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2024 GROUP A PROPOSED CHANGES TO THE I-CODES

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2024 GROUP A – PROPOSED CHANGES TO THE INTERNATIONAL FIRE CODE

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TENTATIVE ORDER OF DISCUSSION
2024 PROPOSED CHANGES TO THE
INTERNATIONAL FIRE CODE

The following is the tentative order in which the proposed changes to the code will be discussed at the public hearings. Proposed changes which impact the same subject have been grouped to permit consideration in consecutive changes.

Proposed change numbers that are indented are those which are being heard out of numerical order. Indentation does not necessarily indicate that one change is related to another. Proposed changes may be grouped for purposes of discussion at the hearing at the discretion of the chair. Note that some F code change proposals may not be included on this list, as they are being heard by another committee.

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IFC Definitions

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

CHAPTER 3 GENERAL REQUIREMENTS

Revise as follows:

SECTION 302
~~DEFINITIONS~~ PERMITS

Delete without substitution:

~~**302.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~

~~**3D PRINTER.**~~

~~**ADDITIVE MANUFACTURING.**~~

~~**BONFIRE.**~~

~~**HI-BOY.**~~

~~**HIGH-VOLTAGE TRANSMISSION LINE.**~~

~~**OPEN BURNING.**~~

~~**PORTABLE OUTDOOR FIREPLACE.**~~

~~**POWERED INDUSTRIAL TRUCK.**~~

~~**RECREATIONAL FIRE.**~~

~~**SKY LANTERN.**~~

~~***VALET TRASH COLLECTION.***~~

Revise as follows:

~~301.2~~ 302.1 Permits.
Permits shall be required as set forth in Section 105.5 for the activities or uses regulated by Sections 306, 307, 308, 315, 320 and 321.

CHAPTER 4 EMERGENCY PLANNING AND PREPAREDNESS

Revise as follows:

SECTION 402
~~DEFINITIONS~~ EMERGENCY PROCEDURES

Delete without substitution:

~~**402.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~

~~**EMERGENCY EVACUATION DRILL.**~~

~~**LOCKDOWN.**~~

Revise as follows:

~~401.2~~ 402.1 Approval. Where required by this code, fire safety plans, emergency procedures and employee training programs shall be *approved* by the *fire code official*.

~~401.3~~ 402.2 Emergency responder notification.
Notification of emergency responders shall be in accordance with Sections 401.3.1 through 401.3.3.

~~401.3.1~~ 402.2.1 Fire events. In the event an unwanted fire occurs on a property, the *owner* or occupant shall immediately report such condition to the fire department.

~~401.3.2~~ 402.2.2 Alarm activations. Upon activation of a fire alarm signal, employees or staff shall immediately notify the fire department.

~~401.3.3~~ 402.2.3 Delayed notification. A person shall not, by verbal or written directive, require any delay in the reporting of a fire to the fire department.

~~401.4~~ 402.3 Required plan implementation. In the event an unwanted fire is detected in a building or a fire alarm activates, the emergency plan shall be implemented.

~~401.5~~ 402.4 Making false report. A person shall not give, signal or transmit a false alarm.

~~401.6~~ 402.5 Emergency evacuation drills.
The sounding of a fire alarm signal and the carrying out of an emergency evacuation drill in accordance with the provisions of Section 405 shall be allowed.

~~401.7~~ 402.6 Unplanned evacuation. Evacuations made necessary by the unplanned activation of a *fire alarm system* or by any other emergency shall not be substituted for a required evacuation drill.

~~401.8~~ 402.7 Interference with fire department operations. It shall be unlawful to interfere with, attempt to interfere with, conspire to interfere with, obstruct or restrict the mobility of or block the path of travel of a fire department emergency vehicle in any way, or to interfere with, attempt to interfere with, conspire to interfere with, obstruct or hamper any fire department operation.

CHAPTER 5 FIRE SERVICE FEATURES

Revise as follows:

SECTION 502
~~DEFINITIONS~~ TIMING OF INSTALLATION

Delete without substitution:

~~**502.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**AGENCY.**~~

~~**FIRE APPARATUS ACCESS ROAD.**~~

~~**FIRE COMMAND CENTER.**~~

~~**FIRE DEPARTMENT MASTER KEY.**~~

~~**FIRE LANE.**~~

~~**KEY BOX.**~~

~~**TRAFFIC CALMING DEVICES.**~~

Revise as follows:

~~501.4~~ 502.1 ~~Timing of installation~~ Access roads and water supply.
Where fire apparatus access roads or a water supply for fire protection are required to be installed, such protection shall be installed and made serviceable prior to and during the time of construction except where *approved* alternative methods of protection are provided. ~~Temporary street signs shall be installed at each street intersection where construction of new roadways allows passage by vehicles in accordance with Section 505.2.~~

CHAPTER 6 BUILDING SERVICES AND SYSTEMS

Revise as follows:

SECTION 602
~~DEFINITIONS~~ UNSAFE CONDITIONS

Delete without substitution:

~~602.1 Definitions~~.
~~The following terms are defined in Chapter 2:~~
~~**COMMERCIAL COOKING APPLIANCES.**~~

~~**HOOD.**~~

~~**Type I.**~~

~~**REFRIGERANT.**~~
~~**REFRIGERATING (REFRIGERATION) SYSTEM.**~~

Revise as follows:

~~601.2~~ 602.1 Hazard abatement.
Operations or conditions deemed unsafe or hazardous by the *fire code official*shall be abated. Equipment, appliances, materials and systems that are modified or damaged and constitute an electrical shock or fire hazard shall not be used.

~~601.2.1~~ 602.2 Correction of unsafe conditions.
The *fire code official* shall be authorized to require the *owner*, the *owner's* authorized agent, operator or occupant of a building or premises to abate or cause to be abated or corrected such unsafe operations or conditions either by repair, rehabilitation, demolition or other *approved*corrective action in compliance with this code.

CHAPTER 7 FIRE AND SMOKE PROTECTION FEATURES

Revise as follows:

SECTION 702

~~DEFINITIONS~~ RATED CONSTRUCTION

Delete without substitution:

~~**702.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**DRAFTSTOP.**~~

~~**FIREBLOCKING.**~~

~~**MEMBRANE-PENETRATION FIRESTOP SYSTEM.**~~

~~**OPENING PROTECTIVE.**~~

~~**SMOKE BARRIER.**~~

~~**SMOKE PARTITION.**~~

~~**THROUGH-PENETRATION FIRESTOP SYSTEM.**~~

Add new text as follows:

702.1 Construction Requirements. Fire-resistance-rated construction and smoke-limiting construction required by this code shall comply with the following:

1. Fire walls shall be constructed in accordance with Section 706 of the *International Building Code*.
2. Fire barriers shall be constructed in accordance with Section 707 of the *International Building Code.*
3. Fire partitions shall be constructed in accordance with Section 708 of the *International Building Code*.
4. Smoke barriers shall be constructed in accordance with Section 709 of the *International Building Code*.
5. Smoke partitions shall be constructed in accordance with Section 710 of the *International Building Code*.
6. Horizontal assemblies shall be constructed in accordance with Section 711 of the *International Building Code.*

-

Revise as follows:

~~**701.2**~~ **702.2 Fire-resistance-rated construction.**
The *fire-resistance rating* of the following *fire-resistance-rated* construction shall be maintained:

1. Structural members.
2. *Exterior walls*.
3. *Fire walls, fire barriers, fire partitions*.
4. *Horizontal assemblies*.
5. Shaft enclosures.

~~**701.2.1**~~ **702.2.1 Hanging displays.**
The hanging and displaying of salable goods and other decorative materials from acoustical ceiling systems that are part of a *fire-resistance-rated horizontal assembly* shall be prohibited.

~~**701.3**~~ **702.3 Smoke barriers.** The *fire-resistance rating* and smoke-resistant characteristics of *smoke barriers* shall be maintained.

~~**701.4**~~ **702.4 Smoke partitions.** The smoke-resistant characteristics of smoke partitions shall be maintained.

~~701.5~~ 702.5 Maintaining protection.
Materials, systems and devices used to repair or protect breaches and openings in *fire-resistance-rated* construction and construction installed to resist the passage of smoke shall be maintained in accordance with Sections 703 through 707.

CHAPTER 8 INTERIOR FINISH, DECORATIVE MATERIALS AND FURNISHINGS

SECTION 801
GENERAL

Revise as follows:

801.1 Scope.
The provisions of this chapter shall govern interior finish, interior trim, furniture, furnishings, decorative materials and decorative vegetation in buildings. ~~Existing buildings shall comply with Sections 803 through 808. New buildings shall comply with Sections 804 through 808, and Section 803 of the International Building Code.~~

SECTION 802
~~DEFINITIONS~~ APPLICATION

Delete without substitution:

~~802.1 Definitions~~.
~~The following terms are defined in Chapter 2:~~
~~FLAME SPREAD.~~

~~FLAME SPREAD INDEX.~~

~~INTERIOR FLOOR-WALL BASE.~~

~~SITE-FABRICATED STRETCH SYSTEM.~~

~~SMOKE-DEVELOPED INDEX.~~

Add new text as follows:

802.1 New buildings. New buildings shall comply with Sections 804 through 808, and Section 803 of the International Building Code.

802.2 Existing buildings. Existing buildings shall comply with Sections 803 through 808.

CHAPTER 9 FIRE PROTECTION AND LIFE SAFETY SYSTEMS

Revise as follows:

SECTION 902
~~DEFINITIONS~~ FIRE PUMP AND RISER ROOMS

Delete without substitution:

~~902.1 Definitions~~.
~~The following terms are defined in Chapter 2:~~
~~ALARM NOTIFICATION APPLIANCE.~~

~~ALARM SIGNAL.~~

~~ALARM VERIFICATION FEATURE.~~

~~ANNUNCIATOR.~~

~~AUDIBLE ALARM NOTIFICATION APPLIANCE.~~

~~AUTOMATIC.~~

~~AUTOMATIC FIRE-EXTINGUISHING SYSTEM.~~

~~AUTOMATIC SMOKE DETECTION SYSTEM.~~

~~AUTOMATIC SPRINKLER SYSTEM.~~

~~AUTOMATIC WATER MIST SYSTEM.~~

~~AVERAGE AMBIENT SOUND LEVEL.~~

~~CARBON DIOXIDE EXTINGUISHING SYSTEM.~~

~~CLEAN AGENT.~~

~~COMMERCIAL MOTOR VEHICLE.~~

~~CONSTANTLY ATTENDED LOCATION.~~

~~DELUGE SYSTEM.~~

~~DETECTOR, HEAT.~~

~~DRY-CHEMICAL EXTINGUISHING AGENT.~~

~~ELEVATOR GROUP.~~

~~EMERGENCY ALARM SYSTEM.~~

~~EMERGENCY VOICE/ALARM COMMUNICATIONS.~~

~~FIRE ALARM BOX, MANUAL.~~

~~FIRE ALARM CONTROL UNIT.~~

~~FIRE ALARM SIGNAL.~~

~~FIRE ALARM SYSTEM.~~

~~FIRE AREA.~~

~~FIRE DETECTOR, AUTOMATIC.~~

~~FIRE PROTECTION SYSTEM.~~

~~FIRE SAFETY FUNCTIONS.~~

~~FIXED BASE OPERATOR (FBO).~~

~~FOAM-EXTINGUISHING SYSTEM.~~

~~GAS DETECTION SYSTEM.~~

~~HALOGENATED EXTINGUISHING SYSTEM.~~

~~IMPAIRMENT COORDINATOR.~~

~~INITIATING DEVICE.~~

~~LIFE SAFETY SYSTEMS.~~

~~MANUAL FIRE ALARM BOX.~~

~~MULTIPLE-STATION ALARM DEVICE.~~

~~MULTIPLE-STATION SMOKE ALARM.~~

~~NOTIFICATION ZONE.~~

~~**NUISANCE ALARM.**~~

~~**PRIVATE GARAGE.**~~

~~**RECORD DRAWINGS.**~~

~~**SINGLE-STATION SMOKE ALARM.**~~

~~**SLEEPING UNIT.**~~

~~**SMOKE ALARM.**~~

~~**SMOKE DETECTOR.**~~

~~**STANDPIPE, TYPES OF.**~~

~~**Automatic dry.**~~
~~**Automatic wet.**~~
~~**Manual dry.**~~
~~**Manual wet.**~~
~~**Semiautomatic dry.**~~

~~STANDPIPE SYSTEM, CLASSES OF.~~
~~**Class I system.**~~
~~**Class II system.**~~
~~**Class III system.**~~

~~**SUPERVISING STATION.**~~
~~**SUPERVISORY SERVICE.**~~

~~**SUPERVISORY SIGNAL.**~~

~~**SUPERVISORY SIGNAL-INITIATING DEVICE.**~~

~~**TIRES, BULK STORAGE OF.**~~

~~**TRANSIENT AIRCRAFT.**~~

~~**TROUBLE SIGNAL.**~~

~~**VISIBLE ALARM NOTIFICATION APPLIANCE.**~~

~~**WET-CHEMICAL EXTINGUISHING AGENT.**~~

~~**WIRELESS PROTECTION SYSTEM.**~~

~~**ZONE.**~~

~~**ZONE, NOTIFICATION.**~~

Revise as follows:

~~**901.4.7**~~ **902.1** **Pump and riser room size.** Where provided, fire pump rooms and *automatic sprinkler system* riser rooms shall be designed with adequate space for all equipment necessary for the installation, as defined by the manufacturer, with sufficient working space around the stationary equipment. Clearances around equipment to elements of permanent construction, including other installed equipment and appliances, shall be sufficient to allow inspection, service, repair or replacement without removing such elements of permanent construction or disabling the function of a required *fire-resistance-rated* assembly. Fire pump and *automatic sprinkler system* riser rooms shall be provided with doors and unobstructed passageways large enough to allow removal of the largest piece of equipment.

~~**901.4.7.1**~~ **902.2** **Access.** Automatic sprinkler system risers, fire pumps and controllers shall be provided with *ready access*. Where located in a fire pump room or *automatic sprinkler system* riser room, the door shall be permitted to be locked provided that the key is available at all times.

~~901.4.7.2~~ 902.3 **Marking on access doors.** Access doors for *automatic sprinkler system* riser rooms and fire pump rooms shall be labeled with an *approved* sign. The lettering shall be in contrasting color to the background. Letters shall have a minimum height of 2 inches (51 mm) with a minimum stroke of $^{3}/_{8}$ inch (10 mm).

~~901.4.7.3~~ 902.4 **Environment.** *Automatic sprinkler system* riser rooms and fire pump rooms shall be maintained at a temperature of not less than 40°F (4°C). Heating units shall be permanently installed.

~~901.4.7.4~~ 902.5 **Lighting.** Permanently installed artificial illumination shall be provided in the *automatic sprinkler system* riser rooms and fire pump rooms.

