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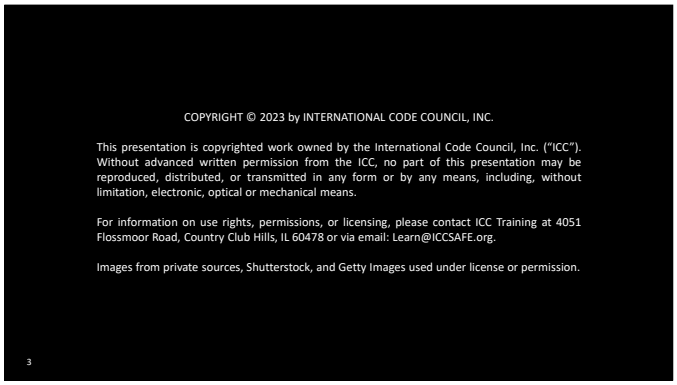

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INSTRUCTOR

Name

- Title
- International Code Council, Inc.
- Credentials
- name@iccsafe.org

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6

6

GOAL & OBJECTIVES

This course…

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.

7

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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?

8

8

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

9

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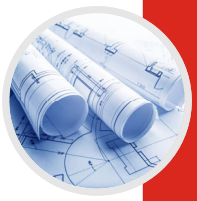
Part I

Administrative

Chapters 1 – 2



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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

11

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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.

12

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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

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104.2.4 Modifications

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.

- 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

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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

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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

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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

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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)

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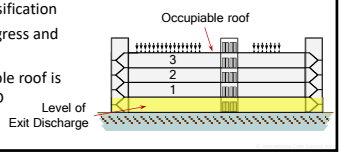
202 Occupiable Roof

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



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203 Occupancy Classification

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

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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

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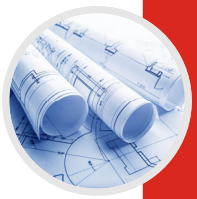
Part II

General Safety Provisions
Chapters 3 – 4



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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

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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

24

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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

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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

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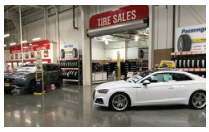
314.4 Indoor Vehicle Display

- Ignition batteries must be disconnected ***IF*** required by FCO
- Fuel tanks cannot exceed:
  - 5 gallons for Class I, II or III liquid fuel
  - ¼ tank or 6.6 gallons for LPG
  - ¼ tank or 630 ft³ for CNG
  - ¼ tank or 2,000 ft³ for hydrogen



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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

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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

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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

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320 Storage of Lithium Batteries

- Storage of lithium-ion and lithium metal batteries regulated
- Exceptions:
  - Temporary storage of batteries or battery components during the battery manufacturing process prior to completion of final quality control checks
  - Temporary storage of batteries during the vehicle manufacturing or repair process

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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 my use more than one storage configuration
    1. Containers
    2. Indoor storage room
    3. Outdoor storage room

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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

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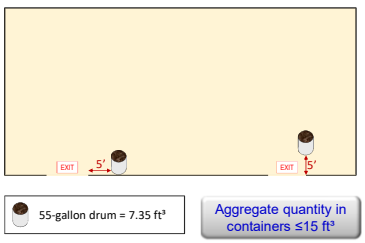
Collection Containers: 55-gallon drums



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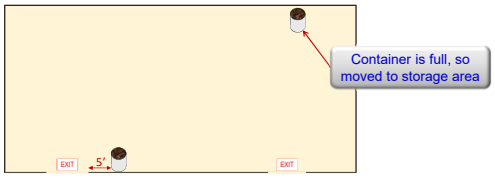
Collection Containers: 55-gallon drums



55-gallon drum = 7.35 ft³

Aggregate quantity in containers ≤15 ft³

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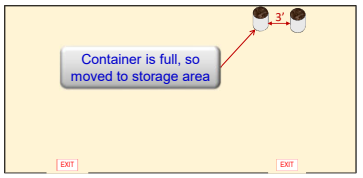
Collection Containers: 55-gallon drums



