy-sensing fire detection
  - Explosion control when required in the technical opinion and report
320.4.2.6 Reduced Requirements for Indoor Storage

- Where the state of charge is demonstrated to be ≤30% for lithium-ion or lithium metal batteries, the following protection features are not required:
  - Technical opinion and report
  - Separation with 2-HR construction
  - Explosion control

Fire-extinguishing system and fire alarm system still required

320.4.3.1 Outdoor Battery Storage Areas

- Outdoor storage of lithium-ion or lithium metal batteries shall be:
  - ≥20' from any building, lot line, public street, public alley, public way or means of egress
  - Separation can be reduced to 3' if separated by a 2-HR fire-resistance rated assembly without openings or penetrations and extending ≥5' above and to the sides of the battery storage area
  - Separation can be reduced to 3' if batteries are contained in approved prefabricated portable structures providing a complete 2-HR fire-resistance rated enclosure

320.4.3.2 Outdoor Battery Storage Areas

- Outdoor storage shall be in piles ≤900 ft²
- Piles shall not exceed 10' in height
- Piles shall be separated by ≥10' of open space
320.4.3.2 Outdoor Battery Storage Areas

- The size, separation or protection requirements for outdoor storage areas for lithium-ion and lithium metal batteries are not affected by a roof covering or weather protection as provided in IBC §414.6.1.
- Outdoor storage areas shall be protected with a fire detection and alarm system with radiant energy-sensing detection.
- Prefabricated portable structures for storage of batteries shall be treated as outdoor storage areas.

322 Powered Micromobility Devices

- Micromobility devices powered by lithium-ion or lithium metal batteries are regulated.
- Battery charging areas
  - Chargers must be listed and from original equipment manufacturer.
  - Extension cords and power taps prohibited.
  - Removed batteries shall not be stacked.
  - Removed batteries separated ≥18” while charging.
  - Fire alarm system required.

Exceptions:
1. Devices for personal use in residential occupancies.
2. Charging performed by the owner in any occupancy.

403.10.6 Fire Safety & Evacuation Plan

- Fire safety and evacuation plan is required for research and development, testing, manufacturing, handling or storage of lithium-ion or lithium metal batteries.
- Fire safety and evacuation plan is required for repair or servicing of vehicles powered by lithium-ion or lithium metal batteries.

Exceptions:
1. New or refurbished batteries installed in the equipment they power.
2. New or refurbished batteries packed with the equipment they power.
3. New or refurbished lithium-ion batteries rated ≤300 watt-hours and lithium metal batteries containing ≤25 grams of lithium metal in original retail packaging.
4. Storage, repair and charging in detached 1- and 2-family dwellings and townhouses for personal use devices.
5. Storage, repair and charging in sleeping units and dwelling units of Group R-1 and R-2 for personal use devices.
Part III
Building and Equipment Design Features
Chapters 5 – 12

202 Definitions

Emergency Responder Communications Enhancement System (ERCES). An infrastructure solution installed within a building to enhance the communications capabilities for first responders that utilizes solutions such as a signal booster, voting receiver, base station or other technology capable of enhancing the radio frequency (RF) to ensure effective public safety communications.

- New definition
- Revised to include all methods of communications
- Same concept and system

510.4.1 Signal Strength

- ERCES provisions are expanded to include usable communications for all technologies available
- Required downlink signal strength for narrowband analog, digital or wideband LTE signals is a minimum Delivered Audio Quality (DAQ) of 3.0
  - Downlink signal is no longer required to meet -95 dBm
- Bit Error Rate (BER) or Signal-to-Interference-Plus-Noise Ratio (SINR) measurements can be used for analog or digital signals

DAQ 3.0 = speech is understandable with slight effort, with occasional repetition due to noise or distortion
### 510.4.2.8 Near-Far Effect in ERCES

- Signal boosters must be designed to minimize the near-far effect.
- Signal boosters, uplink signals and noise levels shall be coordinated with all systems which could be potentially affected by the transmitted RF noise from the ERCES.

**Near-far problems arise when an antenna system is not designed correctly and is caused when a transmission from a portable radio in close proximity (near) to the antenna overpowers the uplink amplifier.**

### 608.1.1 CO₂ Mechanical Refrigeration

- Mechanical refrigeration systems regulated in the 2024 IFC are those with a refrigerant that is toxic, highly toxic, flammable or ammonia.
- Mechanical refrigeration system with CO₂ refrigerant are now included in the IFC.
- CO₂ systems must comply with IIAR CO₂ Safety Standard for Closed-Circuit Carbon Dioxide Refrigeration Systems.

### 608.9 Ammonia Mechanical Refrigeration

- Provisions for ammonia mechanical refrigeration systems are removed from the IFC.
- Now found in the referenced standards IIAR 2, IIAR 6, IIAR 7, IIAR 8 and IIAR 9.
- Issues of refrigerant detection, labeling, ventilation, discharge, and treatment, if any, are contained in the standards.
608.12 Storage of Refrigerants

- Many new refrigerants are classified as flammable gas
- Temporary storage of refrigerants during maintenance and repair of refrigeration systems is exempted from the general storage requirements
- Temporary storage is allowed where the refrigerant is removed from the system and will be reinstalled once the work is complete

705.2.7 Rolling Steel Fire Door Testing

- Rolling steel fire doors have unique requirements necessitating inspection and maintenance to be performed by trained personnel
- Annual testing is required
- Critical to reset the tension properly for rolling fire doors
  - Drop speed between 6"/second and 24"/second
- Records must be maintained

803.11.1 Foam Plastic Materials

- 2021 IFC was vague regarding specific fire tests
- Foam plastic materials used as interior finish must now comply with fire testing in IBC §2603.9
  - Large-scale fire tests
    - NFPA 285
    - FM 4880
    - UL 1040 or UL 1715
903.2 Sprinklers: Telecommunication Batteries

- Batteries for telecommunications equipment are no longer exempt from fire sprinkler requirements
- IF §1207 requires fire sprinklers for the ESS system, then fire sprinklers must be installed and the exception does not apply
- See §1207.3.5
  - Depends on type of battery and storage capacity

903.2 Sprinklers: Lithium Batteries

- Fire sprinkler system required throughout fire areas of Group B for research and development or testing of lithium-ion or lithium metal batteries
- Fire sprinkler system required in the room or space of Group M IF required by
  - §320 for collection, storage or display
  - Ch 32 for high-piled storage