CHAPTER 10 MEANS OF EGRESS

Revise as follows:

SECTION 1002
~~DEFINITIONS~~ MAINTENANCE AND PLANS

Delete without substitution:

~~**[BE] 1002.1 Definitions**~~.
~~The following terms are defined in Chapter 2:~~
~~**ACCESSIBLE MEANS OF EGRESS.**~~

~~**AISLE.**~~

~~**AISLE ACCESSWAY.**~~

~~**ALTERNATING TREAD DEVICE.**~~

~~**AREA OF REFUGE.**~~

~~**AUTOMATIC FLUSH BOLT.**~~

~~**BLEACHERS.**~~

~~**BREAKOUT.**~~

~~**CIRCULATION PATH.**~~

~~**COMMON PATH OF EGRESS TRAVEL.**~~

~~**CONSTANT LATCHING BOLT.**~~

~~**CORRIDOR.**~~

~~**DEAD BOLT.**~~

~~**DEFEND-IN-PLACE.**~~

~~**DOOR, BALANCED.**~~

~~**EGRESS COURT.**~~

~~**EMERGENCY ESCAPE AND RESCUE OPENING.**~~

~~**EXIT.**~~

~~**EXIT ACCESS.**~~

~~**EXIT ACCESS DOORWAY.**~~

~~**EXIT ACCESS RAMP.**~~

~~**EXIT ACCESS STAIRWAY.**~~

~~**EXIT DISCHARGE.**~~

~~EXIT DISCHARGE, LEVEL OF.~~

~~EXIT PASSAGEWAY.~~

~~EXTERIOR EXIT RAMP.~~

~~EXTERIOR EXIT STAIRWAY.~~

~~FIRE EXIT HARDWARE.~~

~~FIXED SEATING.~~

~~FLIGHT.~~

~~FLOOR AREA, GROSS.~~

~~FLOOR AREA, NET.~~

~~FOLDING AND TELESCOPIC SEATING.~~

~~GRADE FLOOR EMERGENCY ESCAPE AND RESCUE OPENINGS.~~

~~GRANDSTAND.~~

~~GUARD.~~

~~HANDRAIL.~~

~~HORIZONTAL EXIT.~~

~~INTERIOR EXIT RAMP.~~

~~INTERIOR EXIT STAIRWAY.~~

~~LOW ENERGY POWER-OPERATED DOOR.~~

~~MANUAL BOLT.~~

~~MEANS OF EGRESS.~~

~~MERCHANDISE PAD.~~

~~NOSING.~~

~~OCCUPANT LOAD.~~

~~OPEN-AIR ASSEMBLY SEATING.~~

~~OPEN-ENDED CORRIDOR.~~

~~OVERHEAD DOORSTOP.~~

~~PANIC HARDWARE.~~

~~PHOTOLUMINESCENT.~~

~~POWER-ASSISTED DOOR.~~

~~POWER-OPERATED DOOR.~~

~~PUBLIC WAY.~~

~~RAMP.~~

~~SCISSOR STAIRWAY.~~

~~SELF-LUMINOUS.~~

~~SMOKE-PROTECTED ASSEMBLY SEATING.~~

~~STAIR.~~

~~STAIRWAY.~~

~~STAIRWAY, INTERIOR EXIT.~~

~~STAIRWAY, SPIRAL.~~

~~**WINDER.**~~

Add new text as follows:

1002.1 Maintenance. Means of egress shall be maintained in accordance with this chapter.

1002.2 Fire safety and evacuation plans. Fire safety and evacuation plans shall be provided for occupancies and buildings where required by Chapter 4.

CHAPTER 11 CONSTRUCTION REQUIREMENTS FOR EXISTING BUILDINGS

Revise as follows:

SECTION 1102
~~DEFINITIONS~~ NOTIFICATION AND TIME SCHEDULE

Delete without substitution:

~~**1102.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**DUTCH DOOR.**~~

~~**EXISTING.**~~

Revise as follows:

~~**1101.4**~~ **1102.1 Owner notification.** When a building is found to be in noncompliance with this chapter, the *fire code official* shall duly notify the *owner* of the building. Upon receipt of such notice, the *owner* shall, subject to the following time limits, take necessary actions to comply with the provisions of this chapter.

~~**1101.4.1**~~ **1102.2 Construction documents.** *Construction documents* necessary to comply with this chapter shall be completed and submitted within a time schedule *approved* by the *fire code official*.

~~**1101.4.2**~~ **1102.3 Completion of work.** Work necessary to comply with this chapter shall be completed within a time schedule *approved* by the *fire code official*.

~~**1101.4.3**~~ **1102.4 Extension of time.** The *fire code official* is authorized to grant necessary extensions of time where it can be shown that the specified time periods are not physically practical or pose an undue hardship. The granting of an extension of time for compliance shall be based on the showing of good cause and subject to the filing of an acceptable systematic plan of correction with the *fire code official*.

CHAPTER 12 ENERGY SYSTEMS

Revise as follows:

SECTION 1202
~~DEFINITIONS~~ MIXED SYSTEMS

Delete without substitution:

~~**1202.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**BATTERY SYSTEM, STATIONARY STORAGE.**~~

~~**BATTERY TYPES.**~~

~~**CAPACITOR ENERGY STORAGE SYSTEM.**~~

~~**CRITICAL CIRCUIT.**~~

~~**EMERGENCY POWER SYSTEM.**~~

~~**ENERGY STORAGE MANAGEMENT SYSTEMS.**~~

~~**ENERGY STORAGE SYSTEM (ESS).**~~

~~**ENERGY STORAGE SYSTEM, ELECTROCHEMICAL.**~~

~~**ENERGY STORAGE SYSTEM, MOBILE.**~~

~~**ENERGY STORAGE SYSTEM, WALK-IN UNIT.**~~

~~**ENERGY STORAGE SYSTEM CABINET.**~~

~~**ENERGY STORAGE SYSTEM COMMISSIONING.**~~

~~**ENERGY STORAGE SYSTEM DECOMMISSIONING.**~~

~~**FUEL CELL POWER SYSTEM, STATIONARY.**~~

~~**PORTABLE GENERATOR.**~~

~~**STANDBY POWER SYSTEM.**~~

Revise as follows:

~~**1201.3**~~ <u>**1202.1**</u> **Mixed system installation.**
Where mixed systems are *approved*, the aggregate nameplate kWh energy of all energy storage systems in a *fire area* shall not exceed the maximum quantity specified for any of the energy systems in this chapter. Where required by the *fire code official*, a hazard mitigation analysis shall be provided and *approved* in accordance with Section 104.2.2 to evaluate any potential adverse interaction between the various energy systems and technologies.

CHAPTER 20 AVIATION FACILITIES

Revise as follows:

SECTION 2002
~~DEFINITIONS~~ <u>OTHER REGULATIONS</u>

Delete without substitution:

~~**2002.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**AIRCRAFT OPERATION AREA (AOA).**~~

~~**AIRPORT.**~~

~~**HELIPORT.**~~

~~**HELISTOP.**~~

Revise as follows:

~~**2001.2**~~ <u>2002.1</u> **Regulations not covered.** Regulations not specifically contained herein pertaining to airports, aircraft maintenance, aircraft hangars and appurtenant operations shall be in accordance with nationally recognized standards.

CHAPTER 21 DRY CLEANING

Delete without substitution:

~~SECTION 2102~~ ~~DEFINITIONS~~

~~**2102.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**DRY CLEANING.**~~

~~**DRY CLEANING PLANT.**~~

~~**DRY CLEANING ROOM.**~~

~~**DRY CLEANING SYSTEM.**~~

~~**SOLVENT OR LIQUID CLASSIFICATIONS.**~~

~~**Class I solvents.**~~
~~**Class II solvents.**~~
~~**Class IIIA solvents.**~~
~~**Class IIIB solvents.**~~
~~**Class IV solvents.**~~

CHAPTER 22 COMBUSTIBLE DUST-PRODUCING OPERATIONS

Delete without substitution:

~~SECTION 2202~~ ~~DEFINITIONS~~

~~**2202.1 Definition.**~~
~~The following terms are defined in Chapter 2:~~
~~**COMBUSTIBLE DUST.**~~

~~**DUST COLLECTION SYSTEM.**~~

Revise as follows:

SECTION ~~2204~~ <u>2202</u> DUST EXPLOSION SCREENING TESTS

~~**2204.1**~~ <u>2202.1</u> **Combustibility and explosivity tests.**
Where combustibility or explosivity screening tests are required to analyze the *combustible dust* as part of compliance with Section 104.9 and Section 414.1.3 of the *International Building Code*, they shall be in accordance with Section 5.4 of NFPA 652.

~~2204.2~~ 2202.2 **Samples.**
Representative samples for the screening test shall be obtained in accordance with Section 5.5 of NFPA 652.

2203.3.1.1 Location.
Dust collectors shall be located outside of buildings.

Exceptions:

1. Dust collectors inside buildings complying with Section 510 of the *International Mechanical Code*.
2. Wet-type dust collectors specifically *listed* for the type of dust conveyed shall be permitted inside buildings where in accordance with the manufacturer's instructions and specifications.
3. Dust collectors designed to specific NFPA standards listed in Table ~~2205.1~~ 2204.1 for the specific type of dust conveyed.

CHAPTER 23 MOTOR FUEL-DISPENSING FACILITIES AND REPAIR GARAGES

Revise as follows:

SECTION 2302
~~DEFINITIONS~~ DOCUMENTS

Delete without substitution:

~~**2302.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**AIRCRAFT MOTOR-VEHICLE FUEL-DISPENSING FACILITY.**~~

~~**ALCOHOL-BLENDED FUELS.**~~

~~**AUTOMOTIVE MOTOR FUEL-DISPENSING FACILITY.**~~

~~**DISPENSING DEVICE, OVERHEAD TYPE.**~~

~~**FLEET VEHICLE MOTOR FUEL-DISPENSING FACILITY.**~~

~~**LIQUEFIED NATURAL GAS (LNG).**~~

~~**MARINE MOTOR FUEL-DISPENSING FACILITY.**~~

~~**REPAIR GARAGE.**~~

~~**SELF-SERVICE MOTOR FUEL-DISPENSING FACILITY.**~~

Revise as follows:

~~2301.3~~ 2303.1 **Construction documents.**
Construction documents shall be submitted for review and approval prior to the installation or construction of automotive, marine or fleet vehicle motor fuel-dispensing facilities and repair garages in accordance with Section 106.1.

CHAPTER 24 FLAMMABLE FINISHES

Delete without substitution:

~~SECTION 2402~~
~~DEFINITIONS~~

~~**2402.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~

~~**DETEARING.**~~

~~**DIP TANK.**~~

~~**ELECTROSTATIC FLUIDIZED BED.**~~

~~**FLAMMABLE FINISHES.**~~

~~**FLAMMABLE VAPOR AREA.**~~

~~**FLUIDIZED BED.**~~

~~**LIMITED SPRAYING SPACE.**~~

~~**RESIN APPLICATION AREA.**~~

~~**ROLL COATING.**~~

~~**SPRAY BOOTH.**~~

~~**SPRAY ROOM.**~~

~~**SPRAYING SPACE.**~~

Revise as follows:

SECTION ~~2410~~ 2402
FLOOR SURFACING AND FINISHING OPERATIONS

~~2410.1~~ 2402.1 Scope.
Floor surfacing and finishing operations exceeding 350 square feet (33 m^2) and using Class I or II liquids shall comply with Sections ~~2410.2~~ 2402.2 through ~~2410.5~~ 2402.5.

~~2410.2~~ 2402.2 Mechanical system operation. Heating, ventilation and air-conditioning systems shall not be operated during resurfacing or refinishing operations or within 4 hours of the application of *flammable* or *combustible liquids*.

~~2410.3~~ 2402.3 Business operation. Floor surfacing and finishing operations shall not be conducted while an establishment is open to the public.

~~2410.4~~ 2402.4 Ignition sources. The power shall be shut down to all electrical sources of ignition within the flammable vapor area, unless those devices are classified for use in Class I, Division 1, hazardous locations.

~~2410.5~~ 2402.5 Ventilation. To prevent the accumulation of flammable vapors, mechanical ventilation at a minimum rate of 1 cubic foot per minute per square foot [0.00508 m^3 /(s × m^2)] of area being finished shall be provided. Such exhaust shall be by *approved* temporary or portable means. Vapors shall be exhausted to the exterior of the building.

CHAPTER 25 FRUIT AND CROP RIPENING

Delete without substitution:

~~**2501.3 Ethylene generators.**~~
~~*Approved* ethylene generators shall be operated and maintained in accordance with Section 2506.~~

~~SECTION 2502~~

~~DEFINITIONS~~

~~2502.1 Terms defined in Chapter 2~~.
~~Words and terms used in this chapter and defined in Chapter 2 shall have the meanings ascribed to them as defined therein.~~

Revise as follows:

SECTION ~~2506~~ 2502
ETHYLENE GENERATORS

~~2506.1~~ 2502.1 Ethylene generators. Ethylene generators shall be *listed* and *labeled* by an *approved* testing laboratory, *approved* by the *fire code official* and used only in *approved* rooms in accordance with the ethylene generator manufacturer's instructions. The listing evaluation shall include documentation that the concentration of ethylene gas does not exceed 25 percent of the lower explosive limit (LEL).

~~2506.2~~ 2502.2 Ethylene generator rooms. Ethylene generators shall be used in rooms having a volume of not less than 1,000 cubic feet (28 m^3). Rooms shall have air circulation to ensure even distribution of ethylene gas and shall be free from sparks, open flames or other ignition sources.

CHAPTER 26 FUMIGATION AND INSECTICIDAL FOGGING

Revise as follows:

SECTION 2602
~~DEFINITIONS~~ SAFETY

Delete without substitution:

~~2602.1 Definitions~~.
~~The following terms are defined in Chapter 2:~~
~~FUMIGANT.~~

~~FUMIGATION.~~

~~INSECTICIDAL FOGGING.~~

Revise as follows:

~~2603.3~~ 2602.1 Notification. The *fire code official* and *fire chief* shall be notified in writing not less than 48 hours before the building, structure or space is to be closed in connection with the utilization of any toxic or flammable fumigant. Notification shall give the location of the enclosed space to be fumigated or fogged, the occupancy, the fumigants or insecticides to be utilized, the person or persons responsible for the operation, and the date and time at which the operation will begin. Written notice of any fumigation or insecticidal fogging operation shall be given to all affected occupants of the building, structure or space in which such operations are to be conducted with sufficient advance notice to allow the occupants to evacuate the building, structure or space. Such notice shall inform the occupants as to the purposes, anticipated duration and hazards associated with the fumigation or insecticidal fogging operation.

~~2603.3.1~~ 2602.2 Warning signs. *Approved* warning signs indicating the danger, type of chemical involved and necessary precautions shall be posted on all doors and entrances to the affected building, structure or space and on all gangplanks and ladders from the deck, pier or land to a ship. Such notices shall be printed in red ink on a white background. Letters in the headlines shall be not less than 2 inches (51 mm) in height and shall state the date and time of the operation, the name and address of the person, the name of the operator in charge, and a warning stating that the affected building, structure or space shall be vacated not less than 1 hour before the operation begins and shall not be reentered until the danger signs have been removed by the proper authorities.

~~2603.3.2~~ 2602.3 Breathing apparatus. Persons engaged in the business of fumigation or insecticidal fogging shall maintain and have available *approved* protective breathing apparatus.

~~2603.3.3~~ 2602.4 Watch personnel. During the period fumigation is in progress, except where fumigation is conducted in a gastight vault or tank, a responsible watchperson shall remain on duty at the entrance or entrances to the enclosed fumigated space until after the fumigation is completed and the building, structure or space is properly ventilated and safe for occupancy. Sufficient watchers shall be provided to prevent persons from entering the enclosed space under fumigation without being observed.

Delete without substitution:

~~2603.3.4 Evacuation during fumigation.~~ ~~Occupants of the building, structure or space to be fumigated, except the personnel conducting the fumigation, shall be evacuated from such building, structure or space prior to commencing fumigation operations.~~

Revise as follows:

~~2603.3.5~~ 2606.5 Evacuation during ~~insecticidal fogging~~ operations. Occupants in the building, structure or space to be fogged or fumigated, except the personnel conducting the insecticidal fogging or fumigation operations, shall be evacuated from such building, structure or space prior to commencing fogging operations.

CHAPTER 27 SEMICONDUCTOR FABRICATION FACILITIES

SECTION 2701 GENERAL

2701.1 Scope.
Semiconductor fabrication facilities and comparable research and development areas classified as Group H-5 shall comply with this chapter and the *International Building Code*. The use, storage and handling of hazardous materials in Group H-5 shall comply with this chapter, other applicable provisions of this code and the *International Building Code*.