55-gallon drum = 7.35 ft³

Aggregate quantity in containers ≤15 ft³

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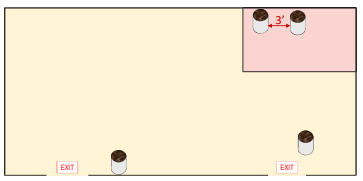
Indoor Battery Storage Room



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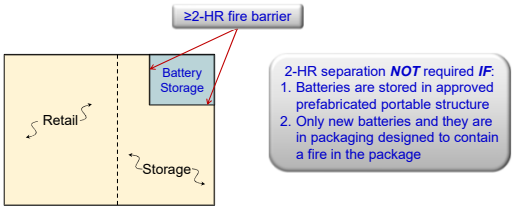
320.4.2.2 Indoor Battery Storage Areas

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



2-HR separation ***NOT*** required ***IF***:
1. Batteries are stored in approved prefabricated portable structure
2. Only new batteries and they are in packaging designed to contain a fire in the package

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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

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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

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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

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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

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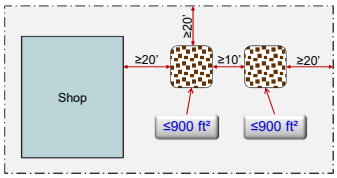
320.4.3.2 Outdoor Battery Storage Areas

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



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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

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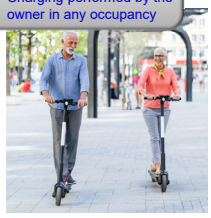
322 Powered Micromobility Devices

- 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



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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

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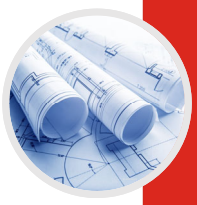
Part III

Building and Equipment Design Features
Chapters 5 – 12



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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

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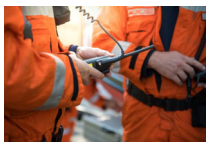
510.4.1 Signal Strength

- 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

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510.4.2.8 Near-Far Effect in ERCES

- Signal boosters must be designed to minimum 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

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608.1.1 CO_2 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 CO_2 refrigerant are now included in the IFC
- CO_2 systems must comply with IIAR CO_2 *Safety Standard for Closed-Circuit Carbon Dioxide Refrigeration Systems*

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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

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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 one the work is complete

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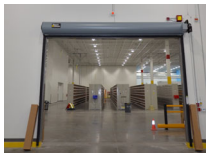
705.2.7 Rolling Steel Fire Door Testing

- 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



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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 286
  - FM 4880
  - UL 1040 or UL 1715

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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 §1207.5.5
  - Depends on type of battery and storage capacity

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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

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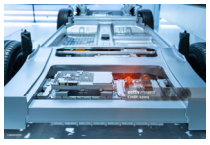
903.2 Sprinklers: Lithium Batteries

- 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



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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

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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

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903.3.1.1.1 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

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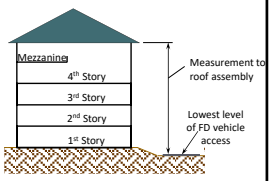
903.3.1.2 NFPA 13R Sprinkler Installations

- 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



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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

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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

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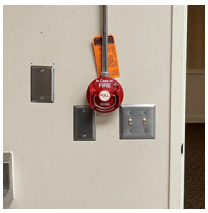
904.14.1 Manual Activation Device

- 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



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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

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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

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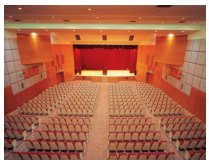
905.5.1 Standpipes: Stages

- 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



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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

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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

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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

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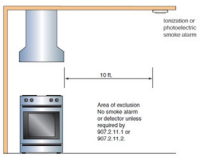
907.2.11.3 Near Cooking Appliances

- 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



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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

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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

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Table 911.1 Explosion Control

Table 911.1 Explosion Control Requirements [f] *(excerpts)*

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
		Hazard Category	
Explosives	Division 1.1	Required	Not required
	Division 1.2	Required	Not required
	Division 1.3	Not required	Required
	Division 1.4[i]	Not required	Required
	Division 1.5	Required	Not required
	Division 1.6	Required	Not required
Flammable gas	Gaseous	Not required	Required[h]
	Liquefied	Not required	Required[h]

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.