903.2 Sprinklers: Lithium Batteries

- Fire sprinkler system required throughout the building:
  - Group F-1 for manufacturing of lithium-ion or lithium metal batteries
  - Group F-1 for manufacturing of vehicles powered by lithium-ion or lithium metal batteries
  - Group S-1:
    - Storage of vehicles powered by lithium-ion or lithium metal batteries with fire area >500 ft²
    - Repair of vehicles powered by lithium-ion or lithium metal batteries with fire area >500 ft²
903.3.1.1.3 Sprinklers: Lithium Batteries

- Fire sprinkler design criteria is not readily available to protect lithium-ion or lithium metal batteries
- Densities change based on individual components, encasement and manufacturer
- Sprinkler densities to be based on fire tests

903.2.8.3 Sprinklers: Group R-4

- Fire sprinklers are required in all Group R
- Fire sprinklers are required in Group R-4 Condition 1 and Condition 2
- NFPA 13D allowed in Group R-3 and R-4 Condition 1
- NFPA 13D not allowed in Group R-3 and R-4 Condition 2
  - NFPA 13
  - NFPA 13R IF ≤4 stories above grade plane AND the roof assembly <45' above the LLFDVA

903.3.1.1 Exempt Sprinkler Locations

- Exceptions 1 & 2 have been combined because there is little differentiation between them
- Item 1 allows sprinklers to be omitted where the application of sprinkler water can create a serious life or fire hazard
- Note that where sprinklers are omitted in accordance with §903.3.1.1.1, the building is still considered fully sprinklered
903.3.1.2 NFPA 13R Sprinkler Installations

- Maximum stories for use of NFPA 13R sprinkler systems is 4
- Maximum height is:
  - Top floor ≤30' above LLFDVA for other than Group R-2
  - For Group R-2, roof assembly ≤45' above LLFDVA
    - Measured to top of parapet at exterior wall, or eave of highest pitched roof

903.4 Sprinkler Alarms

- Local exterior alarm is required for sprinkler systems
  - Audible and visual
  - Not required for 1- and 2-family dwellings
- Electrical supervision required for valves, pumps, tanks, waterflow switches
  - Not required for 1- and 2-family dwellings
  - Not required for limited area sprinkler systems unless the building has a required fire alarm system
- Monitoring is required for sprinkler systems
  - Supervising station or constantly attended location

904.12 Hybrid Fire-extinguishing System

- Hybrid fire-extinguishing systems recognized by the code
  - Do not replace sprinkler system
  - As noted in §904.2.1, are not considered an alternative sprinklers with regard to code modifications
  - Installed in accordance with NFPA 770
  - Consist of water spray and inert gas
### 904.14.1 Manual Activation Device
- Manual activation device is required for fire-extinguishing systems protecting cooking appliances.
- Located 42" to 48" above the floor.
- Located 10' to 20' from cooking appliances.
- New exception allows the FCO to accept other distances where 10' to 20' is not feasible.
- Must be in path of egress.
- Must be visible.

### 905.3 Standpipe: Townhouses
- Standpipe required in buildings:
  - ≥ 4 stories above grade plane, or
  - With floor level ≥ 30' above or below LLFDVA.
- Exceptions:
  - Group R-3.
  - Group R-2 townhouses.

### 905.4 Class I Standpipe Connections
- Class I standpipe connections required:
  - In every required interior exit stairway.
  - In every required exterior exit stairway.
  - On each side of horizontal exit.
  - At the entrance between an exit passageway and other areas of the building.
905.5.1 Standpipes: Stages

- Standpipe connection no longer required on stages
- Standpipe connection no longer required on each tier of dressing rooms
- Standpipe connections still required:
  - On each side of the rear of the auditorium
  - On each side of the balcony

907.2.1 Fire Alarm: Group A-5

- Manual fire alarm system is required for all Group A with ≥300 occupants or ≥100 occupants above or below the LED
- System is not required for Group A-5 if:
  - >15,000 occupants
  - PA system with standby power is provided
  - Enclosed spaces ≤10% of the area and ≤1,000 ft²
  - All means of egress are open to the outside

907.2 Fire Alarm: Lithium Batteries

- Automatic fire alarm system with air-sampling detection or radiant-energy-sensing detection required throughout the fire area in:
  - Group B with research and development or testing of lithium-ion or lithium metal batteries
  - Group F with manufacturing of lithium-ion or lithium metal batteries
  - Group F with manufacturing of vehicles, ESS or equipment powered by lithium-ion or lithium metal batteries
  - Group S with storage of lithium-ion or lithium metal batteries where required by §320
907.2 Fire Alarm: Lithium Batteries

- Automatic fire alarm system with air-sampling detection or radiant-energy-sensing detection required throughout the room or area in:
  - Group M with storage of lithium-ion or lithium metal batteries where required by §320

907.2.11.3 Near Cooking Appliances

- Smoke alarms must be installed ≥10' from cooking appliances
  - Regardless of type smoke alarm
  - Exception allows for reduction down to 6' where necessary to comply with other sections specifying smoke alarm locations

907.5.2.1.3 Audible Alarm Signals

- In Group R-1, R-2 and I-1 which are required to install a fire alarm system, the audible alarm signal sleeping rooms must provide 520 Hz low-frequency signal
  - 6 times more effective in waking young, hearing-impaired and alcohol impaired individuals
  - Not available in smoke alarms
907.10 Smoke Alarm Maintenance

- Smoke alarms are required to be tested in accordance with manufacturer’s instructions.
- Any smoke alarm shall be replaced when:
  - It fails the operability test.
  - It exceeds 10 years after date of manufacture.
  - It sounds the end-of-life signal.
  - The manufacturing date cannot be determined.

Table 911.1 Explosion Control

Table 911.1 Explosion Control Requirements (excerpts)

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>CLASS</th>
<th>Explosion Control Methods</th>
</tr>
</thead>
<tbody>
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<tr>
<td>Explosives</td>
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<tr>
<td>Division 1.1</td>
<td>Required</td>
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<td>Division 1.2</td>
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<td>Division 1.5</td>
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<tr>
<td>Division 1.6</td>
<td>Required</td>
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<tr>
<td>Flammable gas</td>
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<td>Required</td>
</tr>
<tr>
<td>Liquefied</td>
<td>Not required</td>
<td>Required</td>
</tr>
</tbody>
</table>

h. Not required for Category 1B Flammable Gases having a burning velocity not exceeding 3.9 inches per second.

i. Does not apply to consumer fireworks, 1.4G.