Revise as follows:

~~2701.3~~ 2701.2 Multiple hazards.
Where a material poses multiple hazards, all hazards shall be addressed in accordance with Section 5001.1.

~~2701.5~~ 2701.3 Permits.
Permits shall be required as set forth in Section 105.5.

SECTION 2702 ~~DEFINITIONS~~ APPLICATION

Delete without substitution:

~~2702.1 Definitions.~~
~~The following terms are defined in Chapter 2:~~
~~EMERGENCY CONTROL STATION.~~

~~FABRICATION AREA.~~

~~**GAS DETECTION SYSTEM.**~~

~~**HAZARDOUS PRODUCTION MATERIAL (HPM).**~~

~~**HPM.**~~

~~**HPM ROOM.**~~

~~**PASS-THROUGH.**~~

~~**SEMICONDUCTOR FABRICATION FACILITY.**~~

~~**SERVICE CORRIDOR.**~~

~~**TOOL.**~~

~~**WORKSTATION.**~~

Revise as follows:

~~**2701.2**~~ **2702.1 Application.** The requirements set forth in this chapter are requirements specific only to Group H-5 and shall be applied as exceptions or additions to applicable requirements set forth elsewhere in this code.

~~**2701.4**~~ **2702.2 Existing buildings and existing fabrication areas.**
Existing buildings and existing *fabrication areas* shall comply with this chapter, except that transportation and handling of HPM in *corridors* and enclosures for *stairways* and *ramps* shall be allowed where in compliance with Section 2705.3.2 and the *International Building Code*.

CHAPTER 28 LUMBER YARDS AND AGRO-INDUSTRIAL, SOLID BIOMASS AND WOODWORKING FACILITIES

Delete without substitution:

~~SECTION 2802~~
~~DEFINITIONS~~

~~**2802.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**AGRO-INDUSTRIAL.**~~

~~**BIOMASS.**~~

~~**COLD DECK.**~~

~~**FINES.**~~

~~**HOGGED MATERIALS.**~~

~~**PLYWOOD AND VENEER MILLS.**~~

~~**RAW PRODUCT.**~~

~~**SOLID BIOFUEL.**~~

~~**SOLID BIOMASS FEEDSTOCK.**~~

~~**STATIC PILES.**~~

~~**TIMBER AND LUMBER PRODUCTION FACILITIES.**~~

CHAPTER 29 MANUFACTURE OF ORGANIC COATINGS

Revise as follows:

SECTION 2902
~~DEFINITION~~ MAINTENANCE

Delete without substitution:

~~**2902.1 Definition.**~~
~~The following term is defined in Chapter 2:~~
~~**ORGANIC COATING.**~~

Revise as follows:

~~**2901.3**~~ **2902.1 Maintenance.**
Structures and their service equipment shall be maintained in accordance with this code and NFPA 35.

CHAPTER 30 INDUSTRIAL OVENS

SECTION 3001
GENERAL

Revise as follows:

3001.1 Scope.
This chapter shall apply to the installation and operation of industrial ovens and furnaces. ~~Industrial ovens and furnaces shall comply with the applicable provisions of the *International Fuel Gas Code*, the *International Mechanical Code*, NFPA 86, and this chapter.~~ The terms "ovens" and "furnaces" are used interchangeably in this chapter.

SECTION 3002
~~DEFINITIONS~~ ADDITIONAL REQUIREMENTS

Delete without substitution:

~~**3002.1 Definitions**~~.
~~The following terms are defined in Chapter 2:~~
~~**FURNACE CLASS A.**~~

~~**FURNACE CLASS B.**~~

~~**FURNACE CLASS C.**~~

~~**FURNACE CLASS D.**~~

Add new text as follows:

3002.1 Other regulations. Industrial ovens and furnaces shall also comply with the *International Fuel Gas Code*, the *International Mechanical Code* and NFPA 86.

CHAPTER 31 TENTS, TEMPORARY SPECIAL EVENT STRUCTURES AND OTHER MEMBRANE STRUCTURES

SECTION 3101
GENERAL

Revise as follows:

3101.1 Scope.
Tents, temporary special event structures and *membrane structures* shall comply with this chapter. ~~The provisions of Section 3103 are applicable only to temporary *tents* and *membrane structures*. The provisions of Sections 3104 and 3108 are applicable to temporary and permanent *tents* and *membrane structures*. The provisions of Section 3105 are applicable to temporary special event structures. The provisions of Section 3106 are applicable to inflatable amusement devices. The provisions of Section 3107are applicable to outdoor assembly events. Other temporary structures shall comply with the *International Building Code*.~~

SECTION 3102
~~DEFINITIONS~~ APPLICATION

Delete without substitution:

~~**3102.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**AIR-INFLATED STRUCTURE.**~~

~~**AIR-SUPPORTED STRUCTURE.**~~

~~**MEMBRANE STRUCTURE.**~~

~~**TEMPORARY SPECIAL EVENT STRUCTURE.**~~

~~**TENT.**~~

Add new text as follows:

3102.1 Temporary tents, membrane structures and special event structures. The provisions of Sections 3103, 3104 and 3108 are applicable to temporary tents and membrane structures.
The provisions of Section 3105 are applicable to temporary special event structures.

Other temporary structures shall comply with the International Building Code.

3102.2 Permanent tents and membrane structures. The provisions of Sections 3104 and 3108 are applicable to permanent tents and membrane structures.

3102.3 Inflatable amusement devices. The provisions of Section 3106 are applicable to inflatable amusement devices.

3102.4 Outdoor assembly events. The provisions of Section 3107 are applicable to outdoor assembly events.

CHAPTER 32 HIGH-PILED COMBUSTIBLE STORAGE

Revise as follows:

SECTION 3202

~~DEFINITIONS~~ DOCUMENTATION

Delete without substitution:

~~**3202.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**ARRAY.**~~

~~**ARRAY, CLOSED.**~~

~~**AUTOMATED RACK STORAGE.**~~

~~**BIN BOX.**~~

~~**COMMODITY.**~~

~~**EARLY SUPPRESSION FAST-RESPONSE (ESFR) SPRINKLER.**~~

~~**EXPANDED PLASTIC.**~~

~~**EXTRA-HIGH-RACK COMBUSTIBLE STORAGE.**~~

~~**HIGH-PILED COMBUSTIBLE STORAGE.**~~

~~**HIGH-PILED STORAGE AREA.**~~

~~**LONGITUDINAL FLUE SPACE.**~~

~~**MANUAL STOCKING METHODS.**~~

~~**MECHANICAL STOCKING METHODS.**~~

~~**SHELF STORAGE.**~~

~~**SOLID SHELVING.**~~

~~**TRANSVERSE FLUE SPACE.**~~

Revise as follows:

~~3201.3~~ 3202.1 Construction documents.
At the time of building permit application for new structures designed to accommodate high-piled storage or for requesting a change of occupancy/use, and at the time of application for a storage permit, plans and specifications shall be submitted for review and approval. In addition to the information required by the *International Building Code*, the storage permit submittal shall include the information specified in this section. The *construction documents* shall include all of the following:

1. Floor plan of the building showing locations and dimensions of *high-piled storage areas*.
2. Usable storage height for each storage area.
3. Number of tiers within each rack, if applicable.
4. Commodity clearance between top of storage and the sprinkler deflector for each storage arrangement.
5. Aisle dimensions between each storage array.
6. Maximum pile volume for each storage array.
7. Location and classification of commodities in accordance with Section 3203.
8. Location of commodities that are banded or encapsulated.
9. Location of required fire department access doors.
10. Type of fire protection systems.
11. Location of valves controlling the water supply of ceiling and in-rack sprinklers.

12. Type, location and specifications of smoke removal and curtain board systems.
13. Dimension and location of transverse and longitudinal flue spaces.
14. Additional information regarding required design features, commodities, storage arrangement and fire protection features within the *high-piled storage area* shall be provided at the time of permit, where required by the *fire code official*.

~~3201.3.1~~ 3202.1.1 **Approved construction documents.** Following approval of the *construction documents*, a copy of the *approved* plans shall be maintained on the premises in an *approved* location.

~~3201.3.2~~ 3202.1.2 **Approved storage layout.**
A floor plan, of legible size, shall be provided, mounted on a wall and protected from damage. The floor plan shall be mounted in an *approved* location and show the following:
1. Locations, dimensions and rack layout of *high-piled storage areas*.
2. Design storage height for each storage area.
3. Types of commodities.
4. Commodity clearance between top of storage and the sprinkler deflector for each storage arrangement.
5. Aisle dimensions between each storage array.
6. For palletized and solid-piled storage, the maximum pile volume for each storage array.
7. Location and classification of commodities in accordance with Section 3203.
8. Location of required fire department access doors.
9. Location of valves controlling the water supply of ceiling and in-rack sprinklers.

~~3201.4~~ 3202.2 **Fire safety and evacuation plan.**
Where required by the Section 403, a fire safety and evacuation plan shall be submitted at the time of permit application for review and approval. A copy of the *approved* fire safety and evacuation plan shall be maintained on the premises in an *approved* location.

CHAPTER 33 FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION

Revise as follows:

SECTION 3302
~~DEFINITIONS~~ SAFETY PLAN

Delete without substitution:

~~**3302.1 Terms defined in Chapter 2.**~~
~~Words and terms used in this chapter and defined in Chapter 2 shall have the meanings ascribed to them as defined therein.~~

Revise as follows:

~~3303.1~~ 3302.1 **Program development and maintenance.**
The *owner* or *owner's* authorized agent shall be responsible for the development, implementation and maintenance of an *approved*, written *site safety plan* establishing a fire prevention program at the project site applicable throughout all phases of the construction, repair, *alteration* or demolition work. The plan addresses the requirements of this chapter and other applicable portions of this code, the duties of staff and staff training requirements. The plan shall be submitted and *approved* before a building permit is issued. Any changes to the plan shall be submitted for approval.

~~3303.1.1~~ <u>3302.2</u> Components of site safety plans.
Site safety plans shall include the following as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where *approved*, and signage locations in accordance with Section 3305.7.
7. Location and safety considerations for temporary heating equipment.
8. Hot work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of *flammable* and *combustible liquids* and other hazardous materials.
11. Provisions for site security and where required, for a fire watch.
12. Changes that affect this plan.
13. Other site-specific information required by the *fire code official*.

CHAPTER 34 TIRE REBUILDING AND TIRE STORAGE

SECTION 3401 GENERAL

Revise as follows:

3401.1 Scope.
Tire rebuilding plants, tire storage and tire byproduct facilities shall comply with this chapter, other applicable requirements of this code and NFPA 13. ~~Tire storage in buildings shall also comply with Chapter 32.~~

SECTION 3402 ~~DEFINITIONS~~ <u>OTHER REQUIREMENTS</u>

Delete without substitution:

~~3402.1 Terms defined in Chapter 2~~.
~~Words and terms used in this chapter and defined in Chapter 2 shall have the meanings ascribed to them as defined therein.~~

Add new text as follows:

<u>3402.1</u> <u>High-piled storage</u>. <u>Indoor tire storage exceeding a height of six feet shall also comply with Chapter 32.</u>

CHAPTER 35 WELDING AND OTHER HOT WORK

Revise as follows:

SECTION 3502
~~DEFINITIONS~~ OTHER REQUIREMENTS

Delete without substitution:

~~**3502.1 Definitions**~~.
~~The following terms are defined in Chapter 2:~~
~~**HOT WORK.**~~

~~**HOT WORK AREA.**~~

~~**HOT WORK EQUIPMENT.**~~

~~**HOT WORK PERMITS.**~~

~~**HOT WORK PROGRAM.**~~

~~**RESPONSIBLE PERSON.**~~

Revise as follows:

~~3501.3~~ 3502.1 Restricted areas.
Hot work shall only be conducted in areas designed or authorized for that purpose by the personnel responsible for a hot work program. Hot work shall not be conducted in the following areas unless approval has been obtained from the *fire code official*:

1. Areas where the *automatic sprinkler system* is impaired.
2. Areas where there exists the potential of an explosive atmosphere, such as locations where flammable gases, liquids or vapors are present.
3. Areas with readily ignitable materials, such as storage of large quantities of bulk sulfur, baled paper, cotton, lint, dust or loose combustible materials.
4. On board ships at dock or ships under construction or repair.
5. At other locations as specified by the *fire code official*.

~~3501.4~~ 3502.2 Cylinders and containers.
Compressed gas cylinders and fuel containers shall also comply with ~~this chapter and~~ Chapter 53.

CHAPTER 36 MARINAS

Revise as follows:

SECTION 3602
~~DEFINITIONS~~ DOCUMENTS

Delete without substitution:

~~**3602.1 Definitions**~~.
~~The following terms are defined in Chapter 2:~~
~~**FLOAT.**~~

~~**MARINA.**~~

~~**PIER.**~~

~~**VESSEL.**~~

~~**WHARF.**~~

Revise as follows:

~~**3601.2**~~ **3602.1** **Plans and approvals.** Plans for marina fire protection facilities shall be *approved* prior to installation. The work shall be subject to final inspection and approval after installation.

CHAPTER 37 COMBUSTIBLE FIBERS

SECTION 3701 GENERAL

3701.1 Scope. The equipment, processes and operations involving *combustible fibers* shall comply with this chapter.

Revise as follows:

~~**3701.3**~~ **3701.2** **Permits.**
Permits shall be required as set forth in Section 105.5.

SECTION 3702 ~~DEFINITIONS~~ APPLICATION

Delete without substitution:

~~**3702.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**BALED COTTON.**~~

~~**BALED COTTON, DENSELY PACKED.**~~

~~**COMBUSTIBLE FIBERS.**~~

~~**COTTON.**~~

~~**SEED COTTON.**~~

Revise as follows:

~~**3701.2**~~ **3702.1** **Applicability.** Storage of *combustible fibers* in any quantity shall comply with this ~~section~~chapter.

CHAPTER 38 HIGHER EDUCATION LABORATORIES

Revise as follows:

SECTION 3802 ~~DEFINITIONS~~ APPLICATION

Delete without substitution:

~~**3802.1 Definitions**~~**.**
~~The following terms are defined in Chapter 2:~~
~~**CHEMICAL FUME HOOD.**~~

~~**GLOVE BOX.**~~

~~**HIGHER EDUCATION LABORATORY.**~~

~~**LABORATORY SUITE.**~~

~~**SPECIAL EXPERT.**~~

Revise as follows:

~~**3801.2**~~ **<u>3802.1</u>** ~~**Application**~~ **<u>General</u>.**
The provisions of this chapter shall be applied as exceptions or additions to applicable requirements of this code. ~~Unless specifically modified by this chapter, the storage, use and handling of hazardous materials shall comply with the provisions in Chapters 50 through 67 and the *International Building Code* for quantities not exceeding the maximum allowable quantity.~~

Add new text as follows:

<u>3802.2</u> **<u>Quantities not exceeding the maximum allowable quantity</u>.** <u>Unless specifically modified by this chapter, the storage, use and handling of hazardous materials shall comply with the provisions in Chapters 50 through 67 for quantities not exceeding the maximum allowable quantity.</u>

CHAPTER 39 PROCESSING AND EXTRACTION FACILITIES

SECTION 3901
GENERAL

Revise as follows:

~~**3901.3**~~ **<u>3901.2</u> Permits.**
Permits shall be required as set forth in Sections 105.5 and 105.6.

~~**3901.4**~~ **<u>3901.3</u> Lighting.**
Where used, horticultural lights or lighting systems shall be *listed* and *labeled* in accordance with UL 8800 and installed in accordance with the listing, the manufacturer’s installation instructions and NFPA 70.