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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

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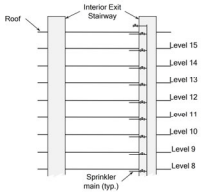
914.3.1.1 Standpipe/Sprinkler Riser in High-rise

- 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



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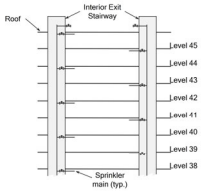
914.3.1.1 Standpipe/Sprinkler Riser in High-rise

- 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



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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

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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

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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

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914.7.2 Fire Alarm: Special Amusement Area

- 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

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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

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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

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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

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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

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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)*
Maximum Floor Area Allowances per Occupant

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR [a]
Information technology equipment facilities	300 gross

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Table 1006.3.4(1) Occupiable Roofs

Table 1006.3.4(1)
Stories and Occupiable Roofs with One Exit or Access to One exit for R-2 Occupancies

Story and Occupiable Roof	Occupancy	Maximum Number of Dwelling Units	Maximum Exit Access Travel Distance
Basement, first, second or third story above grade plane and occupiable roofs over the first or second story above grade plane	R-2 [a,b]	4 dwelling units	125 feet
Fourth story above grade plane and higher	NP	NA	NA

a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 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 occupied roofs accessed through and serving individual dwelling units in Group R-2 occupancies. For Group R-2 occupancies with occupied roofs that are not access through and serving individual units, use Table 1006.3.4(2).

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Table 1006.3.4(2) Occupiable Roofs

Table 1006.3.4(2) *(excerpts)*
Stories and Occupiable Roofs with One Exit or Access to One exit for Other Occupancies

Story and Occupiable Roof	Occupancy	Maximum Occupant Load per Story and Occupiable Roof	Maximum Exit Access Travel Distance (feet)
First story above or below grade plane and occupiable roofs over the first story above grade plane	A, B[b], E, F[b], M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R-1, R-2[a,c]	10	75
	S[b,d]	29	75
Second story above grade plane	B, F, M, S[d]	29	75
Third story above grade plane and higher	NP	NA	NA

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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.

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Table 1010.2.4 Locks & Latches

- **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.

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Table 1010.2.4 Locks & Latches

Table 1010.2.4
Manual Bolts, Automatic Flush Bolts and Constant Latching Bolts on the Inactive Leaf of a Pair of Doors

Application with a Pair of Doors with an Active Leaf and Inactive Leaf	The Pair of Doors are Required to Comply with IBC Section 716	Permitted Uses of Manual Bolt Locks, Automatic Flush Bolts and Constant Latching Bolts on the Inactive Leaf of a Pair of Doors		
		Surface or flush mounted manual bolts	Automatic flush bolts	Constant latching bolts
Group B, F, or S with occupant load less than 50	No	P	P	P
	Yes	NP	NP[b]	P
Group B, F or S where the building is equipped with an automatic sprinkler system in accordance with §903.3.1.1 and the inactive leaf is not needed to meet egress capacity requirements	No	P	P	P
	Yes	NP	NP[b]	P

continued on next slide

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Table 1010.2.4 Locks & Latches

Table 1010.2.4 *(continued)*
Manual Bolts, Automatic Flush Bolts and Constant Latching Bolts on the Inactive Leaf of a Pair of Doors