912.5 FDC Signs

- Signs on FDCs are clarified.
- Lettering ≥1” in height.
- Type of systems supplied.
- Identify buildings served, if more than 1.
- Portion of building served, if not the entire building.
- Pressure required if >150 PSI.
914.3.1.1 Standpipe/Sprinkler Riser in High-rise

- In buildings ≤420’ in height, standpipe and sprinkler systems can be supplied by a single riser or express riser within each vertical water supply zone
- Standpipe and sprinkler risers shall be located in interior exit stairways

- In buildings >420’ in height, 2 risers shall supply standpipe and sprinkler water within each vertical water supply zone
- Each riser shall serve alternating floors
- Adjacent floors cannot be served by the same riser
- Standpipe and sprinkler risers shall be located in interior exit stairways that are remotely located

914.6.1 Sprinklers: Stages

- Sprinklers required for stages >1,000 ft² with a height of >50’ over the stage
- Sprinklers are required beneath all catwalks and galleries above the stage
- Exception 4 now states that sprinkler are not required under catwalks and galleries provided NFPA 13 does not require sprinklers

NFPA 13 §9.5.5.3.1
Sprinklers required under grated flooring >48” in width
Sprinklers required under obstructions >48” in width
914.7 Special amusement areas
Special amusement areas shall comply with Sections 914.7.1 and 914.7.2.

Exceptions:
1. Special amusement areas that are without walls or a roof and constructed to prevent the accumulation of smoke need are not required to comply with this section.
2. Puzzle rooms provided with a means of egress that is unlocked, readily identifiable and always available are not required to comply with this section.

- Puzzle rooms fall under the definition of special amusement areas
- Puzzle rooms must comply with special amusement area requirements, unless the means of egress is always available and unlocked

914.7.2 Fire Alarm: Special Amusement Area

- Fire alarm system required in special amusement areas
- Smoke detection throughout
- Emergency voice/alarm communications
- Constantly attended location required to:
  - Monitor alarm
  - Manually activate the EVAC

- Activation of 1 smoke detector shall activate an audible and visual alarm in the constantly attended location
- Activation of 2 smoke detectors, 1 smoke detector with alarm verification, sprinkler waterflow, or the manual device in the constantly attended location shall:
  - Activate prerecorded message
  - Stop conflicting sounds or visual distractions
  - Illuminate the means of egress

Additionally, in Puzzle Rooms the egress doors shall unlock and open
915.1 Carbon Monoxide Detection

- CO detection is required in all occupancies other than Groups F, S and U that are not normally occupied.
- Detection required if a CO source exists:
  - Buildings supplied by a CO-producing forced-air furnace.
  - Buildings with attached private garages.
  - Buildings that have a CO-producing vehicle used within the building.
  - Buildings with a CO source.

CO source is a piece of equipment or permanently installed appliance, fireplace or process that produces or emits carbon monoxide gas.

915.2 CO Detection Locations

- Locations for CO detection are specified:
  - Sleeping units and dwelling units – outside of each sleeping area unless CO source in sleeping room.
  - Group E requires a CO detection system.
  - Rooms with fuel-burning forced air furnace require CO detection in the room.
  - Occupiable rooms contiguous to attached private garages with opening to garage.

CO detection provided in air ducts and plenums shall not substitute for installation in required locations.

915.3 CO Detection and Fire Alarms

- CO alarms only allowed in sleeping units and dwelling units.
- In new buildings with a required fire alarm system and required CO detection, shall have CO detectors connected to the FACU.
- In new buildings without a fire alarm system, install a CO detection system.
  - Where approved by the FCO, CO alarms can be utilized.
917.2 Mass Notification: Group E

- Mass notification risk analysis is required for:
  - New building at a multi-building college or university campus
  - New building containing a Group E with an occupant load of ≥500
  - Analysis conducted in accordance with NFPA 72
  - Mass notification provided is risk analysis determines it is needed

1004.5 Information Technology Equipment

- Information technology equipment (ITE) added to code
- ITE is server room, or server farm
  - Different than data entry centers

Table 1004.5 (excerpts)

<table>
<thead>
<tr>
<th>FUNCTION OF SPACE</th>
<th>OCCUPANT LOAD FACTORa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information technology equipment</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 1006.3.4(1) Occupiable Roofs

<table>
<thead>
<tr>
<th>Story and Occupiable Roof</th>
<th>Occupancy</th>
<th>Minimum Number of Dwelling Units</th>
<th>Maximum Exit Access Travel Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement, first, second or third story above grade plane and occupiable roofs over the first or second story above grade plane</td>
<td>R-2</td>
<td>4 dwelling units</td>
<td>125 feet</td>
</tr>
<tr>
<td>Fourth story above grade plane and higher</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1031.

b. This table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, use Table 1006.3.4(2).

c. This table is for occupiable roofs accessed through and serving individual dwelling units in Group R-2 occupancies. For Group R-2 occupancies with occupiable roofs that are not served through and serving individual units, use Table 1006.3.4(2).
Table 1006.3.4(2) Occupiable Roofs

<table>
<thead>
<tr>
<th>Story and Occupiable Roof</th>
<th>Occupancy</th>
<th>Maximum Occupant Load per Story and Occupiable Roof</th>
<th>Maximum Exit Access Travel Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>First story above or below grade plane and occupiable roofs over the first story above grade plane</td>
<td>A, B, E, F, H, U</td>
<td>40</td>
<td>75</td>
</tr>
<tr>
<td>Second story above grade plane</td>
<td>B, E, M, S</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>Third story above grade plane and higher</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

Table 1010.2.4 Locks & Latches

- **Automatic Flush Bolt.** Door locking hardware installed on the inactive leaf of a pair of doors, which has a bolt that is extended automatically into the door frame or floor when the active leaf is closed after the inactive leaf, and which holds the inactive leaf in a closed position. When the active leaf is opened, the automatic flush bolt retracts the bolt or rod, allowing the inactive leaf to be.

- **Constant Latching Bolt.** Door locking hardware installed on the inactive leaf of a pair of doors, which has a bolt that automatically latches into the door frame or the floor, and which holds the inactive leaf in a closed position. The latch bolt is retracted manually to allow the inactive leaf to be opened.

- **Dead Bolt.** Door locking hardware with a bolt that is extended and retracted by action of the lock mechanism.