~~**3901.5**~~ **<u>3901.4</u> Carbon dioxide generation.**
Carbon dioxide-enriched atmospheres generated using methods to create carbon dioxide as a byproduct shall meet the requirements of Sections 5307.4.1 through 5307.4.7.

SECTION 3902
~~DEFINITIONS~~ <u>APPLICATION</u>

Delete without substitution:

~~**3902.1 Definitions**~~**.**
~~The following terms are defined in Chapter 2:~~
~~**DESOLVENTIZING.**~~

~~**MISCELLA.**~~

Revise as follows:

~~**3901.2**~~ **<u>3902.1</u> Existing buildings or facilities.**
Existing buildings or facilities used for the processing or extraction of plant oils using solvents shall comply with this chapter. ~~Existing extraction processes where the medium of extraction is changed to include the use of solvents shall comply with this chapter.~~

Add new text as follows:

<u>3902.2</u> <u>Existing processes</u>. <u>Existing extraction processes where the medium of extraction is changed to include the use of solvents shall comply with this chapter.</u>

CHAPTER 40 STORAGE OF DISTILLED SPIRITS AND WINES

Revise as follows:

SECTION 4002
~~DEFINITIONS~~ <u>NONAPPLICABILITY</u>

Delete without substitution:

~~**4002.1 Definitions**~~**.**
~~Words and terms used in this chapter and defined in Chapter 2 shall have the meanings ascribed to them as defined therein.~~

Revise as follows:

~~**4001.1.1**~~ **<u>4002.1</u> Nonapplicability.**
Chapter 50 and Chapter 57 are not applicable to the storage of distilled spirits and wines in barrels and casks ~~as identified in Section 5001.1, Exception 10, and Section 5701.2, Item 10~~<u>where stored in compliance with this chapter</u>.

CHAPTER 50 HAZARDOUS MATERIALS—GENERAL PROVISIONS

Revise as follows:

~~**5001.4**~~ **<u>5001.3</u> Retail and wholesale storage and display.**
For retail and wholesale storage and display of nonflammable solid and nonflammable or noncombustible liquid hazardous materials in Group M occupancies and storage in Group S occupancies, see Section 5003.11.

~~**5001.5**~~ **<u>5001.4</u> Permits.**
Permits shall be required as set forth in Sections 105.5 and 105.6.
Where required by the *fire code official*, permittees shall apply for approval to permanently close a storage, use or handling facility. Such application shall be submitted not less than 30 days prior to the termination of the storage, use or handling of hazardous materials. The *fire code official* is authorized to require that the application be accompanied by an *approved* facility closure plan in accordance with Section ~~5001.6.3~~<u>5001.5.3</u>.

~~**5001.5.1**~~ **<u>5001.4.1</u> Hazardous Materials Management Plan.** Where required by the *fire code official*, an application for a permit shall include a Hazardous Materials Management Plan (HMMP). The HMMP shall include a facility site plan designating the following:

1. Access to each storage and use area.

2. Location of emergency equipment.
3. Location where liaison will meet emergency responders.
4. Facility evacuation meeting point locations.
5. The general purpose of other areas within the building.
6. Location of all above-ground and underground tanks and their appurtenances including, but not limited to, sumps, vaults, below-grade treatment systems and piping.
7. The hazard classes in each area.
8. Locations of all *control areas* and Group H occupancies.
9. Emergency *exits*.

~~5001.5.2~~ 5001.4.2 Hazardous Materials Inventory Statement (HMIS). Where required by the *fire code official*, an application for a permit shall include an HMIS, such as Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III, Tier II Report or other *approved* statement. The HMIS shall include the following information:

1. Product name.
2. Component.
3. Chemical Abstract Service (CAS) number.
4. Location where stored or used.
5. Container size.
6. Hazard classification.
7. Amount in storage.
8. Amount in use-*closed systems*.
9. Amount in use-*open systems*.

~~5001.6~~ 5001.5 Facility closure.
Facilities shall be placed out of service in accordance with Sections ~~5001.6.1~~5001.5.1 through ~~5001.6.3~~5001.5.3.

~~5001.6.1~~ 5001.5.1 Temporarily out-of-service facilities. Facilities that are temporarily out of service shall continue to maintain a permit and be monitored and inspected.

~~5001.6.2~~ 5001.5.2 Permanently out-of-service facilities.
Facilities for which a permit is not kept current or is not monitored and inspected on a regular basis shall be deemed to be permanently out of service and shall be closed in an *approved* manner. Where required by the *fire code official*, permittees shall apply for approval to close permanently storage, use or handling facilities. The *fire code official* is authorized to require that such application be accompanied by an *approved* facility closure plan in accordance with Section ~~5001.6.3~~5001.5.3.

~~5001.6.3~~ 5001.5.3 Facility closure plan.
Where a facility closure plan is required in accordance with Section ~~5001.5~~5001.4 to terminate storage, dispensing, handling or use of hazardous materials, it shall be submitted to the *fire code official* not less than 30 days prior to facility closure. The plan shall demonstrate that hazardous materials that are stored, dispensed, handled or used in the facility will be transported, disposed of or reused in a manner that eliminates the need for further maintenance and any threat to public health and safety.

SECTION 5002
~~DEFINITIONS~~ PERFORMANCE-BASED DESIGN

Delete without substitution:

~~**5002.1 Definitions.**~~

~~The following terms are defined in Chapter 2:~~

~~**BOILING POINT.**~~

~~**CEILING LIMIT.**~~

~~**CHEMICAL.**~~

~~**CHEMICAL NAME.**~~

~~**CLOSED CONTAINER.**~~

~~**CONTAINER.**~~

~~**CONTROL AREA.**~~

~~**CYLINDER.**~~

~~**DAY BOX.**~~

~~**DEFLAGRATION.**~~

~~**DESIGN PRESSURE.**~~

~~**DETACHED BUILDING.**~~

~~**DISPENSING.**~~

~~**EXCESS FLOW CONTROL.**~~

~~**EXHAUSTED ENCLOSURE.**~~

~~**EXPLOSION.**~~

~~**FLAMMABLE VAPORS OR FUMES.**~~

~~**GAS CABINET.**~~

~~**GAS ROOM.**~~

~~**HANDLING.**~~

~~**HAZARDOUS MATERIALS.**~~

~~**HEALTH HAZARD.**~~

~~**IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH).**~~

~~**INCOMPATIBLE MATERIALS.**~~

~~**LIQUID.**~~

~~**LOWER EXPLOSIVE LIMIT (LEL).**~~

~~**LOWER FLAMMABLE LIMIT (LFL).**~~

~~**MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA.**~~

~~**NORMAL TEMPERATURE AND PRESSURE (NTP).**~~

~~**OUTDOOR CONTROL AREA.**~~

~~**PERMISSIBLE EXPOSURE LIMIT (PEL).**~~

~~**PESTICIDE.**~~

~~**PHYSICAL HAZARD.**~~

~~**PRESSURE VESSEL.**~~

~~**SAFETY CAN.**~~

~~**SAFETY DATA SHEET (SDS).**~~

~~**SECONDARY CONTAINMENT.**~~

~~**SEGREGATED.**~~

~~**SOLID.**~~

~~**STORAGE, HAZARDOUS MATERIALS.**~~

~~**SYSTEM.**~~

~~**TANK, ATMOSPHERIC.**~~

~~**TANK, PORTABLE.**~~

~~**TANK, STATIONARY.**~~

~~**TANK VEHICLE.**~~

~~**UNAUTHORIZED DISCHARGE.**~~

~~**USE (MATERIAL).**~~

~~**VAPOR PRESSURE.**~~

Revise as follows:

~~5001.3~~ 5002.1 Performance-based design alternative.
Where *approved* by the *fire code official*, buildings and facilities where hazardous materials are stored, used or handled shall be permitted to comply with this section as an alternative to compliance with the other requirements set forth in this chapter and Chapters 51 through 67.

~~5001.3.1~~ 5002.1.1 Objective.
The objective of Section ~~5001.3~~5002 is to protect people and property from the consequences of unauthorized discharge, fires or explosions involving hazardous materials.

~~5001.3.2~~ 5002.2 Functional statements. Performance-based design alternatives are based on the following functional statements:

1. Provide safeguards to minimize the risk of unwanted releases, fires or explosions involving hazardous materials.
2. Provide safeguards to minimize the consequences of an unsafe condition involving hazardous materials during normal operations and in the event of an abnormal condition.

~~5001.3.3~~ 5002.3 Performance requirements.
Where safeguards, systems, documentation, written plans or procedures, audits, process hazards analysis, mitigation measures, engineering controls or construction features are required by Sections ~~5001.3.3.1~~5002.3.1 through ~~5001.3.3.18~~5002.3.18, the details of the design alternative shall be subject to approval by the *fire code official*. The details of actions granting the use of the design alternatives shall be recorded and entered in the files of the jurisdiction.

~~5001.3.3.1~~ 5002.3.1 Properties of hazardous materials. The physical- and health-hazard properties of hazardous materials on-site shall be known and shall be made readily available to employees, neighbors and the *fire code official*.

~~5001.3.3.2~~ 5002.3.2 Reliability of equipment and operations. Equipment and operations involving hazardous materials shall be designed, installed and maintained to ensure that they reliably operate as intended.

~~5001.3.3.3~~ 5002.3.3 Prevention of unintentional reaction or release. Safeguards shall be provided to minimize the risk of an unintentional reaction or release that could endanger people or property.

~~5001.3.3.4~~ 5002.3.4 Spill mitigation. Spill containment systems or means to render a spill harmless to people or property shall be provided where a spill is determined to be a plausible event and where such an event would endanger people or property.

~~5001.3.3.5~~ 5002.3.5 **Ignition hazards.** Safeguards shall be provided to minimize the risk of exposing combustible hazardous materials to unintended sources of ignition.

~~5001.3.3.6~~ 5002.3.6 **Protection of hazardous materials.** Safeguards shall be provided to minimize the risk of exposing hazardous materials to a fire or physical damage whereby such exposure could endanger or lead to the endangerment of people or property.

~~5001.3.3.7~~ 5002.3.7 **Exposure hazards.** Safeguards shall be provided to minimize the risk of and limit damage from a fire or explosion involving explosive hazardous materials whereby such fire or explosion could endanger or lead to the endangerment of people or property.

~~5001.3.3.8~~ 5002.3.8 **Detection of gas or vapor release.** Where a release of hazardous materials gas or vapor would cause immediate harm to persons or property, means of mitigating the dangerous effects of a release shall be provided.

~~5001.3.3.9~~ 5002.3.9 **Reliable power source.** Where a power supply is relied on to prevent or control an emergency condition that could endanger people or property, the power supply shall be from a reliable source.

~~5001.3.3.10~~ 5002.3.10 **Ventilation.** Where ventilation is necessary to limit the risk of creating an emergency condition resulting from normal or abnormal operations, means of ventilation shall be provided.

~~5001.3.3.11~~ 5002.3.11 **Process hazard analyses.** Process hazard analyses shall be conducted to ensure reasonably the protection of people and property from dangerous conditions involving hazardous materials.

~~5001.3.3.12~~ 5002.3.12 **Prestartup safety review.** Written documentation of prestartup safety review procedures shall be developed and enforced to ensure that operations are initiated in a safe manner. The process of developing and updating such procedures shall involve the participation of affected employees.

~~5001.3.3.13~~ 5002.3.13 **Operating and emergency procedures.** Written documentation of operating procedures and procedures for emergency shutdown shall be developed and enforced to ensure that operations are conducted in a safe manner. The process of developing and updating such procedures shall involve the participation of affected employees.

~~5001.3.3.14~~ 5002.3.14 **Management of change.** A written plan for management of change shall be developed and enforced. The process of developing and updating the plan shall involve the participation of affected employees.

~~5001.3.3.15~~ 5002.3.15 **Emergency plan.** A written emergency plan shall be developed to ensure that proper actions are taken in the event of an emergency, and the plan shall be followed if an emergency condition occurs. The process of developing and updating the plan shall involve the participation of affected employees.

~~5001.3.3.16~~ 5002.3.16 **Accident procedures.** Written procedures for investigation and documentation of accidents shall be developed, and accidents shall be investigated and documented in accordance with these procedures.

~~5001.3.3.17~~ 5002.3.17 **Consequence analysis.** Where an accidental release of hazardous materials could endanger people or property, either on- or off-site, an analysis of the expected consequences of a plausible release shall be performed and utilized in the analysis and selection of active and passive hazard mitigation controls.

~~5001.3.3.18~~ 5002.3.18 **Safety audits.** Safety audits shall be conducted on a periodic basis to verify compliance with the requirements of this section.

CHAPTER 51 AEROSOLS

Revise as follows:

SECTION 5102

~~DEFINITIONS~~ AEROSOL CONTAINERS

Delete without substitution:

~~**5102.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**AEROSOL CONTAINER.**~~

~~**AEROSOL PRODUCT.**~~

~~**Level 1 aerosol products.**~~
~~**Level 2 aerosol products.**~~
~~**Level 3 aerosol products.**~~

~~**AEROSOL PRODUCT WAREHOUSE.**~~
~~**PROPELLANT.**~~

~~**RETAIL DISPLAY AREA.**~~

Revise as follows:

~~5101.4~~ 5002.1 ~~Containers~~ Maximum size of containers.
Metal aerosol containers shall be limited to a maximum size of 33.8 fluid ounces (1000 ml). Plastic aerosol containers shall be limited to a maximum of 4 fluid ounces (118 ml) except as provided in Sections 5104.1.1 and 5104.1.2. Glass aerosol containers shall be limited to a maximum of 4 fluid ounces (118 ml).

CHAPTER 53 COMPRESSED GASES

SECTION 5301 GENERAL

Revise as follows:

5301.1 Scope.
Storage, use and handling of *compressed gases* in *compressed gas* containers, cylinders, tanks and systems shall comply with this chapter and NFPA 55, including those gases regulated elsewhere in this code. Partially full *compressed gas* containers, cylinders or tanks containing residual gases shall be considered as full for the purposes of the controls required.
~~Liquefied natural gas for use as a vehicular fuel shall also comply with NFPA 52 and NFPA 59A.~~

~~*Compressed gases* classified as hazardous materials shall also comply with Chapter 50 for general requirements and chapters addressing specific hazards, including Chapters 58 (Flammable Gases and Flammable *Cryogenic Fluids*), 60 (Highly Toxic and Toxic Materials), 63 (*Oxidizers*, Oxidizing Gases and Oxidizing *Cryogenic Fluids*) and 64 (*Pyrophoric* Materials).~~

~~Compressed hydrogen (CH_2) shall also comply with the applicable portions of Chapters 23 and 58 of this code, the *International Fuel Gas Code* and NFPA 2.~~

~~Cutting and welding gases shall also comply with Chapter 35.~~

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 608).
2. Compressed natural gas (CNG) for use as a vehicular fuel shall comply with Chapter 23, the *International Fuel Gas Code* and NFPA 52 .
3. *Cryogenic fluids* shall comply with Chapter 55.

4. LP-gas shall comply with Chapter 61 and the *International Fuel Gas Code*.

SECTION 5302
~~DEFINITIONS~~ OTHER REQUIREMENTS

Delete without substitution:

~~**5302.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**COMPRESSED GAS.**~~

~~**COMPRESSED GAS CONTAINER.**~~

~~**COMPRESSED GAS SYSTEM.**~~

~~**NESTING.**~~

~~**TUBE TRAILER.**~~

Add new text as follows:

5302.1 Other hazards. In addition to the requirements of this chapter, the following material-specific requirements shall apply:

1. Compressed gases classified as hazardous materials shall comply with Chapter 50.
2. Flammable gases and flammable cryogenic fluids shall comply with Chapter 58.
3. Highly Toxic and Toxic Materials shall comply with Chapter 60.
4. Oxidizers, oxidizing gases and oxidizing cryogenic fluids shall comply with chapter 63.
5. Pyrophoric materials shall comply with Chapter 64.
6. Compressed hydrogen (CH2) shall comply with Chapters 23 and 58 and NFPA 2.
7. Cutting and welding gases shall comply with Chapter 35.