Application with a Pair of Doors with an Active Leaf and Inactive Leaf	The Pair of Doors are Required to Comply with IBC Section 716	Permitted Uses of Manual Bolt Locks, Automatic Flush Bolts and Constant Latching Bolts on the Inactive Leaf of a Pair of Doors		
		Surface or flush mounted manual bolts	Automatic flush bolts	Constant latching bolts
Group I-2 patient care rooms and sleeping rooms where the inactive leaf is not needed to meet egress capacity requirements	No	NP	NP[b]	P
	Yes	NP	NP[b]	P
Any occupancy where panic hardware is not required, egress doors are used in pairs, and where both leaves are required to meet egress capacity requirements	No	NP	P	NP
	Yes	NP	NP[b]	NP
Storage or equipment rooms where the inactive leaf is not needed to meet egress capacity requirements	No	P[a]	P	P
	Yes	P[a]	P	P

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Table 1010.2.4 Locks & Latches, 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.

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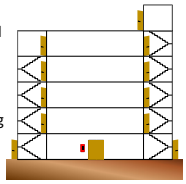
1010.2.6 Stairway Doors

- 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



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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

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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

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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

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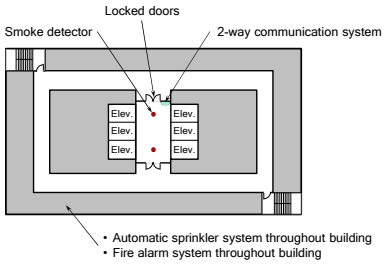
1010.2.14 Elevator Lobby Access Doors



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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

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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

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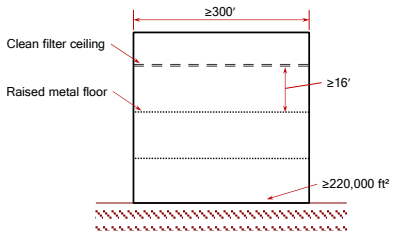
1017.2.3 Exit Access Travel Distance



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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

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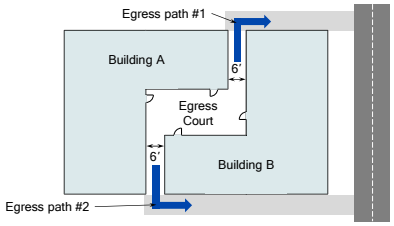
1029.3 Construction of Egress Court



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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

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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

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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

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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

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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

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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

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Table 1207.1.3 ESS Threshold

- New ESS technologies added to §1207

TABLE 1207.1.3
ENERGY STORAGE SYSTEM (ESS) THRESHOLD QUANTITIES

TECHNOLOGY	ENERGY CAPACITY [a]
Capacitor ESS	3 kWh
Flow batteries [b]	20 kWh
Lead acid batteries, all types	70 kWh [c]
Lithium-ion batteries	20 kWh
Nickel-cadmium (Ni-Cd), Nickel metal hydride (Ni-MH) and Nickel zinc (NI-Zn) batteries	70 kWh
Non-electrochemical ESS [d]	70 kWh
Other battery technologies	10 kWh
Other electrochemical ESS technologies	3 kWh
Sodium nickel chloride batteries	70 kWh
Zinc manganese dioxide ($Zn-MnO_2$) batteries	70 kWh

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Table 1207.5 Maximum Capacity for ESS

- New ESS technologies added to §1207

TABLE 1207.5
MAXIMUM ALLOWABLE QUANTITIES OF ELECTROCHEMICAL ESS

TECHNOLOGY	MAXIMUM ALLOWABLE QUANTITIES [a]
STORAGE BATTERIES	
Flow batteries [b]	600 kWh
Lead-acid, all types	Unlimited
Lithium-ion	600 kWh
Sodium nickel chloride	600 kWh
Nickel-cadmium (Ni-Cd), nickel metal hydride (NI-MH) and nickel zinc (Ni-Zn)	Unlimited
Zinc manganese dioxide ($Zn-MnO_2$)	Unlimited
Other battery technologies	200 kWh
CAPACITORS	
All types	20 kWh
OTHER ELECTROCHEMICAL ESS	
All types	20 kWh