- **Manual Bolt.** Door locking hardware operable from one side of the door, or from the edge of a door leaf, with a bolt or rod extended and retracted by manual movement of the bolt or rod, such as a manual flush bolt or manual surface bolt.
### Table 1010.2.4 Locks & Latches

#### Manual Bolts, Automatic Flush Bolts and Constant Latching Bolts on the Inactive Leaf of a Pair of Doors

<table>
<thead>
<tr>
<th>Application with a Pair of Doors with an Active Leaf and Inactive Leaf</th>
<th>The Pair of Doors are Required to Comply with IBC Section 716</th>
<th>Standard Type of Manual Bolt Locks, Automatic Flush Bolts and Constant Latching Bolts on the Inactive Leaf of a Pair of Doors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group B, F or S where the building is equipped with a fire protection system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group B, F or S where the building is equipped with a fire protection system and automatic smoke and heat detectors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group C, D or E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group I-2 patient care rooms and sleeping rooms where the inactive leaf is not needed to meet egress capacity requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any occupancy where panic hardware is not required, exit doors are used in pairs, and where both leaves are required to meet egress capacity requirements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Storage or equipment rooms where the inactive leaf is not needed to meet egress capacity requirements</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Footnotes

- a. Not permitted on corridor doors in Group I-2 occupancies where corridor doors are required to be positive latching.
- b. Permitted where both doors are self-closing or automatic-closing, and are provided with a coordinator that causes the inactive leaf to be closed prior to the active leaf.
1010.2.6 Stairway Doors

- Stairway doors can be locked from the side opposite egress provided the doors are:
  - Capable of being unlocked individually or simultaneously by a signal from the fire command center or location inside the main entrance
  - Automatically unlocked upon activation of fire alarm
  - Automatically unlocked upon failure of the locking system or loss of power

1010.2.9 Access Control Systems

- The code acknowledges access control systems
- Access control systems are allowed provided the egress side complies with one of the locking arrangements in Ch 10

1010.2.14 Elevator Lobby Access Doors

- Doors from an elevator lobby to the tenant space can be electrically locked provided:
  - The floor has at least 2 exits that do not required travel through the elevator lobby
  - The building is equipped throughout with a sprinkler system
  - The building is equipped throughout with a fire alarm system
  - Smoke detectors are provided in the elevator lobbies
  - 2-way communication system is located in the elevator lobby and connected to an approved constantly attended station which has the capability of unlocking the electric locks
  - Emergency lighting is provided in the elevator lobby
  - The locking devices are listed
1010.2.14 Elevator Lobby Access Doors

- The electrically locked doors shall unlock:
  - By activation of a switch at the constantly attended station
  - Upon activation of the sprinkler system
  - Upon activation of the smoke detection system
  - Upon activation of the fire alarm system by means other than a manual fire alarm box
  - Doors shall remain unlocked until the fire alarm system is reset
  - On loss of power to the electric locks or electrical locking system
  - The electric locks shall have the capability of being unlocked by a switch located at the fire command center, security station or other approved location

1013.2 Low-level Exit Signs

- Low level exit signs are required in areas serving guest rooms in Group R-1
- Bottom of the sign located between 10" and 18" above the floor
- No longer required in Group R-1 IF the building is sprinklered
- NFPA 13 or 13R is acceptable
1017.2.3 Exit Access Travel Distance

- Exit access travel distance in Group H-5 ≤200'
- Exit access travel distance can be increased to 300' IF:
  - The width of the fabrication area ≥300'
  - The area of the fabrication area ≥220,000 ft²
  - The height of the fabrication area, measured between the raised metal floor and the clean filter ceiling, ≥16'
  - The ventilation supply rate is ≥20 CFM and shall remains operational

1029.3 Construction of Egress Court

- Width of egress court ≥10', OR walls shall be 1-HR construction for a height of 10'
- New Exception 3 allows the width to be reduced to the required width based on the occupant load provided ≥2 independent paths to the public way
1029.3 Construction of Egress Court

Egress path #1

Egress Court

Building A

Building B

Egress path #2

1032.2.2 Fire Escape Maintenance

- Requirements to maintain fire escapes has been in the code since 2000
- Located in Ch 11
- Relocated to maintenance of means of egress in §1032
- Examined every 5 years
- Evaluated for capability to carry live load of 100 lbs/ft²

1103.9 CO Detection in Existing Buildings

- CO detection required in existing buildings with a CO source
- All occupancies
- Detection can be CO alarms
- Not required to be connected to fire alarm system
1107.1 Existing Energy Storage Systems

- Failure Modes and Effects Analysis (FMEA) shall be provided for existing ESS utilizing lithium-ion battery technology IF:
  - Capacity exceeds Table 1207.1.3, and
  - Installed prior to the local adoption of the 2018 IFC
  - Except for detached 1- and 2-family dwellings and townhouses
  - FMEA shall evaluate thermal runaway and early detection

1201.1, 1207.1 ESS Under Utility Control

- ESS systems must comply with Ch 12 and NFPA 855
- ESS managed by utility companies are specifically required to comply with Ch 12
  - Excludes capacitors and capacitor equipment for utilities and industrial facilities
  - Excludes mobile ESS at utility substations for ≤90 days during repair or maintenance

1205.2.3 Building-Integrated PV Systems

- Building-integrated photovoltaic systems must be listed to UL 3741
- Components must be designed so when FF cut and remove components for ventilation, they are not exposed to significant electrical charge
- The eaves, or edge of building, must be marked to identify areas to avoid ground ladder placement
1207.2.1 ESS Commissioning

- Commissioning plan is required for new, replaced or retrofit ESS
- New exceptions added
  - Lead-acid and nickel-cadmium ESS <50 VAC or 60 VDC for telecommunications equipment under utility control can comply with NFPA 76
  - Lead-acid and nickel-cadmium ESS used for DC power at utility substations can comply with state or local regulations

Table 1207.1.3 ESS Threshold

- New ESS technologies added to §1207

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>ENERGY CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitor ESS</td>
<td>3 kWh</td>
</tr>
<tr>
<td>Flow batteries</td>
<td>20 kWh</td>
</tr>
<tr>
<td>Lead-acid batteries, all types</td>
<td>70 kWh *</td>
</tr>
<tr>
<td>Lithium-ion batteries</td>
<td>20 kWh</td>
</tr>
<tr>
<td>Nickel-cadmium (Ni-Cd), Nickel metal hydride (Ni-MH) and Nickel zinc (Ni-Zn) batteries</td>
<td>70 kWh</td>
</tr>
<tr>
<td>Non-electrochemical ESS</td>
<td>70 kWh</td>
</tr>
<tr>
<td>Other battery technologies</td>
<td>70 kWh</td>
</tr>
<tr>
<td>Other electrochemical ESS technologies</td>
<td>70 kWh</td>
</tr>
<tr>
<td>Sodium nickel chloride batteries</td>
<td>70 kWh</td>
</tr>
<tr>
<td>Zinc manganese dioxide (Zn-MnO₂) batteries</td>
<td>70 kWh</td>
</tr>
<tr>
<td>Other electrochemical ESS technologies</td>
<td>70 kWh</td>
</tr>
</tbody>
</table>