CHAPTER 54 CORROSIVE MATERIALS

SECTION 5401
GENERAL

Revise as follows:

5401.1 Scope.
The storage and use of *corrosive* materials shall be in accordance with this chapter. ~~*Compressed gases* shall also comply with Chapter 53.~~

Exceptions:

1. Display and storage in Group M and storage in Group S occupancies complying with Section 5003.11.
2. Stationary storage battery systems in accordance with Section 1207.
3. This chapter shall not apply to R-717 (ammonia) where used as a refrigerant in a refrigeration system (see Section 608).

SECTION 5402

~~DEFINITION~~ <u>OTHER REQUIREMENTS</u>

Delete without substitution:

~~**5402.1 Definition**~~**.**
~~The following term is defined in Chapter 2:~~
~~**CORROSIVE.**~~

Add new text as follows:

<u>**5402.1** **Compressed gases**</u>**.** <u>*Compressed gases* shall also comply with Chapter 53.</u>

CHAPTER 55 CRYOGENIC FLUIDS

SECTION 5501
GENERAL

Revise as follows:

5501.1 Scope.
Storage, use and handling of *cryogenic fluids* shall comply with this chapter and NFPA 55. ~~*Cryogenic fluids* classified as hazardous materials shall also comply with the general requirements of Chapter 50.~~ Partially full containers containing residual *cryogenic fluids* shall be considered as full for the purposes of the controls required.

Exceptions:

1. Fluids used as refrigerants in refrigeration systems (see Section 608).
2. Liquefied natural gas (LNG), which shall comply with NFPA 59A.

~~Oxidizing *cryogenic fluids*, including oxygen, shall comply with Chapter 63, as applicable.~~
~~Flammable *cryogenic fluids*, including hydrogen, methane and carbon monoxide, shall comply with Chapters 23 and 58, as applicable.~~

~~Inert *cryogenic fluids*, including argon, helium and nitrogen, shall comply with ANSI/CGA P-18.~~

5501.2 Permits.
Permits shall be required as set forth in Section 105.5.

Revise as follows:

SECTION 5502
~~DEFINITIONS~~ <u>OTHER REQUIREMENTS</u>

Delete without substitution:

~~**5502.1 Definitions**~~**.**
~~The following terms are defined in Chapter 2.~~
~~**CRYOGENIC CONTAINER.**~~

~~**CRYOGENIC FLUID.**~~

~~**CRYOGENIC VESSEL.**~~

~~**FLAMMABLE CRYOGENIC FLUID.**~~

~~**LOW-PRESSURE TANK.**~~

Add new text as follows:

5502.1 Other hazards. In addition to the requirements of this chapter, the following material-specific requirements shall apply:

1. Cryogenic fluids shall comply with NFPA 55.
2. Cryogenic fluids classified as hazardous materials shall comply with the general requirements of Chapter 50.
3. Oxidizing cryogenic fluids, including oxygen, shall comply with Chapter 63, as applicable.
4. Flammable cryogenic fluids, including hydrogen, methane and carbon monoxide, shall comply with Chapters 23 and 58, as applicable.
5. Inert cryogenic fluids, including argon, helium and nitrogen, shall comply with ANSI/CGA P-18.

CHAPTER 56 EXPLOSIVES AND FIREWORKS

Revise as follows:

SECTION 5602
~~DEFINITIONS~~ QUANTITIES AND DISTANCES

Delete without substitution:

~~**5602.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**AMMONIUM NITRATE.**~~

~~**BARRICADE.**~~

~~**Artificial barricade.**~~
~~**Natural barricade.**~~

~~**BARRICADED.**~~
~~**BLAST AREA.**~~

~~**BLAST SITE.**~~

~~**BLASTER.**~~

~~**BLASTING AGENT.**~~

~~**BULLET RESISTANT.**~~

~~**DETONATING CORD.**~~

~~**DETONATION.**~~

~~**DETONATOR.**~~

~~**DISCHARGE SITE.**~~

~~**DISPLAY SITE.**~~

~~**EXPLOSIVE.**~~

~~**High explosive.**~~
~~**Low explosive.**~~
~~**Mass-detonating explosives.**~~

~~UN/DOTn Class 1 explosives.~~
~~Division 1.1.~~
~~Division 1.2.~~
~~Division 1.3.~~
~~Division 1.4.~~
~~Division 1.5.~~
~~Division 1.6.~~

~~EXPLOSIVE MATERIAL.~~
~~FALLOUT AREA.~~

~~FIREWORKS.~~

~~Fireworks, 1.3G.~~
~~Fireworks, 1.4G.~~

~~FIREWORKS DISPLAY.~~
~~HIGHWAY.~~

~~INHABITED BUILDING.~~

~~MAGAZINE.~~

~~Indoor.~~
~~Type 1.~~
~~Type 2.~~
~~Type 3.~~
~~Type 4.~~
~~Type 5.~~

~~MORTAR.~~
~~NET EXPLOSIVE WEIGHT (net weight).~~

~~OPERATING BUILDING.~~

~~OPERATING LINE.~~

~~PLOSOPHORIC MATERIAL.~~

~~PROXIMATE AUDIENCE.~~

~~PUBLIC TRAFFIC ROUTE (PTR).~~

~~PYROTECHNIC ARTICLE.~~

~~PYROTECHNIC COMPOSITION.~~

~~PYROTECHNIC SPECIAL EFFECT.~~

~~PYROTECHNIC SPECIAL-EFFECT MATERIAL.~~

~~PYROTECHNICS.~~

~~QUANTITY-DISTANCE (Q-D).~~

~~Inhabited building distance (IBD).~~
~~Intermagazine distance (IMD).~~
~~Intraline distance (ILD) or Intraplant distance (IPD).~~

~~RAILWAY.~~
~~READY BOX.~~

~~SMALL ARMS AMMUNITION.~~

~~SMALL ARMS PRIMERS.~~

~~SMOKELESS PROPELLANTS.~~

~~**SPECIAL INDUSTRIAL EXPLOSIVE DEVICE.**~~

~~**THEFT RESISTANT.**~~

Revise as follows:

~~5601.8~~ 5602.1 Establishment of quantity of explosives and distances.
The quantity of *explosives* and distances shall be in accordance with Sections ~~5601.8.1~~5602.2 through ~~5601.8.1.4~~5602.3.4.

~~5601.8.1~~ 5602.2 Quantity of explosives.
The quantity-distance (Q-D) tables in Sections 5604.5 and 5605.3 shall be used to provide the minimum separation distances from potential explosion sites as set forth in Tables ~~5601.8.1(1)~~5602.2(1) through ~~5601.8.1(3)~~5602.2(3). The classification and the weight of the *explosives* are primary characteristics governing the use of these tables. ~~The net *explosive* weight shall be determined in accordance with Sections 5601.8.1.1 through 5601.8.1.4.~~

TABLE ~~5601.8.1(1)~~5602.2(1) APPLICATION OF QUANTITY-DISTANCE (Q-D) TABLES—DIVISION 1.1, 1.2 AND 1.5 EXPLOSIVES[a, b, c]

ITEM	MAGAZINE	OPERATING BUILDING	INHABITED BUILDING	PUBLIC TRAFFIC ROUTE
Inhabited building	IBD in Table 5604.5.2(1)	IBD in Table 5604.5.2(1)	Not Applicable	Not Applicable
Magazine	IMD in Table 5604.5.2(1)	ILD or IPD in Table 5605.3	IBD in Table 5604.5.2(1)	PTR in Table 5604.5.2(1)
Operating building	ILD or IPD in Table 5604.5.2(1)	ILD or IPD in Table 5605.3	IBD in Table 5604.5.2(1)	PTR in Table 5604.5.2(1)
Public traffic route	PTR in Table 5604.5.2(1)	PTR in Table 5604.5.2(1)	Not Applicable	Not Applicable

For SI: 1 foot = 304.8 mm.

a. The minimum separation distance shall be 60 feet. Where a building or magazine containing explosives is barricaded, the minimum distance shall be 30 feet.

b. Linear interpolation between tabular values in the referenced Q-D tables shall not be allowed. Nonlinear interpolation of the values shall be allowed subject to an *approved* technical opinion and report prepared in accordance with Section 104.2.2.

c. For definitions of quantity-distance abbreviations IBD, ILD, IMD, IPD and PTR, see Chapter 2.

TABLE ~~5601.8.1(2)~~5602.2(2) APPLICATION OF QUANTITY-DISTANCE (Q-D) TABLES—DIVISION 1.3 EXPLOSIVES[a, b, c]

ITEM	MAGAZINE	OPERATING BUILDING	INHABITED BUILDING	PUBLIC TRAFFIC ROUTE
Inhabited building	IBD in Table 5604.5.2(2)	IBD in Table 5604.5.2(2)	Not Applicable	Not Applicable
Magazine	IMD in Table 5604.5.2(2)	ILD or IPD in Table 5604.5.2(2)	IBD in Table 5604.5.2(2)	PTR in Table 5604.5.2(2)
Operating building	ILD or IPD in Table 5604.5.2(2)	ILD or IPD in Table 5604.5.2(2)	IBD in Table 5604.5.2(2)	PTR in Table 5604.5.2(2)
Public traffic route	PTR in Table 5604.5.2(2)	PTR in Table 5604.5.2(2)	Not Applicable	Not Applicable

For SI: 1 foot = 304.8 mm.

a. The minimum separation distance shall be not less than 50 feet.

b. Linear interpolation between tabular values in the referenced Q-D table shall be allowed.

c. For definitions of quantity-distance abbreviations IBD, ILD, IMD, IPD and PTR, see Chapter 2.

TABLE ~~5601.8.1(3)~~5602.2(3) APPLICATION OF QUANTITY-DISTANCE (Q-D) TABLES—DIVISION 1.4 EXPLOSIVES[a, b, c]

ITEM	MAGAZINE	OPERATING BUILDING	INHABITED BUILDING	PUBLIC TRAFFIC ROUTE
Inhabited building	IBD in Table 5604.5.2(3)	IBD in Table 5604.5.2(3)	Not Applicable	Not Applicable
Magazine	IMD in Table 5604.5.2(3)	ILD or IPD in Table 5604.5.2(3)	IBD in Table 5604.5.2(3)	PTR in Table 5604.5.2(3)
Operating building	ILD or IPD in Table 5604.5.2(3)	ILD or IPD in Table 5604.5.2(3)	IBD in Table 5604.5.2(3)	PTR in Table 5604.5.2(3)
Public traffic route	PTR in Table 5604.5.2(3)	PTR in Table 5604.5.2(3)	Not Applicable	Not Applicable

For SI: 1 foot = 304.8 mm.

a. The minimum separation distance shall be not less than 50 feet.

b. Linear interpolation between tabular values in the referenced Q-D table shall not be allowed.

c. For definitions of quantity-distance abbreviations IBD, ILD, IMD, IPD and PTR, see Chapter 2.

Add new text as follows:

5602.3 Net explosive weight. The net explosive weight of explosives shall be determined in accordance with Sections 5602.3.1 through 5602.3.4.

Revise as follows:

~~5601.8.1.1~~ 5602.3.1 Mass-detonating explosives (Division 11, 12 or 15).
The total net *explosive* weight of mass-detonating *explosives* (Division 1.1, 1.2 or 1.5) shall be used. See Table 5604.5.2(1) or Table 5605.3, as appropriate.

Exception: Where the TNT equivalence of the *explosive material* has been determined, the equivalence is allowed to be used to establish the net *explosive* weight.

~~5601.8.1.2~~ 5602.3.2 Nonmass-detonating explosives (excluding Division 14).
Nonmass-detonating *explosives* (excluding Division 1.4) shall be as follows:

1. Division 1.3 propellants. The total weight of the propellants alone shall be the net *explosive* weight. The net weight of propellant shall be used. See Table 5604.5.2(2).
2. Combinations of bulk metal powder and pyrotechnic compositions. The sum of the net weights of metal powders and pyrotechnic compositions in the containers shall be the net *explosive* weight. See Table 5604.5.2(2).

~~5601.8.1.3~~ 5602.3.3 Combinations of mass-detonating and nonmass-detonating explosives (excluding Division 14).
Combination of mass-detonating and nonmass-detonating *explosives* (excluding Division 1.4) shall be as follows:

1. Where Division 1.1 and 1.2 *explosives* are located in the same site, determine the distance for the total quantity considered first as 1.1 and then as 1.2. The required distance is the greater of the two. Where the Division 1.1 requirements are controlling and the TNT equivalence of the 1.2 is known, the TNT equivalent weight of the 1.2 items shall be allowed to be added to the total *explosive* weight of Division 1.1 items to determine the net *explosive* weight for Division 1.1 distance determination. See Table 5604.5.2(2) or 5605.3, as appropriate.
2. Where Division 1.1 and 1.3 *explosives* are located in the same site, determine the distances for the total quantity considered first as 1.1 and then as 1.3. The required distance is the greater of the two. Where the Division 1.1 requirements are controlling and the TNT equivalence of the 1.3 is known, the TNT equivalent weight of the 1.3 items shall be allowed to be added to the total *explosive* weight of Division 1.1 items to determine the net *explosive* weight for Division 1.1 distance determination. See Table 5604.5.2(1), 5604.5.2(2) or 5605.3, as appropriate.
3. Where Division 1.1, 1.2 and 1.3 *explosives* are located in the same site, determine the distances for the total quantity considered first as 1.1, next as 1.2 and finally as 1.3. The required distance is the greatest of the three. As allowed by Items 1 and 2, TNT equivalent weights for 1.2 and 1.3 items are allowed to be used to determine the net weight of *explosives* for Division 1.1 distance determination. Table 5604.5.2(1) or 5605.3 shall be used where TNT equivalency is used to establish the net *explosive* weight.
4. For composite pyrotechnic items Division 1.1 and Division 1.3, the sum of the net weights of the pyrotechnic composition and the *explosives* involved shall be used. See Tables 5604.5.2(1) and 5604.5.2(2).

~~5601.8.1.4~~ 5602.3.4 Moderate fire—no blast hazards (Division 14). For Division 1.4 *explosives*, the total weight of the *explosive material* alone is the net weight. The net weight of the *explosive material* shall be used.

5604.5.2 Outdoor magazines.
Outdoor magazines other than Type 3 shall be located so as to comply with Table 5604.5.2(2) or 5604.5.2(3) as set forth in Tables

~~5601.8.1(1)~~ 5602.2(1) through ~~5601.8.1(3)~~5602.2.(3). Where a magazine or group of magazines, as described in Section 5604.5.2.2, contains different classes of *explosive materials*, and Division 1.1 materials are present, the required separations for the magazine or magazine group as a whole shall comply with Table 5604.5.2(2).

5605.4 Separation of manufacturing operating buildings from inhabited buildings, public traffic routes and magazines.
Where an operating building on an *explosive materials* plant site is designed to contain *explosive materials*, such a building shall be located away from inhabited buildings, public traffic routes and magazines in accordance with Table 5604.5.2(2) or 5604.5.2(3) as appropriate, based on the maximum quantity of *explosive materials* permitted to be in the building at one time (see Section ~~5601.8~~5602).

Exception: Fireworks manufacturing buildings constructed and operated in accordance with NFPA 1124.

5605.4.1 Determination of net explosive weight for operating buildings.
In addition to the requirements of Section ~~5601.8~~5602 to determine the net *explosive* weight for materials stored or used in operating buildings, quantities of *explosive materials* stored in magazines located at distances less than intraline distances from the operating building shall be added to the contents of the operating building to determine the net *explosive* weight for the operating building.