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Table 1207.6 Specific Requirements for ESS

- New ESS technologies added to §1207

TABLE 1207.6 *(excerpts)*
MAXIMUM ALLOWABLE QUANTITIES OF ELECTROCHEMICAL ESS

COMPLIANCE REQUIRED [b]		BATTERY TECHNOLOGY					
Feature	Section	Lead-acid	Nickel cadmium (Ni-Cd), nickel metal hydride (Ni-MH) and nickel zinc (Ni-Zn)	Zinc manganese dioxide (Zn-MnO2)	Lithium-ion	Flow	Sodium nickel chloride
Exhaust ventilation	1207.6.1	Yes	Yes	Yes	No	Yes	No
Explosion control	1207.6.3	Yes [a]	Yes [a]	Yes	Yes	No	Yes
Safety caps	1207.6.4	Yes	Yes	No	No	No	No
Spill control and neutralization	1207.6.2	Yes [c]	Yes [c]	Yes [f]	No	Yes	No
Thermal runaway	1207.6.5	Yes [d]	Yes [d]	Yes [e]	Yes [e]	No	Yes

f. Not required for batteries with jelled electrolyte.

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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

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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

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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

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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

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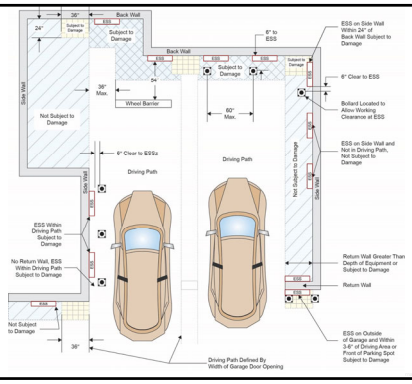
1207.11.7.1
ESS in Garages



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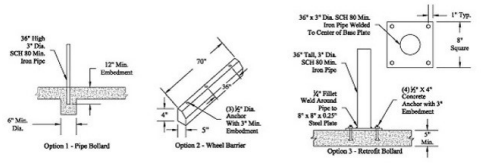
1207.11.7.3 ESS in Garages



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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

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Part IV

Special Occupancies and Operations
Chapters 20 – 41

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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

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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

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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

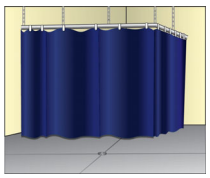

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Table 2704.2.2.1 Haz Mat in Fab Areas

- 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

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Table 2704.2.2.1 Haz Mat in Fab Areas

TABLE 2704.2.2.1 *(excerpts)*
QUANTITY LIMITS FOR HAZARDOUS MATERIALS IN A SINGLE FABRICATION AREA IN GROUP H-5 [a]

HAZARD CATEGORY	SOLIDS (pounds/ft²)	LIQUIDS (gallons/ft²)	GAS (ft³ @ NTP/square foot)
PHYSICAL-HAZARD MATERIALS			
Combustible liquid Class II Class IIIA Combination Class I, II and IIIA	Not Applicable	~~0.01~~ 0.02 ~~0.02~~ 0.04 ~~0.04~~ 0.08	Not Applicable
Flammable liquid Class IA Class IB Class IC Combination Class IA, IB and IC Combination Class I, II and IIIA	Not Applicable	~~0.0025~~ 0.005 ~~0.025~~ 0.05 ~~0.025~~ 0.05 ~~0.025~~ 0.05 ~~0.04~~ 0.08	Not Applicable
Organic peroxide Unclassified detonable Class I Class II Class III	Note b Note b ~~0.025~~ 0.05 ~~0.1~~ 0.2	~~Not Applicable~~ Note b Note b 0.0025 0.02	Not Applicable

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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

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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

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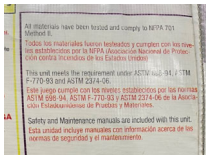
3106 Inflatable Amusement Devices

- 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



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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