Table 1207.5 Maximum Capacity for ESS

- New ESS technologies added to §1207

<table>
<thead>
<tr>
<th>TECHNOLOGY</th>
<th>MAXIMUM ALLOWABLE QUANTITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>STORAGE BATTERIES</td>
<td></td>
</tr>
<tr>
<td>Flow batteries</td>
<td>600 kWh</td>
</tr>
<tr>
<td>Lead-acid, all types</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Lithium-ion</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Sodium nickel phosphate</td>
<td>600 kWh</td>
</tr>
<tr>
<td>Nickel-cadmium (Ni-Cd), Nickel metal hydride (Ni-MH) and Nickel zinc (Ni-Zn) batteries</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Zinc manganese dioxide (Zn-MnO₂) batteries</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Other battery technologies</td>
<td>Unlimited</td>
</tr>
<tr>
<td>OTHER ELECTROCHEMICAL ESS</td>
<td></td>
</tr>
<tr>
<td>All types</td>
<td>20 kWh</td>
</tr>
</tbody>
</table>
Table 1207.6 Specific Requirements for ESS

- New ESS technologies added to §1207

**TABLE 1207.6 (excerpts)**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Section</th>
<th>Lead-acid</th>
<th>Nickel-cadmium (Ni-Cd)</th>
<th>Nickel metal hydride (Ni-MH) and nickel zinc (Ni-Zn)</th>
<th>Lithium-ion</th>
<th>Flow</th>
<th>Spills &amp; Neutralization</th>
<th>Exhaust Ventilation</th>
<th>Explosion Control</th>
<th>Safety Caps</th>
<th>Thermal runaway</th>
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<tbody>
<tr>
<td>1207.1</td>
<td>Yes</td>
<td>Yes</td>
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<td>No</td>
<td>No</td>
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<td>No</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>1207.3</td>
<td>No*</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<td>1207.4</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
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<td>Yes</td>
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<td>1207.6.1</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<td>1207.6.2</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>1207.6.3</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

* Not required for batteries with jelled electrolyte.

1207.5.5 Fire-extinguishing System for ESS

- Fire-extinguishing system design for ESS is based on the following:
  - Sprinklers for ESS ≤50 kWh – minimum design of 0.3 GPM/ft² over the room or 2,500 ft², whichever is smaller
  - Sprinklers for ESS >50 kWh – minimum design based on large-scale fire testing
  - Alternative fire-extinguishing system for ESS – based on large-scale fire testing
- New exceptions:
  - Lead-acid and nickel-cadmium ESS under utility control
  - Lead-acid ESS used for UPS comprising ≤10% of floor area

1207.11.1 ESS in Group R-3 or R-4

- ESS in Group R-3 or R-4 must comply with §1207.11, OR:
  - Be listed and labeled “FOR USE IN RESIDENTIAL DWELLING UNITS” and comply with the listing and manufacturer’s instructions, OR
  - Have a capacity <1 kWh
1207.11.3 ESS in Group R-3 or R-4

- ESS may be installed in the following locations:
  - Detached garages
  - Detached accessory structures
  - Attached garages IF separated in accordance with IBC §406.3.2
  - Outdoors or on the exterior side of exterior walls IF ≥3' from doors and windows directly entering the dwelling unit
  - Enclosed utility closets, basements and storage spaces within dwelling units and sleeping units provided with finished or noncombustible walls and ceilings
    - Unfinished wood-framed construction shall be provided ≥5/8" Type X gypsum wallboard

1207.11.7.1 ESS in Garages

- ESS installed in garages shall be protected from vehicle impact
- Potential vehicle impact occurs:
  - Within the normal driving path to the back wall
    - Garage vehicle opening width is the normal driving path
    - ≤48" above the driving surface on the back wall
  - On the back wall within 36" of the normal driving path
  - On a side wall within 24" of the back wall and within 36" of the normal driving path
1207.11.7.3 ESS in Garages

1207.11.6 Fire Detection

- ESS installed Group R-3 and R-4 shall be provided with fire detection
- Rooms and areas within dwelling units, sleeping units, basements and attached garages shall be provided with a smoke alarm in accordance with §907.2.11
- Hardwired with battery backup and interconnected with smoke alarms in the dwelling or sleeping unit
- A listed heat alarm shall be installed where smoke alarms cannot be installed because of their listing restrictions

Part IV

Special Occupancies and Operations
Chapters 20 – 41
2404.2 Enclosures for Spray Operations

- Portable or inflatable enclosures shall not be used for spray operations
- Spray operations at marinas, dry docks and construction areas are allowed if they comply with NFPA 33
- Membrane enclosures can be used if they comply with NFPA 33

NFPA 33, Ch 18 Membrane Enclosures

- Membrane enclosures are limited in use to 180 days
- Membrane must be noncombustible, or pass NFPA 701 Test Method 2, or meets specific criteria when tested to NFPA 286, or be classified as a welding curtain by FM 4950
- Membrane enclosures are permitted in buildings protected with sprinkler systems
- Control ignition sources inside enclosure – Class I Division 1

2404.5.4 Limited Finishing Workstation

- Limited finishing workstations added as an option for spray finishing operations
- Must comply with NFPA 33 and:
  - Protected by fire-extinguishing system
  - Provided with mechanical ventilation
  - Limited to use of 1 gallon in 8-hour period
  - Control ignition sources – Class I Div 1 inside enclosure
  - Enclosure noncombustible or meets NFPA 701, NFPA 286 or FM 4950
Table 2704.2.2.1 Haz Mat in Fab Areas

- Semiconductor industry continues to expand
- To increase production and efficiency, the quantity limits for many materials have increased in the fabrication area
- The maximum quantity at a single workstation has not changed

---

Table 2704.2.2.1 Haz Mat in Fab Areas

<table>
<thead>
<tr>
<th>TABLE 2704.2.2.1 Excerpt(s)</th>
<th>QUANTITY LIMITS FOR HAZARDOUS MATERIALS IN A SINGLE FABRICATION AREA IN GROUP H-5</th>
<th>GAS (ft³ @ NTP)</th>
<th>LIQUIDS (gallons/ft²)</th>
<th>SOLIDS (pounds/ft²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL-HAZARD MATERIALS</td>
<td>Not Applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combustible liquid</td>
<td>Class II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class IIIA</td>
<td>Not Applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Combustible liquid</td>
<td>Combination Class I, II and IIIA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable liquid</td>
<td>Class I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class IA</td>
<td>Class IB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class IC</td>
<td>Not Applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class IA</td>
<td>Combination Class I, II and IIIA</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Explosive substance</td>
<td>Unclassified detonable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>Class II</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class III</td>
<td>Not Applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic peroxide</td>
<td>Class I</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class IA</td>
<td>Class IB</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class IC</td>
<td>Not Applicable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