CHAPTER 57 FLAMMABLE AND COMBUSTIBLE LIQUIDS

Revise as follows:

SECTION 5702
~~DEFINITIONS~~ CLASSIFICATION OF MATERIALS

Delete without substitution:

~~**5702.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**ALCOHOL-BASED HAND RUB.**~~

~~**BULK PLANT OR TERMINAL.**~~

~~**BULK TRANSFER.**~~

~~**COMBUSTIBLE LIQUID.**~~

~~**Class II.**~~

~~**Class IIIA.**~~

~~**Class IIIB.**~~

~~**FIRE POINT.**~~

~~**FLAMMABLE LIQUID.**~~

~~**Class IA.**~~

~~**Class IB.**~~

~~**Class IC.**~~

~~**FLASH POINT.**~~

~~**FUEL LIMIT SWITCH.**~~

~~**LIQUID STORAGE ROOM.**~~

~~**LIQUID STORAGE WAREHOUSE.**~~

~~**MOBILE FUELING.**~~

~~**PROCESS TRANSFER.**~~

~~**REFINERY.**~~

~~**REMOTE EMERGENCY SHUTOFF DEVICE.**~~

~~**REMOTE SOLVENT RESERVOIR.**~~

~~**SOLVENT DISTILLATION UNIT.**~~

~~**TANK, PRIMARY.**~~

Revise as follows:

~~5701.5~~ 5702.1 Material classification.
Flammable and *combustible liquids* shall be classified in accordance with the definitions in Chapter 2.
~~When mixed with lower flash-point liquids, Class II or III liquids are capable of assuming the characteristics of the lower flash-point liquids. Under such conditions, the appropriate provisions of this chapter for the actual *flash point* of the mixed liquid shall apply.~~

~~When heated above their *flash points*, Class II and III liquids assume the characteristics of Class I liquids. Under such conditions, the appropriate provisions of this chapter for *flammable liquids* shall apply.~~

Add new text as follows:

5702.2 Mixtures. When mixed with lower flash-point liquids, Class II or III liquids are capable of assuming the characteristics of the lower flash-point liquids. Under such conditions, the appropriate provisions of this chapter for the actual *flash point* of the mixed liquid shall apply.

5702.3 Heated liquids. Where heated above their *flash points*, Class II and III liquids assume the characteristics of Class I liquids. Under such conditions, the appropriate provisions of this chapter for *flammable liquids* shall apply.

CHAPTER 58 FLAMMABLE GASES AND FLAMMABLE CRYOGENIC FLUIDS

SECTION 5801 GENERAL

Revise as follows:

5801.1 Scope.
The storage and use of flammable gases and flammable *cryogenic fluids* shall be in accordance with this chapter, NFPA 2 and NFPA 55. ~~*Compressed gases* shall also comply with Chapter 53 and *cryogenic fluids* shall also comply with Chapter 55. Flammable *cryogenic fluids* shall comply with Section 5806. Hydrogen motor fuel-dispensing stations and repair garages and their associated above-ground hydrogen storage systems shall also be designed, constructed and maintained in accordance with Chapter 23.~~

Exceptions:

1. Gases used as refrigerants in refrigeration systems (see Section 608).
2. Liquefied petroleum gases and natural gases regulated by Chapter 61.
3. Fuel-gas systems and appliances regulated under the *International Fuel Gas Code* other than gaseous hydrogen systems and appliances.
4. *Pyrophoric* gases in accordance with Chapter 64.

SECTION 5802 ~~DEFINITIONS~~ OTHER REQUIREMENTS

Delete without substitution:

~~**5802.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**FLAMMABLE GAS.**~~

~~**FLAMMABLE LIQUEFIED GAS.**~~

~~**GAS DETECTION SYSTEM.**~~

~~**GASEOUS HYDROGEN SYSTEM.**~~

~~**HYDROGEN FUEL GAS ROOM.**~~

~~**METAL HYDRIDE.**~~

~~**METAL HYDRIDE STORAGE SYSTEM.**~~

Add new text as follows:

5802.1 Other hazards. In addition to the requirements of this chapter, the following material-specific requirements shall apply:

1. Compressed gases shall comply with Chapter 53.
2. Cryogenic fluids shall comply with Chapter 55.
3. Hydrogen motor fuel-dispensing stations and repair garages and their associated above-ground hydrogen storage systems shall comply with Chapter 23.

CHAPTER 59 FLAMMABLE SOLIDS

Delete without substitution:

~~SECTION 5902 DEFINITIONS~~

~~**5902.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**FLAMMABLE SOLID.**~~

~~**MAGNESIUM.**~~

CHAPTER 60 HIGHLY TOXIC AND TOXIC MATERIALS

Revise as follows:

6001.1 Scope.
The storage and use of highly toxic and toxic materials shall comply with this chapter. ~~*Compressed gases* shall also comply with Chapter 53.~~

Exceptions:

1. Display and storage in Group M and storage in Group S occupancies complying with Section 5003.11.

2. Conditions involving pesticides or agricultural products as follows:
   2.1. Application and release of pesticide, agricultural products and materials intended for use in weed abatement, erosion control, soil amendment or similar applications when applied in accordance with the manufacturer's instruction and label directions.
   2.2. Transportation of pesticides in compliance with the Federal Hazardous Materials Transportation Act and regulations thereunder.
   2.3. Storage in *dwellings* or private garages of pesticides registered by the US Environmental Protection Agency to be utilized in and around the home, garden, pool, spa and patio.

SECTION 6002
~~DEFINITIONS~~ OTHER REQUIREMENTS

Delete without substitution:

~~**6002.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**CONTAINMENT SYSTEM.**~~

~~**CONTAINMENT VESSEL.**~~

~~**EXCESS FLOW VALVE.**~~

~~**HIGHLY TOXIC.**~~

~~**OZONE-GAS GENERATOR.**~~

~~**PHYSIOLOGICAL WARNING THRESHOLD.**~~

~~**REDUCED FLOW VALVE.**~~

~~**TOXIC.**~~

Add new text as follows:

6002.1 Compressed gases. *Compressed gases* shall also comply with Chapter 53.

CHAPTER 61 LIQUEFIED PETROLEUM GASES

SECTION 6101
GENERAL

Revise as follows:

6101.1 Scope.
Storage, handling and transportation of liquefied petroleum gas (LP-gas) and the installation of LP-gas equipment pertinent to systems for such uses shall comply with this chapter and NFPA 58. ~~Properties of LP-gases shall be determined in accordance with Appendix B of NFPA 58.~~

SECTION 6102
~~DEFINITIONS~~ LP-gas

Delete without substitution:

~~**6102.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**LIQUEFIED PETROLEUM GAS (LP-gas).**~~

~~**LP-GAS CONTAINER.**~~

Add new text as follows:

6102.1 Properties. Properties of LP-gases shall be determined in accordance with Appendix B of NFPA 58.

CHAPTER 62 ORGANIC PEROXIDES

SECTION 6201 GENERAL

Revise as follows:

6201.1 Scope.
The storage and use of *organic peroxides* shall be in accordance with this chapter and Chapter 50.
~~Unclassified detonable *organic peroxides* that are capable of *detonation* in their normal shipping containers under conditions of fire exposure shall be stored in accordance with Chapter 56.~~

SECTION 6202 ~~DEFINITION~~ OTHER REQUIREMENTS

Delete without substitution:

~~**6202.1 Definition.**~~
~~The following term is defined in Chapter 2:~~
~~**ORGANIC PEROXIDE.**~~

- ~~**Class I.**~~
- ~~**Class II.**~~
- ~~**Class III.**~~
- ~~**Class IV.**~~
- ~~**Class V.**~~
- ~~**Unclassified detonable.**~~

Add new text as follows:

6202.1 Detonable organic peroxides. Unclassified detonable *organic peroxides* that are capable of *detonation* in their normal shipping containers under conditions of fire exposure shall be stored in accordance with Chapter 56.

CHAPTER 63 OXIDIZERS, OXIDIZING GASES AND OXIDIZING CRYOGENIC FLUIDS

SECTION 6301

GENERAL

Revise as follows:

6301.1 Scope.
The storage and use of oxidizing materials shall be in accordance with this chapter and Chapter 50. ~~Oxidizing gases shall also comply with Chapter 53. Oxidizing *cryogenic fluids* shall also comply with Chapter 55.~~

Exceptions:

1. Display and storage in Group M and storage in Group S occupancies complying with Section 5003.11.
2. Bulk oxygen systems at industrial and institutional consumer sites shall be in accordance with NFPA 55.
3. Liquid oxygen stored or used in home health care in Group I-1, I-4 and R occupancies in accordance with Section 6306.

SECTION 6302
~~DEFINITIONS~~ OTHER REQUIREMENTS

Delete without substitution:

~~**6302.1 Definitions.**~~
~~The following terms are defined in Chapter 2:~~
~~**BULK OXYGEN SYSTEM.**~~

~~**LIQUID OXYGEN AMBULATORY CONTAINER.**~~

~~**LIQUID OXYGEN HOME CARE CONTAINER.**~~

~~**OXIDIZER.**~~

~~**Class 4.**~~
~~**Class 3.**~~
~~**Class 2.**~~
~~**Class 1.**~~

~~**OXIDIZING CRYOGENIC FLUID.**~~
~~**OXIDIZING GAS.**~~

Add new text as follows:

6302.1 **Other hazards.** In addition to the requirements of this chapter, the following material-specific requirements shall apply:

1. Oxidizing gases shall comply with Chapter 53.
2. Oxidizing cryogenic fluids shall comply with Chapter 55.

CHAPTER 64 PYROPHORIC MATERIALS

SECTION 6401
GENERAL

Revise as follows:

6401.1 Scope.

The storage and use of *pyrophoric* materials shall be in accordance with this chapter. ~~*Compressed gases* shall also comply with Chapter 53.~~

SECTION 6402
~~DEFINITION~~ OTHER REQUIREMENTS

Delete without substitution:

~~**6402.1 Definition.**~~
~~The following term is defined in Chapter 2:~~
~~**PYROPHORIC.**~~

Add new text as follows:

6402.1 **Compressed gases.** *Compressed gases* shall also comply with Chapter 53.

CHAPTER 65 PYROXYLIN (CELLULOSE NITRATE) PLASTICS

SECTION 6501
GENERAL

Revise as follows:

6501.1 Scope.
This chapter shall apply to the storage and handling of plastic substances, materials or compounds with cellulose nitrate (pyroxylin) as a base, by whatever name known, in the form of blocks, sheets, tubes or fabricated shapes.
~~Cellulose nitrate (pyroxylin) motion picture film shall comply with the requirements of Section 306.~~

SECTION 6502
~~DEFINITIONS~~ OTHER REQUIREMENTS

Delete without substitution:

~~**6502.1 Terms defined in Chapter 2.**~~
~~Words and terms used in this chapter and defined in Chapter 2 shall have the meanings ascribed to them as defined therein.~~

Add new text as follows:

6502.1 **Cellulose nitrate (pyroxylin) film.** Cellulose nitrate (pyroxylin) motion picture film shall comply with Section 306.

CHAPTER 66 UNSTABLE (REACTIVE) MATERIALS

SECTION 6601
GENERAL

Revise as follows:

6601.1 Scope.
The storage and use of unstable (reactive) materials shall be in accordance with this chapter. ~~*Compressed gases* shall also comply with Chapter 53.~~

Exceptions:

1. Display and storage in Group M and storage in Group S occupancies complying with Section 5003.11.
2. Detonable unstable (reactive) materials shall be stored in accordance with Chapter 56.

SECTION 6602
~~DEFINITION~~ OTHER REQUIREMENTS

Delete without substitution:

~~**6602.1 Definition.**~~
~~The following term is defined in Chapter 2:~~
~~**UNSTABLE (REACTIVE) MATERIAL.**~~

~~**Class 4.**~~
~~**Class 3.**~~
~~**Class 2.**~~
~~**Class 1.**~~

Add new text as follows:

6602.1 Compressed gases. *Compressed gases* shall also comply with Chapter 53.

CHAPTER 67 WATER-REACTIVE SOLIDS AND LIQUIDS

Delete without substitution:

~~SECTION 6702~~
~~DEFINITION~~

~~**6702.1 Definition.**~~
~~The following term is defined in Chapter 2:~~
~~**WATER-REACTIVE MATERIAL.**~~

~~**Class 3.**~~
~~**Class 2.**~~
~~**Class 1.**~~

Reason: The intent of this proposal is to remove the lists of defined terms included within each chapter of the IFC. The list of definitions is found in the XX02 sections, and provides no useful information other a list of defined terms.

In the 2012 IFC, all the definitions were consolidated into Chapter 2. The lists of terms in the XX02 sections are vestiges of the previous format where the definitions appeared in each chapter. At one time, the XX02 sections contained terms which had a definition specific to a given chapter and only applicable within that chapter. The reformatting which moved all defined terms to Chapter 2 results in chapter-specific definitions no longer being an option. The lists of defined terms have not been maintained with a correct correlation to the new defined terms added to Chapter 2 and do not even contain all the defined terms used in each chapter. More importantly, when the code user seeks a definition, they do not refer to the XX02 sections, they return to Chapter 2 where the definitions are found.

The IBC removed the XX02 sections in the 2018 edition and there has been no negative consequence. The XX02 sections in the IFC no longer provide any guidance or assistance to the code user. It is time to remove these lists from the IFC. Rather than renumber every section in the code, it has been attempted to repurpose the XX02 section by relocating some criteria from within each chapter.

Ch 3 – Permit requirements are moved to Section 302.

Ch 4 – Sections 401.2 through 401.8 relocated to Section 402 Emergency Procedures.

Ch 5 – Section 501.4 Timing of Installation is moved to Section 502. New Section 502.1 contains provisions for access roads and water supply. The second sentence is deleted because it is duplicated in Section 505.2, and therefore unnecessary.

Ch 6 – Sections 601.2 and 601.2.1 are moved to 602 Unsafe Conditions.

Ch 7 – Section 702.1 is inserted to address all types of construction and refer to the specific IBC sections appropriate for the construction of each component. Sections 701.2 through 701.2.1 addressing fire-resistant and smoke-resistant construction are relocated to follow Section 702.1.

Ch 8 – Two sentences from Section 801.1 dealing with application to new and existing buildings are relocated to Section 802 and separated into two separate sections.

Ch 9 – Relocated provisions from Section 901.4.7 Fire Pump Rooms and Riser Rooms to Section 902. This matches the text in the IBC.

Ch 10 – Added provisions for maintenance and fire safety/evacuation plans to Section 1002. These new sections are similar to the current text in the IBC.

Ch 11 – Relocated Section 1101.4 for notification of the owner and scheduling to Section 1102.

Ch 12 – Relocated Section 1201.3 Mixed Systems to Section 1202.

Ch 20 – Relocated Section 2001.2 Regulations Not Covered to Section 2002.

Ch 21 – Section 2102 is deleted and the chapter is renumbered.

Ch 22 – Relocated Section 2204 Dust Explosion Screening Test is moved to Section 2202. References to 2205 are corrected to 2204. Section 2205 to be renumbered.

Ch 23 – Relocated Section 2301.3 to Section 2302.

Ch 24 – Relocated Section 2410 Floor Surfacing and Finishing Operations to Section 2402.

Ch 25 – Section 2506 Ethylene Generators is relocated to 2502. Section 2501.3 is deleted since it states that “approved” ethylene generators must comply with Section 2506, and Section 2506.1 new Section 2502.1) states all ethylene generators must be listed and approved. Therefore, all equipment must be approved, and Section 2501.3 provides no additional information or requirements.

Ch 26 – Relocated Section 2603.3 for safety and notification to Section 2602. Section 2602.4 contains provisions that were previously in Sections 2603.3.5 and 2603.3.4. They both address evacuation, one during fumigation and the other during fogging. These two sections are combined into one section. The remainder of Section 2603 is renumbered.