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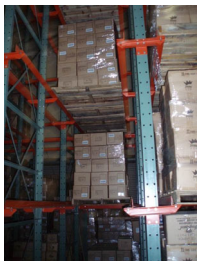
3208.3 Flue Spaces

- 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



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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

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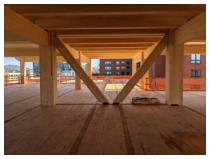
3312.1 Mass Timber Construction

- 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



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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

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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

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3901.5 CO_2 Enrichment

- CO_2 operations are regulated in the 2021 IFC, but only if CO_2 is stored on-site
  - Stored as compressed gas or liquefied gas
  - Quantities >100 lbs require permit and must meet requirements
- CO_2 generation is now added to the code and a permit is required
  - CO_2 is created on-site, often using a propane burner
  - CO_2 is not stored

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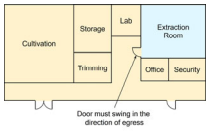
3903.7 Means of Egress

- 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



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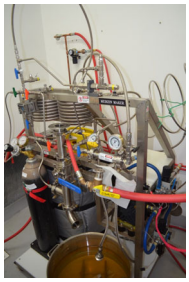
3905.3.1 Ventilation: Flammable

- 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



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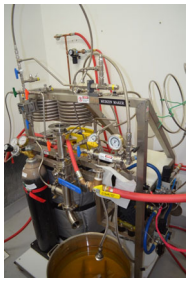
3905.3.2 Ventilation: CO_2

- 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



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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
  - ≥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

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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

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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

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Chapter 41
Temporary Heating & Cooking Operations

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

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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

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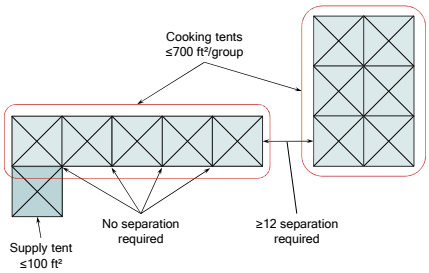
4104.5.1 Groups of Cooking Tents



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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.

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Part V

Hazardous Materials

Chapters 50 – 67

147

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Table 5003.1.1(5) Haz Mat Exemptions

Table 5003.1.1(5) Hazardous Materials Exemptions [a] *(excerpts)*

Material Classification	Occupancy or Application	Exemption
Combustible fiber	Baled Cotton	Densely packed baled cotton shall not be classified as combustible fiber, provided that the bales comply with the packing requirements of ISO 8115
Explosives	Groups B, F, M and S	Storage of special industrial explosive devices is not limited
	Groups M and R-3	Storage of black powder, smokeless propellant, and small arms primers is not limited
Flammable and combustible liquids and gases	Alcoholic beverages	Quantity of alcoholic beverages in liquor stores and distributors without bulk storage is not limited
		The quantity of alcoholic beverages in distilling or brewing of beverages is not limited
		The storage quantity of beer, distilled spirits and wines in barrels and casks is not limited
		The quantity of alcoholic beverages in retail and wholesale sales occupancies is not limited. To qualify for this allowance, beverages shall be packaged in individual containers ≤1.3 gallons
	Flammable finishing operations	Buildings and structures occupied for the application of flammable finishes complying with Ch 24
	Fuel	Quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited
		Quantity of gaseous fuels in piping systems and fixed appliances regulated by IFGC is not limited
		The quantity of liquid fuels in piping systems and fixed appliances regulated by IMC is not limited
	Fuel oil	The quantity of fuel oil storage complying with §605.4.2 is not limited
	Hand sanitizer	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 shall be provided in the construction documents

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Table 5003.8.2 Detached Building