3103.8.1 Water-filled vessels

- Temporary tents and membrane structures must be adequately anchored
- Stakes into the ground are the default method of choice
- Water-filled barrels have been used in cases where the structure sits on concrete
- Water-filled barrels are only permitted where the FCO approves their use and then only if in accordance with tent manufacturer’s load specifications
3106 Inflatable Amusement Devices

- Inflatable amusement devices are made of flexible fabric or other combustible materials that is inflated by ≥1 air blowers and typically designed for recreational activities that allow occupants to bounce, climb, slide, negotiate an obstacle course or participate in interactive play
- Anchored or secured
- Control of electrical wiring and equipment

3106 Inflatable Amusement Devices

- Provided with permanently affixed label:
  - Material must have limited flame propagation and meets NFPA 701 Test Method 2
  - Designed to ASTM F2374
  - Manufacturer’s name

3108.4 Tents: Open Flame or Cooking

- Open flames and equipment containing solid, liquid or gas fuel shall not be in the tent and shall be separated for the tent by a minimum of 10’
- Cooking is allowed inside tents provided it is in accordance with Ch 41
3208.3 Flue Spaces

- Flue spaces are critical in high-piled storage
- Flues allow heat to rise to activate sprinklers
- Flues allow sprinkler water to reach the fire below
- Minimum flue space dimensions are required
- The code is clarified that the rack uprights can be within the flue space and are not treated as an obstruction
- Flue space is measured from edge of commodity to edge of adjacent commodity

Ch 33
Fire Safety During Construction

Section 3301 General
Section 3302 Definitions
Section 3303 Administrative Safety Controls
Section 3304 Protection of Combustible Materials
Section 3305 Ignition Source Controls
Section 3306 Fire Protection Systems and Devices
Section 3307 Fire Department Site Access and Water Supply
Section 3308 Motorized Construction Equipment
Section 3309 Hazardous Materials
Section 3310 Additional Safeguards for Occupied Buildings
Section 3311 Additional Safeguards for Type I & II Construction
Section 3312 Additional Safeguards for Type IV Construction

3312.1 Mass Timber Construction

- When Type IVA or IVB construction reaches 6 stories, the 2021 IFC requires a single layer of noncombustible protection to be installed on all exposed wood surfaces up to 4 stories below the top floor under construction
- In other words, never more than 4 stories of unprotected wood during the construction
- 2024 IFC exempts the floor from this requirement
3901 Plant Cultivation

- Ch 39 now includes all facilities conducting plant processing and solvent-based extraction
  - Includes cultivation, pre-extraction and post-extraction operations
  - Greenhouses are excluded provided they do not utilize carbon dioxide enrichment

3901.4 Lighting

- Lighting is used extensively in cultivation
- Lighting must be listed to UL 8800 Standard for Horticultural Lighting Equipment and Systems
- Lighting creates vast amounts of heat and electrical systems must be properly designed to safely handle the electrical loads

3901.5 CO₂ Enrichment

- CO₂ operations are regulated in the 2021 IFC, but only if CO₂ is stored on-site
  - Stored as compressed gas or liquefied gas
  - Quantities >100 lbs require permit and must meet requirements
- CO₂ generation is now added to the code and a permit is required
  - CO₂ is created on-site, often using a propane burner
  - CO₂ is not stored
3903.7 Means of Egress

- Exit doors and exit access doors from extraction rooms must swing in the direction of travel
- Panic hardware is not required, but door swing is required

3905.3.1 Ventilation: Flammable

- Continuous mechanical ventilation is required for extraction processes using flammable/combustible liquids or flammable gas as the extraction medium
  - ≥5 CFM per ft², OR
  - Based on engineered system to maintain the concentration ≤25% of the LEL
- Electrical equipment shall be interlocked so it is only operational while ventilation system is operational

3905.3.2 Ventilation: CO₂

- Continuous mechanical ventilation is required for extraction processes using asphyxiant or irritant gas as the extraction medium
  - ≥1 CFM per ft²
- Gas detection system can be provided in lieu of continuous ventilation
- Electrical equipment shall be interlocked so it is only operational while ventilation system is operational
3905.3.3 Ventilation: Post-extraction

- Continuous mechanical ventilation is required for post-extraction processes using flammable liquids or combustible liquids heated above their flashpoint
  - ≥ 2 CFM per ft²
- Gas detection system can be provided in lieu of continuous ventilation
- Electrical equipment shall be interlocked so it is only operational while ventilation system is operational

4005 Protection of Distilled Spirits

- Sprinkler systems to protect alcoholic beverages with alcohol content ≤ 20% are in accordance with NFPA 13
- Fire sprinkler criteria for > 20% is in the IFC:
  - Palletized storage of distilled spirits in wooden barrels
  - Rack storage of distilled spirits in wooden barrels
- Sprinkler design criteria is based on FM Global fire testing

4005 Protection of Distilled Spirits

- § 4005.1 Palletized storage of distilled spirits in wooden barrels
  - Maximum 7 pallets high
- § 4005.1.4.6 small facility requirements
- § 4005.2 Rack storage of distilled spirits in wooden barrels
  - Barrels on side
  - Barrels on end
- Storage in metal containers must comply with Ch 57
4101 General
4102 Portable electrical heating appliances
4103 Portable fuel-fired heating appliances
4104 Portable fuel-fired cooking appliances
4105 Portable electrical cooking appliances
4106 Mobile food preparation vehicles

Chapter 41
Temporary Heating & Cooking Operations

4104.4 Cooking operations
Cooking that produces sparks or grease-laden vapors shall not be performed within 10 feet of a tent or membrane structure except where the following conditions are met:
1. Cooking devices shall be isolated from the public.
2. Cooking devices shall be maintained and used according to the manufacturer’s instructions.

Exception: Designated cooking tents with an automatic sprinkler system installed in accordance with Section 903.3.1.1.

- Cooking with liquid-fuels, gaseous-fuels and solid-fuels shall be separated ≥ 10’ from tents and membrane structures
- Cooking in tents provided with a sprinkler system are allowed to have the public present

4104.5.1 Groups of Cooking Tents

- Cooking tents ≤ 700 ft²/group
- Supply tent ≤ 100 ft²
- No separation required
- ≥ 12 separation required
4106 Mobile Food Preparation Vehicles

- Permit is required
- Must comply with code and NFPA 96
  - Many requirements in the 2021 IFC are now to be found in NFPA 96
- Exhaust hood is required over cooking
- Specific requirements for manual activation device for fire-extinguishing system override the general requirements in 904.12.