Ch 27 – Relocated Sections 2701.2 and 2701.4 for application to Section 2702 Application.

Ch 28 – Section 2801.2 to relocated to Section 2802.

Ch 29 – Section 2901.3 is relocated to Section 2902 Maintenance.

Ch 30 – Second sentence from Section 3001.1 is relocated to Section 3002. The reference to complying with “this chapter” is deleted in the new section 3002.1 because it is already stated in Section 3001.1.

Ch 31 – Relocated 5 sentences to Section 3102. New Section 3102 addresses application to specific operations. The items were editorially reformatted to clarify the sections applicable to temporary tents and structures versus permanent tents and membrane structures.

Ch 32 – Sections 3201.3 through 3201.4 are relocated to Section 3202 Documentation.

Ch 33 – Sections 3303.1 are relocated to Section 3302 Safety Plan.

Ch 34 – The last sentence of Section 3401.1 is reworded and becomes Section 3402.

Ch 35 – Sections 3501.3 and 3501.4 are relocated to Section 3502 Other Requirements.

Ch 36 – Section 3601.2 Plans and Approvals is relocated to Section 3602.

Ch 37 – Section 3701.2 is relocated to Section 3702 Applicability.

Ch 38 – Section 3801.2 is relocated to Section 3702 Application. The section is separated into 2 sections. Section 3802.1 addresses the provisions in Ch 38 as being revisions to other requirements in the code. Section 3802.2 addresses the requirements applicable for materials below the MAQ.

Ch 39 – Section 3901.2 is relocated to Section 3902 Application, and separated into 2 sections. Section 3902.1 addresses existing buildings and facilities. Section 3902.2 addresses existing processes and changes in the extraction medium.

Ch 40 – Section 4001.1.1 is relocated to Section 4002 Nonapplicability.

Ch 41 – Section 4102 is created. Section 4101.3 becomes 4102.1 and the entire chapter is renumbered.

Ch 50 – Section 5001.3 is relocated to Section 5002 Performance-based Design. Subsections of 5001 are renumbered and referenced sections revised to match new Section 5002.

Ch 51 – Section 5101.4 is relocated to Section 5102 Aerosol Containers.

Ch 53 – Second and third paragraphs in Section 5301.1 are relocated to Section 5302 Other Regulations. Items 2 through 5 are editorially revised to correlate the format.

Ch 54 – Second sentence in Section 5401.1 is relocated to Section 5402 Other Requirements.

Ch 55 – Second sentence in Section 5501.1 regarding haz mat is relocated to Section 5502 Other Regulations. Also, the last 3 paragraphs of Section 5501.1 are also relocated to Section 5502 and editorially revised to correlate the format.

Ch 56 – Sections 5601.8.1 through 5601.8.1.4 are relocated to Section 5602 Quantities and Distances. Section 5602.3 is added as a charging section for the subsections dealing with the weight of explosives. Other sections throughout the chapter are revised to reference the correct sections.

Ch 57 – Section 5701.5 is relocated to Section 5702 Material Classification. Each paragraph is separated into a separate subsection, dealing with mixtures and liquids heated above the flash point.

Ch 58 – The second and fourth sentences of Section 5801.1 are relocated to Section 5802 Other Requirements and separated into individual items. The items are editorially revised to correlate the format. The third sentence of Section 5801.1 is deleted since it simply referencing a section in this chapter. The first sentence already says these materials need to comply.

Ch 59 – Section 5902 is deleted. The remainder of the chapter is to be renumbered.

Ch 60 – The last sentence of Section 6001.1 is relocated to Section 6002 Other Requirements.

Ch 61 – The last sentence from Section 6101.1 is relocated to Section 6102 LP-gas.

Ch 62 – The second paragraph from Section 6201.1 is relocated to Section 6202 Other Requirements.

Ch 63 – The last sentence from Section 6301.1 is relocated to Section 6302 Other Requirements.

Ch 64 – The last sentence from Section 6401.1 is relocated to Section 6402 Other Requirements.

Ch 65 – The second paragraph from Section 6501.1 is relocated to Section 6502 Other Requirements.

Ch 66 – The last sentence from Section 6601.1 is relocated to Section 6602 Other Requirements.

Ch 67 – Section 6702 is deleted. The remainder of the chapter would be renumbered.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal deletes the XX02 sections (definitions) in each chapter with other text relocated from elsewhere in the chapter. In some cases, the text is editorially revised to make the sections correlate. No new requirements are created.

F1-24

F2-24

IFC: 301.2, 501.2, 501.3, 901.2, 901.3, 901.6.3, 901.6.3.1, 901.5, 1101.3, 2001.3, 2101.2, 2201.2, 2301.2, 2301.3, 2401.3, 2501.2, 2601.2, 2701.5, 2801.2, 2901.2, 3001.2, 3103.2, 3201.2, 3201.3.1, 3401.2, 3501.2, 3601.2, 3701.3, 3901.3, 5001.5, 5101.2, 5301.2, 5501.2, 5601.2, 5701.4, 5801.2, 5901.2, 6001.2, 6101.2, 6201.2, 6301.2, 6401.2, 6501.2, 6601.2, 6701.2

Proponents: Steven Orlowski, Sundowne Building Code Consultants, LLC, Self (sorlowski@sbcc.codes); Robert Marshall, San Mateo Consolidated Fire Department, International Association of Fire Chiefs- Fire and Life Safety Section (rmarshall@smcfire.org)

2024 International Fire Code

Delete without substitution:

~~**301.2 Permits.**~~
~~Permits shall be required as set forth in Section 105.5 for the activities or uses regulated by Sections 306, 307, 308, 315, 320 and 321.~~

~~**501.2 Permits.**~~
~~A permit shall be required as set forth in Sections 105.5 and 105.6.~~

~~**501.3 Construction documents.** *Construction documents* for proposed fire apparatus access, location of *fire lanes*, security gates across fire apparatus access roads and *construction documents* and hydraulic calculations for fire hydrant systems shall be submitted to the fire department for review and approval prior to construction.~~

~~**901.2 Construction documents.**~~
~~The *fire code official* shall have the authority to require *construction documents* and calculations for all *fire protection* and *life safety systems* and to require permits be issued for the installation, rehabilitation or modification of any *fire protection* and *life safety systems. Construction documents* for *fire protection* and *life safety systems* shall be submitted for review and approval prior to system installation.~~

~~**901.3 Permits.**~~
~~Permits shall be required as set forth in Sections 105.5 and 105.6.~~

~~**901.6.3 Records.** Records of all system inspections, tests and maintenance shall be maintained in accordance with Section 110.3.~~

~~**901.6.3.1 Records information.** Initial records shall include the name of the installation contractor, type of components installed, manufacturer of the components, location and number of components installed per floor. Records shall include the manufacturers' operation and maintenance instruction manuals. Such records shall be maintained for the life of the installation.~~

~~**901.5 Administration of installation acceptance testing.**~~
~~Fire protection and *life safety* systems and appurtenances thereto shall be subject to acceptance tests as contained in the installation standards and as *approved* by the *fire code official*. The *fire code official* shall be notified before any required acceptance testing.~~

~~**1101.3 Permits.**~~
~~Permits shall be required as set forth in Sections 105.5 and 105.6 and the *International Building Code*.~~

~~**2001.3 Permits.**~~
~~For permits to operate aircraft-refueling vehicles, application of flammable or combustible finishes and hot work, see Section 105.5.~~

~~**2101.2 Permit required**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**2201.2 Permits**~~**.**

~~Permits shall be required for *combustible dust* producing operations as set forth in Section 105.5.~~

~~**2301.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**2301.3 Construction documents**~~**.**

~~*Construction documents* shall be submitted for review and approval prior to the installation or construction of automotive, marine or fleet vehicle motor fuel-dispensing facilities and repair garages in accordance with Section 106.1.~~

~~**2401.3 Permits**~~**.**

~~Permits shall be required as set forth in Sections 105.5 and 105.6.~~

~~**2501.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**2601.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**2701.5 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**2801.2 Permit**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**2901.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**3001.2 Permits**~~**.**

~~Permits shall be required as set forth in Sections 105.5 and 105.6.~~

~~**3103.2 Approval required**~~**.**

~~*Tents* and *membrane structures* required to have a permit, as set forth in Sections 105.5 and 105.6, shall not be erected, operated or maintained for any purpose without first obtaining a permit and approval from the *fire code official*.~~

~~**3201.2 Permits**~~**.**
~~A permit shall be required as set forth in Sections 105.5 and 105.6.~~

~~**3201.3.1 Approved construction documents.** Following approval of the *construction documents*, a copy of the *approved* plans shall be maintained on the premises in an *approved* location.~~

~~**3401.2 Permit required**~~**.**
~~Permits shall be required as set forth in Section 105.5.~~

~~**3501.2 Permits**~~**.**
~~Permits shall be required as set forth in Section 105.5.~~

~~**3601.2 Plans and approvals.** Plans for marina fire protection facilities shall be *approved* prior to installation. The work shall be subject to final inspection and approval after installation.~~

~~**3701.3 Permits**~~**.**
~~Permits shall be required as set forth in Section 105.5.~~

~~**3901.3 Permits**~~**.**
~~Permits shall be required as set forth in Sections 105.5 and 105.6.~~

Revise as follows:

5001.5 ~~Permits~~<u>Facility Closure Plan</u>.
~~Permits shall be required as set forth in Sections 105.5 and 105.6.~~
Where required by the *fire code official*, permittees shall apply for approval to permanently close a storage, use or handling facility. Such application shall be submitted not less than 30 days prior to the termination of the storage, use or handling of hazardous materials. The *fire code official* is authorized to require that the application be accompanied by an *approved* facility closure plan in accordance with Section 5001.6.3.

Delete without substitution:

~~**5101.2 Permit required**~~**.**
~~Permits shall be required as set forth in Section 105.5.~~

~~**5301.2 Permits**~~**.**
~~Permits shall be required as set forth in Section 105.5.~~

~~**5501.2 Permits**~~**.**
~~Permits shall be required as set forth in Section 105.5.~~

~~**5601.2 Permit required**~~**.**
~~Permits shall be required as set forth in Section 105.5 and regulated in accordance with this section.~~

~~**5701.4 Permits**~~**.**

~~Permits shall be required as set forth in Sections 105.5 and 105.6.~~

~~**5801.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**5901.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**6001.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

Revise as follows:

6101.2 Permits <u>for filling LP-gas continers</u>.

~~Permits shall be required as set forth in Sections 105.5 and 105.6.~~

Distributors shall not fill an LP-gas container for which a permit is required unless a permit for installation has been issued for that location by the *fire code official*.

Delete without substitution:

~~**6201.2 Permits**~~**.**

~~Permits shall be required for organic peroxides as set forth in Section 105.5.~~

~~**6301.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**6401.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**6501.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**6601.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

~~**6701.2 Permits**~~**.**

~~Permits shall be required as set forth in Section 105.5.~~

Reason: There are several sections throughout many chapters in the International Fire Code, which require permits needing to comply with Section 105 and construction documents complying with Section 106. The purpose of this proposal is to remove the redundancy and the pointers as they are not necessary. This proposal does acknowledge that in some chapters the requirements are different than the general permitting requirements, such as Chapter 50 and Chapter 61 (Section 5001.2 requires a permit for facility closures and Section 6101.2 requires permits for filling LP-gas containers, both of which are not listed in section 105). This proposal is strictly editorial in nature and does not remove the code officials ability to require permits.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal removes redundant pointers in several chapter of the IFC, that point back to section 105 and 106 for permitting and construction document requirements. This proposal is editorial in nature and has no cost impact on construction.

F2-24

F3-24

IFC: 105.5.2

Proponents: William Koffel, Koffel Associates, Inc., Household & Consumer Products Association (HCPA) (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

105.5.2 Aerosol products, aerosol cooking spray products, plastic aerosol 2 products, and plastic aerosol 3 products.
An operational permit is required to manufacture, store or handle an aggregate quantity of Level 2 or Level 3 aerosol products, aerosol cooking spray products, plastic aerosol 2 products, or plastic aerosol 3 products in excess of 500 pounds (227 kg) net weight.

Reason: Adding plastic aerosol 2 products to the permit requirements is consistent with other proposed changes to the IFC and the current edition of NFPA 30B.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The requirement is for an operational permit which should not impact the cost of construction.

F3-24

F4-24

IFC: 105.5.14

Proponents: William Koffel, Koffel Associates, Inc., California Solar and Storage Association (CALSSA) (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

105.5.14 Energy storage systems.
An operational permit is required for ~~stationary and~~ mobile energy storage systems regulated by Section 1207.

Reason: While the need for an operational permit for mobile ESS is understandable, there do not appear to be any operational considerations with a stationary ESS. The construction permit required by Section 105.6 adequately addresses stationary ESS. CALSSA members have reported that only a few, if any, fire officials are issuing operational permits for stationary ESS.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00 Cost will decrease.

Estimated Immediate Cost Impact Justification (methodology and variables):

Eliminating the need for an operational permit for stationary ESS will decrease the cost of such systems. Operational permits are also not related to construction costs.

F4-24

F5-24

IFC: 105.5.36

Proponents: Scott Plumer, Arvada Fire Protection District, Arvada Fire Protection District

2024 International Fire Code

Revise as follows:

105.5.36 Open burning. An operational permit is required for the kindling or maintaining of an open fire or a fire on any public street, alley, road, or other public or private ground. Instructions and stipulations of the permit shall be complied with.

Exception: *Recreational fires* and *portable outdoor fireplaces*.

Reason: This proposal adds an exception for *portable outdoor fireplaces* to the open burning requirements. There is no need to require permits for these appliances since the code already requires they be used according to the manufacturer instructions.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal will not affect the cost of construction as it is a clarification only.

F5-24

F6-24

IFC: 105.5.58 (New)

Proponents: Scott Eckstein, Richardson Fire Department, Richardson Fire Department (scott.eckstein@cor.gov)

2024 International Fire Code

Add new text as follows:

105.5.58 Indoor Assembly Events. An operational permit is required to conduct an *indoor assembly event* where planned attendance exceeds 500 persons.

Exception: When the *indoor assembly event* is utilized as part of a Group A occupancy and for the purpose of religious worship.

Reason: Crowd managers are required per 403.11.3 (IFC 2021) for outdoor events over 1,000 people and for indoor assemblies events over 500 people. Indoor events are becoming more prevalent in assembly and educational occupancies that are not connected to religious worship. These indoor events frequently do not fall under the use of carnival, trade show, exhibitition or other types of gathering.

The code should be updated to include the use of an operational permit for indoor assembly events when a crowd manager would otherwise be required.

Bibliography: This alteration is conceptual in nature and is meant to address when a permit is required for indoor assembly events when a crowd manager is already required, but no permit exists.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no real cost impact to developers or organizers. Frequently fire departments are already involved and provide safety information to organizers when the indoor assembly event exceeds a certain size.

F6-24

F7-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com)

2024 International Fire Code

Revise as follows:

AEROSOL PRODUCT. A combination of a container, a propellant and a material that is dispensed. Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated Level ~~1, Level 2 or Level 3.~~3, Level 2 or Level 1.

~~Level 1 aerosol products~~ Level 3. ~~Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb) (20 kJ/g)~~. An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb (30 kJ/g)..

~~Level 2 aerosol products~~ Level 2. An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes:Those with a total chemical heat of combustion that is greater than 8,600 Btu/lb (20 kJ/g), but less than or equal to 13,000 Btu/lb (30 kJ/g).

~~Level 3 aerosol products~~ Level 1. ~~Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb (30 kJ/g).~~ An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 3). Where the GHS category is not known, the following is acceptable for classification purposes: Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb) (20 kJ/g).