Table 5003.8.2 Detached Building Required *(excerpts)*

A DETACHED BUILDING IS REQUIRED WHERE THE QUANTITY OF MATERIAL EXCEEDS THAT LISTED HEREIN			
Material	**Class**	**Solids and liquids (tons) [a,b]**	**Gases (cubic feet) [a,b]**
Explosives	Division 1.1	Maximum Allowable Quantity	Not Applicable
Explosives	Division 1.2	Maximum Allowable Quantity	Not required
	Division 1.3	Maximum Allowable Quantity	Not required
	Division 1.4 [e]	Maximum Allowable Quantity	Required
	Division 1.4 [c,e]	1	Required
	Division 1.5	Maximum Allowable Quantity	Not required
	Division 1.6	Maximum Allowable Quantity	Not required

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

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Table 5003.11.1 Haz Mat in Group M and S

Table 5003.11.1 *(excerpts)*
Maximum Allowable Quantity per Indoor and Outdoor Control Area in Group M and S Occupancies – Nonflammable Solids, Nonflammable and Noncombustible Liquids [d,e,f]

Condition		Maximum Allowable Quantity per Control Area	
Material	**Class**	**Solids pounds**	**Liquids gallons**
A. Physical Hazard Materials—Nonflammable and Noncombustible Solids and Liquids			
1. Oxidizers [b,c]	4	Not Allowed	Not Allowed
	3	~~1,350~~ 1,500 [g]	~~135~~ 150
	2	2,250 [h]	225
	1	18,000 [i,j]	1,800 [i,j]

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Table 5003.11.2 Flammable Gas Category 1B

Table 5003.112
MAXIMUM ALLOWABLE QUANTITY OF LOW BURNING VELOCITY CATEGORY 1B FLAMMABLE GAS IN GROUP M AND S OCCUPANCIES PER CONTROL AREA [a]

FLAMMABLE GAS CATEGORY 1B (Low BV) [d]	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA	
	Sprinklered in accordance with Note b	Nonsprinklered
Gaseous	390,000 ft³	195,000 ft³
Liquefied	40,000 lbs. [c]	20,000 lbs.

a. Control areas shall be separated from each other by not less than a 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 area 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 80,000 pounds.
d. "Low BV" Category 1B flammable gas has a burning velocity of 3.9 inches per second or less.

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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

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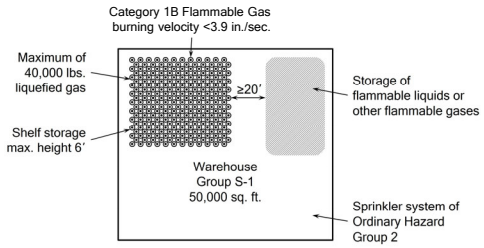
5003.11.2.1 Flammable Gas 1B Storage



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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

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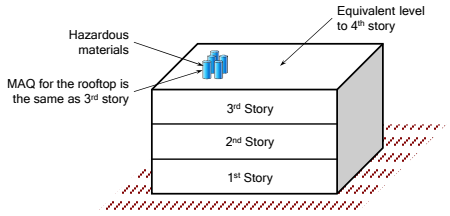
5003.13 Rooftop Storage of Haz Mat



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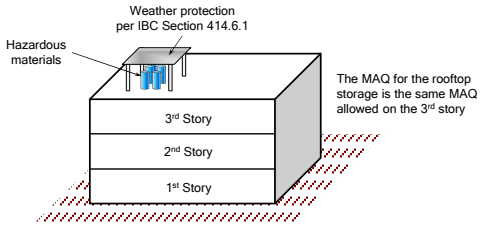
5003.13.5 Rooftop Storage of Haz Mat



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5104 Plastic Aerosol 3 Products

- Aerosol products in plastic containers:
  - Plastic aerosol 1
    - Propellant is ≤4% flammable liquefied gas emulsified with product, or is 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

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Table 5104.3.1 General Storage Warehouse

- Plastic aerosol 3 treated included with Aerosol Level 3

TABLE 5104.3.1
NONSEGREGATED STORAGE OF LEVEL 2 AND 3 AEROSOL AND PLASTIC AEROSOL 3 PRODUCTS IN GENERAL PURPOSE WAREHOUSES [b]

AEROSOL LEVEL	MAXIMUM NET WEIGHT PER FLOOR (pounds) [b]			
	Palletized or solid-pile storage		Rack storage	
	Unprotected	Protected [a]	Unprotected	Protected [a]
2	2,500	12,000	2,500	24,000
3	1,000	12,000	1,000	24,000
Combination 2 and 3	2,500	12,000	2,500	24,000

a. 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.
b. Storage quantities indicated are the maximum permitted in any 50,000-square-foot area.