Part V

Hazardous Materials

Chapters 50 – 67

Table 5003.1.1(S) Haz Mat Exemptions

<table>
<thead>
<tr>
<th>Material Description</th>
<th>Category or Application</th>
<th>Exemption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammable liquids and gases</td>
<td>Alcoholic beverages</td>
<td>Quantity of alcoholic beverages in liquor stores and distributors without bulk storage is not limited</td>
</tr>
<tr>
<td></td>
<td>Flammable finishing operations</td>
<td>Quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited</td>
</tr>
<tr>
<td></td>
<td>Fuel</td>
<td>Quantity of fuel in piping systems and fixed appliances regulated by IFGC is not limited</td>
</tr>
<tr>
<td></td>
<td>Hand sanitizer</td>
<td>The quantity of alcohol-based hand rubs (ABHR) classified as Class I or II liquids in dispensers installed in accordance with Sections 5705.5 and 5705.5.1 is not limited. The location of the ABHR dispensers must be unobstructed by vertical clearances or obstructions.</td>
</tr>
</tbody>
</table>
Table 5003.8.2 Detached Building

<table>
<thead>
<tr>
<th>Material</th>
<th>Class</th>
<th>Solids and Liquids (tons)</th>
<th>Gases (cubic feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosives</td>
<td>Division 1.1</td>
<td>Maximum Allowable Quantity</td>
<td>Not required</td>
</tr>
<tr>
<td>Division 1.2</td>
<td>Maximum Allowable Quantity</td>
<td>Not required</td>
<td></td>
</tr>
<tr>
<td>Division 1.3</td>
<td>Maximum Allowable Quantity</td>
<td>Not required</td>
<td></td>
</tr>
<tr>
<td>Division 1.4</td>
<td>Maximum Allowable Quantity</td>
<td>Required</td>
<td></td>
</tr>
<tr>
<td>Division 1.5</td>
<td>Maximum Allowable Quantity</td>
<td>Not required</td>
<td></td>
</tr>
<tr>
<td>Division 1.6</td>
<td>Maximum Allowable Quantity</td>
<td>Not required</td>
<td></td>
</tr>
</tbody>
</table>

Table 5003.11.1 Haz Mat in Group M and S

<table>
<thead>
<tr>
<th>Condition</th>
<th>Maximum Allowable Quantity per Control Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Physical Hazard Materials—Nonflammable and Noncombustible Solids and Liquids</td>
<td></td>
</tr>
<tr>
<td>1. Oxidizers</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Not Allowed</td>
</tr>
<tr>
<td>3</td>
<td>1,200 lb</td>
</tr>
<tr>
<td>2</td>
<td>3,000 lb</td>
</tr>
<tr>
<td>1</td>
<td>16,000 lb</td>
</tr>
</tbody>
</table>

Table 5003.11.2 Flammable Gas Category 1B

<table>
<thead>
<tr>
<th>Flammable Gas Category 1B</th>
<th>Maximum Allowable Quantity per Control Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low BV</td>
<td>Sprinklered in accordance with Note b</td>
</tr>
<tr>
<td>Gaseous</td>
<td>20,000 lb</td>
</tr>
<tr>
<td>Liquefied</td>
<td>43,000 lb</td>
</tr>
</tbody>
</table>

Notes:
- a. Control areas shall be separated from each other by not less than 1-hour fire barrier.
- b. The building shall be equipped throughout with an approved automatic sprinkler system with minimum sprinkler design density of Ordinary Hazard Group 2 in the area where flammable gases are stored or displayed.
- c. Where storage areas exceed 50,000 square feet in area, the maximum allowable quantities are allowed to be increased by 2 percent for each 1,000 square feet of area in excess of 50,000 square feet, up to not more than 100 percent of the table amounts. Separation of control areas is not required. The aggregate amount shall not exceed 60,000 pounds.
- d. "Low BV" Category 1B flammable gas has a burning velocity of 3.8 inches per second or less.
5003.11.2.1 Flammable Gas 1B Storage

- Storage
  - Separate ≥20' from flammable liquids
  - Separate ≥10' from flammable liquids if secondary containment or diking is provided
  - Edge of secondary containment or diking ≥10' from Category 1B flammable gas
  - Shelf storage ≥6' in height

- Fire protection
  - Rack storage, palletized storage or solid piles ≥6' in height shall be sprinklered
  - Sprinklers designed for Extra Hazard Group 1
  - Shelf storage shall be on metal shelves
  - Combustible commodities shall not be stored above

5003.11.2.1 Flammable Gas 1B Storage

Category 1B Flammable Gas burning velocity <3.9 in./sec.

Maximum of 40,000 lb of saturated gas

Storage of flammable liquids or other flammable gases

Sprinkler system of Ordinary Hazard Group 2

Warehouse Group S-1 50,000 sq. ft.

5003.13 Rooftop Storage of Haz Mat

- Storage on roofs or on top of canopies is considered rooftop storage
- Rooftop storage quantities shall NOT be included in the MAQ for the building
- Rooftop storage does NOT create another story
- Quantity in rooftop storage shall not exceed the MAQ for the story below
5003.13 Rooftop Storage of Haz Mat

MAQ for the rooftop storage is the same as the 3rd story.

Weather protection per IBC Section 414.6.1

5003.13.5 Rooftop Storage of Haz Mat

The MAQ for the rooftop storage is the same MAQ allowed on the 3rd story.

5104 Plastic Aerosol 3 Products

- Aerosol products in plastic containers:
  - Plastic aerosol 1
    - Propellant is ≤4% flammable liquefied gas emulsified with product, or a nonflammable, or has no fire point
    - Product contains ≤20% ethanol or IPA
  - Plastic aerosol 3
    - Propellant is ≤10% flammable propellant
    - Product contains ≤50% water-miscible alcohols
  - Plastic aerosol X
    - Exceeds criteria above
    - Plastic aerosol X products are prohibited

Photo of Plastic Aerosol 1 courtesy of P&G Packaging
### Table 5104.3.1 General Storage Warehouse

<table>
<thead>
<tr>
<th>AEROSOL LEVEL</th>
<th>Maximum Net Weight Per Floor (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Protected</td>
</tr>
<tr>
<td>2</td>
<td>2,000</td>
</tr>
<tr>
<td>3</td>
<td>1,000</td>
</tr>
<tr>
<td>Combination 2 and 3</td>
<td>2,000</td>
</tr>
</tbody>
</table>

- Approved automatic sprinkler system protection and storage arrangements shall comply with NFPA 30B.
- Sprinkler system protection shall extend 20 feet beyond the storage area containing the aerosol products.
- Storage quantities indicated are the maximum permitted in any 50,000-square-foot area.

### Table 5106.2.1 Aerosols in Retail

<table>
<thead>
<tr>
<th>Floor</th>
<th>Maximum Net Weight Per Floor (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basement</td>
<td>Not Allowed</td>
</tr>
<tr>
<td>Ground</td>
<td>2,000</td>
</tr>
<tr>
<td>Upper</td>
<td>500</td>
</tr>
</tbody>
</table>

- The total quantity shall not exceed 1,000 pounds net weight in any one 100-square-foot retail display area.
- Per 25,000-square-foot retail display area.
- Minimum Ordinary Hazard Group 2 wet-pipe automatic sprinkler system throughout the retail sales occupancy.

### 5705.5 Alcohol-based Hand Rub Dispensers

- Quantities of alcohol-based hand rub dispensers in storage and use are not included when calculating the MAQ.
- Location and method of flammable liquid storage must still be approved.
- The following restrictions in the 2021 IFC are removed:
  - Corridor ≥ 6’ in width for placement in the corridor
  - Sprinklers required for placement in a carpeted room.
5705.5 Alcohol-based Hand Rub Dispensers

- No longer required to be wall-mounted
- Must be separated ≥3’ from heating devices, open flame and ignition sources
- Must be separated ≥3’ from, and cannot obstruct, the means of egress

Motor Vehicle Fueling Operations

- Fixed fueling facilities (Ch 23)
- Dispensing on Farms and Construction Sites (§5706.2)
- Mobile Fuel Dispensing (§5706.5.4)
- Fleet Fueling (§5706.5.4.5)
- On-demand Mobile Fueling (§5707)
- Hydrogen Mobile Fueling (§5809 – new)
- Marine Fueling (§2310.4)
5706.5.4.5 Fleet Fueling

- Fleet fueling is allowed where approved by the FCO at the following facilities:
  - Commercial
  - Industrial
  - Governmental
  - Manufacturing
- Class I flammable liquid fuel (gasoline) is now included in this operation.

5809 Hydrogen On-demand Mobile Fueling

- On-demand mobile fueling of gaseous hydrogen is added to the code.
- FCO must approve the operation.
- Permit is required.
- Fueling from tank vehicle or trailer is allowed.

- Hydrogen fueling vehicle or fueling trailer must comply with NFPA 2.
- Containers or tanks must be mounted on vehicles.
- Fire safety and emergency response plan is required.
- Operator must be trained.
- Nighttime fueling only allowed if adequately illuminated and approved by FCO.
5809 Hydrogen On-demand Mobile Fueling

- FCO can approve the individual sites where H₂ mobile fueling is allowed, or geographical areas where H₂ mobile fueling is allowed
- Prohibited in buildings, covered parking structures, on public streets
- Separation ≥25’ to sources of ignition
- Fuel hose ≥15’
- Fueling vehicle and vehicle being fueled must be bonded
  - Can be accomplished by the fuel hose

Part VII

Appendices
Appendix A – O

E102.1.7.2 Oxidizer Classifications

- The Globally Harmonized System (GHS) is an internationally agreed upon standard for classification of hazardous materials
- The IFC has not made a full transition to the GHS system
- Many Safety Data Sheets (SDS) have made the transition
- This revision provides a cross reference to assist the FCO when evaluating oxidizers
**E102.1.7.2 Oxidizer Classifications**

**Table E102.1.7.2 Oxidizer Comparison (IFC versus GHS)**

<table>
<thead>
<tr>
<th>IFC Hazard Classification</th>
<th>GHS Hazard Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidizer, Class 4</td>
<td>H271, Category 1</td>
</tr>
<tr>
<td>Oxidizer, Class 3</td>
<td>H271, Category 1</td>
</tr>
<tr>
<td>Oxidizer, Class 2</td>
<td>H272, Category 2</td>
</tr>
<tr>
<td>Oxidizer, Class 1</td>
<td>H272, Category 3</td>
</tr>
</tbody>
</table>

**E104 GHS Definitions**

- The definitions from GHS are added to further assist in the transition to the GHS nomenclature.
- Many definitions are similar, but few have an exact match.
- Table E104.2 provides a comparison and describes similarities and differences.

**Table E104.2 IFC vs. GHS Definitions**

<table>
<thead>
<tr>
<th>IFC Hazard Classification</th>
<th>GHS Hazard Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxidizer, Class 4</td>
<td>Oxidizer, Class 4</td>
</tr>
<tr>
<td>Oxidizer, Class 3</td>
<td>Oxidizer, Class 3</td>
</tr>
<tr>
<td>Oxidizer, Class 2</td>
<td>Oxidizer, Class 2</td>
</tr>
<tr>
<td>Oxidizer, Class 1</td>
<td>Oxidizer, Class 1</td>
</tr>
</tbody>
</table>
Appendix O
Valet Trash Collection and Recycling Collection in Group R-2 Occupancies

- O101 Scope
- O102 Containers
- O102.1 General
- O102.2 Integrity
- O102.3 Height
- O102.4 Capacity and limit
- O102.5 Construction materials
- O103.1 Container Location
- O103.2 Minimum means of egress width
- O103.3 Stairways
- O104.1 Time limits
- O104.2 Collection rules
- O104.3 Suspension of service

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Appendix O Valet Trash Collection

- §304.1.1 states that valet trash collection is only permitted where specifically approved by the FCO
- Where the FCO determines that valet trash collection is to occur, Appendix O provides criteria and requirements for that operation

Vallet trash collection is an intermediary service that removes trash or recycling materials placed outside of dwelling units or sleeping units for final collection

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O102 Containers

- Containers must be liquid-tight and have a lid
- Material must be noncombustible or have a peak heat release ≤300 kW/m²
- Container size:
  - ≤30” in height
  - ≤2 cubic feet (15 gallons)
O103 Container Location

- Only 1 container can be placed for collection at any time
- Lids shall be in the fully closed position when available for collection
- Container cannot obstruct the minimum required egress width
- Container cannot be placed on stairs or stair landings, or in an interior exit stairway

O104 Additional Requirements

- **Filled** containers shall not be placed outside the dwelling unit for more than 6 hours in a 24-hour period
- **Empty** containers shall not remain outside the dwelling unit for more than 12 hours in a 24-hour period
- Written rules shall be established that the property manager will enforce regarding service rules, hours and penalties

Discussion
1) Over 200 individual code change proposals were approved for the 2024 IFC
2) This presentation covered those revisions with a larger, or more significant impact
3) Please refer to the code for complete code language
4) The code keeps pace with technology as best it can; however, you will likely be using this code for 3 or more years. During that time, new technologies will be developed. Alternative methods in Ch 1 allows the FCO to review and approve other methods of providing fire and life safety

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