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Table 5106.2.1 Aerosols in Retail

TABLE 5106.2.1
MAXIMUM QUANTITIES OF LEVEL 2 AND 3 AEROSOL PRODUCTS, AEROSOL COOKING SPRAY PRODUCTS AND PLASTIC AEROSOL 3 PRODUCTS IN RETAIL DISPLAY AREAS

MAXIMUM NET WEIGHT PER FLOOR (pounds) [b]			
Floor	Unprotected [a]	Protected in accordance with Section 5106.2 [a,c]	Protected in accordance with Section 5106.3 [c]
Basement	Not Allowed	500	500
Ground	2,500	10,000	10,000
Upper	500	2,000	Not Allowed

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

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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

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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

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5705.5 Alcohol-based Hand Rub Dispensers

- Because they are not mounted, they will not always in the same location

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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)**

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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

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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

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5809 Hydrogen On-demand Mobile Fueling

- 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

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5809 Hydrogen On-demand Mobile Fueling

- FCO can approve the individual sites where H_2 mobile fueling is allowed, or geographical areas where H_2 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

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Part VII

Appendices

Appendix A – O

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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

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E102.1.7.2 Oxidizer Classifications

Table E102.1.7.2
Oxidizer Comparison (IFC versus GHS)

IFC Hazard Classification	GHS Hazard Classification
Oxidizer, Class 4	H271, Category 1
Oxidizer, Class 3	H271, Category 1
Oxidizer, Class 2	H272, Category 2
Oxidizer, Class 1	H272, Category 3

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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

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Table E104.2 IFC vs. GHS Definitions

TABLE E104.2 *(excerpts)*
IFC AND GHS HAZARD DEFINITIONS COMPARISON [a]

IFC MATERIAL	IFC CLASS	IFC DEFINITION	GHS 2017 (REV 7) CLASSIFICATION (H-CODE AND CATEGORY); HAZARD STATEMENT; DEFINITION
Combustible liquid	—	A liquid having a closed cup flash point at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:	A flammable liquid means a liquid having a flash point of not more than 93°C.
Combustible liquid	II	Liquids having a closed cup flash point at or above 100°F (38°C) and below 140°F (60°C).	H226, Category 3; Flammable liquid and vapor: Flash point ≥ 23°C and ≤ 60°C
Flammable liquid	IA	Liquids having a flash point below 73°F (23°C) and having a boiling point below 100°F (38°C).	H224, Category 1; Extremely flammable liquid and vapor. Flash point < 23°C and initial boiling point ≤ 35°C
Flammable liquid	IB	Liquids having a flash point below 73°F (23°C) and having a boiling point at or above 100°F (38°C).	H225, Category 2; Highly flammable liquid and vapor. Flash point < 23°C and initial boiling point > 35°C
Flammable liquid	IC	Liquids having a flash point at or above 73°F (23°C) and below 100°F (38°C).	H226, Category 3; Flammable liquid and vapor. Flash point ≥ 23°C and ≤ 60°C

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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

Valet 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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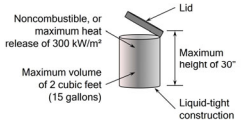
O102 Containers

- 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)



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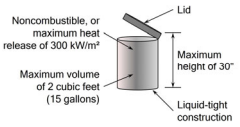
O103 Container Location

- 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 place on stairs or stair landings, or in an interior exit stairway



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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

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Discussion

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KEY POINTS

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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