2024 International Building Code

Revise as follows:

[F] AEROSOL PRODUCT. A combination of a container, a propellant and a material that is dispensed. Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated Level ~~1, Level 2 or Level~~ 3, Level 2 or Level 1.

~~Level 1 aerosol products~~ Level 3. ~~Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb) (20 kJ/g)~~. An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb (30 kJ/g).

~~Level 2 aerosol products~~ Level 2. An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes:Those with a total chemical heat of combustion that is greater than 8,600 Btu/lb (20 kJ/g), but less than or equal to 13,000 Btu/lb (30 kJ/g).

~~Level 3 aerosol products~~ Level 1. ~~Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb (30 kJ/g).~~ An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 3). Where the GHS category is not known, the following is acceptable for classification purposes: Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb) (20 kJ/g).

Reason:
Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

For consistency with other Hazardous Materials classifications throughout the I-codes, this proposal re-orders the Aerosol products to list the highest hazard materials first (Level 3), followed in order by reduced level of hazard, ending with the least hazardous material (Level 1).

Aerosol definitions are similar between IFC and GHS, with the same cut-off values for heat of combustion. However, GHS definitions of aerosols include additional testing criteria including ignition distance tests and percentage of flammable components. Minimal changes are anticipated by using the proposed definitions.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F7-24

F8-24

IFC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

AIRCRAFT OPERATION AREA (AOA). Any area used or intended for use for the parking, taxiing, takeoff, landing or other ground-based or water-based aircraft activity.

AIRPORT. An area of land, water, or structural surface that is used, or intended for use, for the landing and taking off of aircraft with an overall length greater than 39 feet (11 887 mm) and an overall exterior fuselage width greater than 6.6 feet (2012 mm), and any appurtenant areas that are used or intended for use for airport buildings and other airport facilities.

Reason: The intent of the code was always to apply to seaplane facilities as well as land based plane facilities. The change clarifies the intent of the code.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The change is a clarification that seaplane facilities are included as part of these defined terms.

F8-24

F9-24

IFC: SECTION 202 (New); IBC: SECTION 202 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Add new definition as follows:

ASPHYXIANT. A gas or vapor that displaces oxygen in the ambient atmosphere and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death. These materials are categorized under OSHA (29 CFR 1910.1200) as a Simple Asphyxiant.

ASPHYXIANT, SIMPLE. An asphyxiant that, within the context of this code, exhibits no other health hazard or physical hazard. Examples of simple asphyxiants include nitrogen, argon, and helium.

2024 International Building Code

Add new definition as follows:

ASPHYXIANT. A gas or vapor that displaces oxygen in the ambient atmosphere and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death. These materials are categorized under OSHA (29 CFR 1910.1200) as a Simple Asphyxiant.

ASPHYXIANT, SIMPLE. An asphyxiant that, within the context of this code, exhibits no other health hazard or physical hazard. Examples of simple asphyxiants include nitrogen, argon, and helium.

Reason: Both asphyxiants and simple asphyxiants are terms used in the IFC, but neither is currently defined.

The proposed definition of simple asphyxiant is consistent with its use in the IFC and the definition currently provided in NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response, in that a simple asphyxiant must present no health or physical hazard other than asphyxiation.

The Globally Harmonized System (GHS) of classification does not define these terms, but under OSHA's Hazard Communication Standard, simple asphyxiants may also exhibit physical hazards. Liquefied flammable gases are materials considered to be simple asphyxiants under OSHA but not the IFC. When this term appears in Safety Data Sheets (SDS) for materials, it can be confusing since it is inconsistent with its use in the IFC. In this instance, it is considered more important to align the definitions with the IFC and NFPA 704 than with the OSHA definition.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposed definitions only serve to clarify terms currently used in the IFC and will not impact the cost of construction or maintenance of new or existing buildings and facilities.

F9-24

F10-24

IFC: SECTION 202 (New); IBC: SECTION 202 (New)

Proponents: Steve Thomas, Shums Coda Associates, Himself (sthomas@coloradocode.net)

2024 International Fire Code

Add new definition as follows:

AUTOMATIC FIRE DETECTION SYSTEM. A system that senses the presence of fire, smoke, or heat and activates a fire suppression system or an automatic alarm system.

2024 International Building Code

Add new definition as follows:

AUTOMATIC FIRE DETECTION SYSTEM. A system that senses the presence of fire, smoke, or heat and activates a fire suppression system or an automatic alarm system.

Reason: There has been some confusion on whether an automatic fire detection system includes automatic sprinklers or not. The intent of this proposal is to clarify that the system does include automatic sprinklers. The term is used in several locations within the IBC and the IFC. The definition is based on the same term in the NFPA 2021 Glossary of Terms.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal intends to clarify a code requirement.

F10-24

F11-24

IFC: SECTION 202, 202, SECTION 202 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

SECTION 202
GENERAL DEFINITIONS

BATTERY TYPES. For the purposes of this code, certain types are defined as follows:

Revise as follows:

Flow battery. A type of storage battery that includes chemical components dissolved in two different liquids. Ion exchange, which provides the flow of electrical current, occurs through the membrane while both liquids circulate in their respective spaces. (Includes vanadium redox, zinc-bromine, polysulfide-bromide, and other flowing electrolyte-type technologies).

Lead-acid battery. ~~A~~ An aqueous storage battery that is comprised of lead electrodes ,(lead dioxide Is the active material for the positive anode and metallic lead is the active material for the negative cathode), immersed in a solution of water and sulfuric acid electrolyte. Common major classification distinctions (i.e., types) include, vented lead-acid (VLA) , and valve-regulated lead-acid (VRLA). The VRLA is further subdivided into two types representing the method in which the electrolyte is immobilized: either gelled (gel cell) or absorbed in finely-woven porous fiberglass mat (AGM) separators inside the battery between the electrodes.

~~**Lithium metal polymer**~~ **Lithium-sulfur rechargeable battery.** A storage battery that is similar to the lithium-ion battery except that it has a lithium metal anode in the place of the traditional carbon or graphite anode. A lithium-sulfur battery is a secondary (rechargeable) battery that has lithium metal at the anode, sulfur at the cathode, and the electrolyte is nonaqueous.

Lithium-ion battery. A storage battery with lithium ions serving as the charge carriers of the battery. The electrolyte is a polymer mixture of carbonates with ~~an inorganic~~ flammable organic salt ~~and can be~~ in a liquid ~~or a gelled polymer~~ form. Lithiated metal or mixed metal oxides (e.g. cobalt [LCO], manganese [LMO], nickel-manganese-cobalt [NMC or NCM], nickel-cobalt-aluminum [NCA] or iron phosphate [LFP]) ~~is~~ typically ~~a~~ make up the cathode and forms of carbon or graphite (or lithium titanate oxide [LTO]) typically form the anode. Each of these different types of cathodes and anode combinations produce different energy densities, different lifetimes, differing fast charge abilities, and differing safety characteristics, among many other things. The choice of Li-ion chemistry is often driven by whichever of these factors or best mix of factors is/are most important for the application.

Nickel-cadmium (Ni-Cd) battery. An alkaline storage battery in which the positive active material is nickel oxide, the negative electrode contains cadmium and the electrolyte is a solution of water and potassium hydroxide. They lose less life at high temperatures and have better capacity at low temperatures than most other battery technologies, and have a long life if not cycled too much.

Nickel-metal hydride (Ni-MH). An alkaline storage battery in which the positive active material is nickel oxide, the negative electrode is an intermetallic compound and the electrolyte is usually potassium hydroxide solution in water.

Delete without substitution:

~~**Stationary storage battery.** A group of electrochemical cells interconnected to supply a nominal voltage of DC power to a suitably connected electrical load, designed for service in a permanent location.~~

Add new definition as follows:

BATTERY. A class of devices which contain materials that convert chemical energy into electrical energy which then can be used as a power source. There are several technologies that utilize a variety of materials and chemistries for the purpose of storing this electro-chemical energy for use when required.

Electrochemical double layer capacitors (EDLCs).
These devices are usually built up from an electrolyte, a separator, and two carbon-based electrodesAlso referred to as supercapacitors, they store energy using either ion adsorption (electrochemical double layer capacitors) or fast surface redox reactions (pseudo-capacitors). They are commonly also called “supercapacitors” or the trademarked “ultracapacitor™” because they store orders of magnitude more power and energy for the same unit mass or volume as a traditional electrolytic capacitor. They can release power and accept charge much faster than batteries for the same footprint, but store much less energy.

Hybrid supercapacitor Battery (Lithium-ion capacitor (LIC). The lithium-ion capacitor (LIC or LiC) is a hybrid type of capacitor classified as a type of supercapacitor. It combines lithium-ion technology and electric double layer capacitor (EDLC) construction. It is called a hybrid because the anode is the same as those used in lithium-ion batteries and the cathode is the same as those used in supercapacitors. Activated carbon is typically used as the cathode. The anode of the LIC consists of carbon material which is often pre-doped with lithium ions.

Iron-air aqueous battery. The battery includes iron and air electrodes. Each of the cells are filled with water-based, non-flammable alkaline electrolyte (which functions partially like the anolytes and catholytes of flow batteries battery. The battery does not present the risk of thermal runaway. Like the Ni-Fe battery they are relatively coulombically inefficient on float charge, and thus are usually disconnected from the charge bus when at or nearing full charge.

Nickel Iron (Ni-Fe). The battery has nickel(III) oxide-hydroxide positive plates and iron negative plates, with an electrolyte of potassium hydroxide. The active materials are held in nickel-plated steel tubes or perforated pockets. Nickel-iron batteries do not cause spill concerns since there is no acid in the component. They are capable of tens of thousands of cycles and have calendar lifetimes of well over 50 years. However, they are highly coulombically inefficient (with the inefficiency coming from high percentages of water electrolysis from the charging current) when at or near full state-of-charge (SOC). As such, they are usually equipped with catalytic recombiner vents and automatic watering systems.

Nickel-hydrogen (NiH_2). The cells are a hybrid technology, combining elements from both batteries and fuel cells. The battery differs from a nickel–metal hydride (NiMH) battery by the use of hydrogen in gaseous form The nickel–hydrogen cells utilize the nickel hydroxide electrode from nickel–cadmium cells and a platinum hydrogen electrode from fuel cell technology to create a chemistry without the issues and limitations inherent with the cadmium electrode. The cell is contained within a hermetically sealed pressure vessel that envelopes the electrodes and accommodates the pressurized hydrogen.

Nickel-Zinc (Ni-Zn). A battery that is chemically similar to the nickel-metal hydride battery. Nickel and zinc have low toxicity, the battery is non-flammable, and presents no threat to the environment. The Ni-Zn battery uses an alkaline electrolyte (potassium hydroxide, KOH) and zinc acts as the negative electrode while nickel hydroxide is the positive electrode.

Sodium nickel chloride (NaNiCl). This battery is a member of the ‘high temperature’ family. which works at typical temperature scope of 270°C–350°C. Its cell contains sodium and nickel chloride electrodes, isolated by a beta-alumina electrolyte, which can conduct sodium particles yet not electrons. This chemistry is much safer than most battery chemistries with far fewer toxic materials involved in its production, but it does not have the cycling ability or energy density of most of the Li-ion chemistries.

Zinc-air aqueous battery. A zinc–air battery contains a zinc electrode and porous air electrode separated by a membrane and an aqueous alkaline electrolyte that is used in a manner similar to the catholytes and anolytes of a flow battery. The cathode is a bi-functional air electrode which features one or more catalysts that can perform the oxygen reduction reaction (ORR) during discharging and the oxygen evolution reaction (OER) during charging.

Zinc bromide. In zinc bromide batteries, the cathode is made using zinc instead of lithium. The electrolyte is water-based and, therefore, does not pose a fire risk.

Zinc manganese dioxide (Zn-MnO_2). The battery features a Zinc (Zn) anode and a dioxide (MnO_2) cathode with a strongly basic electrolyte (typically potassium hydroxide, KOH), The battery does not present environmental hazards and is EPA-certified for landfill disposal in the United States, and the aqueous electrolyte is non-flammable.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Over several cycles, and in the current code writing cycle for ICC and NFPA 855, new battery types have been vetted and added to provisions addressing energy storage systems. This proposal updates the existing definitions under the subheading of "BATTERY TYPES", adds ten new sub-definitions of recognized battery types, and adds a generic definition for a "battery" due to the additional areas of the IFC that now regulates batteries of various types.

The sub-definition of "stationary storage battery" is proposed for deletion as the portion of the code that applied to that term was eliminated when the energy storage system requirements were added which captured that type of installation.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal editorial updates the definitions related to batteries to correlate with current IFC and NFPA 855 requirements addressing the batteries. Existing definitions have been modified to correlate with current scientific descriptions and new battery types have been added. There are no technical requirement increases associated with these updated definitions. The modifications and additions will increase understanding of the application of the code requirements to these technologies.

F11-24

F12-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com)

2024 International Fire Code

Revise as follows:

COMBUSTIBLE LIQUID. A liquid having a closed cup *flash point* at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:
The category of combustible liquids does not include *compressed gases* or *cryogenic fluids* or liquids that do not have a fire point when tested in accordance with ASTM D92.

Class II. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 3) and having a flashpoint at or above 100°F (38°C). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a closed cup *flash point* at or above 100°F (38°C) and below 140°F (60°C).
Class IIIA. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 4). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a closed cup *flash point* at or above 140°F (60°C) and below 200°F (93°C).
Class IIIB. *Liquids* having a closed cup *flash point* at or above 200°F (93°C).

FLAMMABLE LIQUID. A liquid having a closed cup *flash point* below 100°F (38°C). *Flammable liquids* are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:
The category of *flammable liquids* does not include *compressed gases* or *cryogenic fluids* or liquids that do not have a *fire point* when tested in accordance with ASTM D92.

Class IA. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a *flash point* below 73°F (23°C) and a *boiling point* below 100°F (38°C).
Class IB. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a *flash point* below 73°F (23°C) and a *boiling point* at or above 100°F (38°C).
Class IC. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 3) and having a flashpoint below 100°F (38°C). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a *flash point* at or above 73°F (23°C) and below 100°F (38°C). The category of flammable liquids does not include *compressed gases* or *cryogenic fluids,* or liquids that do not have a fire point when tested in accordance with ASTM D92.

2024 International Building Code

Revise as follows:

[F] COMBUSTIBLE LIQUID. A *liquid* having a closed cup *flash point* at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:
The category of combustible liquids does not include *compressed gases* or *cryogenic fluids* or *liquids* that do not have a fire point when tested in accordance with ASTM D92.

Class II. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 3) and having a flashpoint at or above 100°F (38°C). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a closed cup *flash point* at or above 100°F (38°C) and below 140°F (60°C).
Class IIIA. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as

a Flammable Liquid (Category 4). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a closed cup *flash point* at or above 140°F (60°C) and below 200°F (93°C).

Class IIIB. *Liquids* having a closed cup *flash point* at or above 200°F (93°C).

[F] FLAMMABLE LIQUID. A *liquid* having a closed cup *flash point* below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

Class IA. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a *flash point* below 73°F (23°C) and a *boiling point* below 100°F (38°C).

Class IB. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a *flash point* below 73°F (23°C) and a *boiling point* at or above 100°F (38°C).

Class IC. A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 3) and having a flashpoint below 100°F (38°C). Where the GHS category is not known, the following is acceptable for classification purposes: *Liquids* having a *flash point* at or above 73°F (23°C) and below 100°F (38°C). The category of flammable liquids does not include *compressed gases* or *cryogenic fluids,* or liquids that do not have a fire point when tested in accordance with ASTM D92.

Reason:

Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

Flammable and combustible liquid definitions are nearly identical between IFC and GHS, with the exception of Category 3. Category 3 spans both Flammable Liquids, Class IC and Combustible Liquids, Class II. Users will need to verify flashpoints to differentiate Category 3 liquids. No changes are anticipated by using the proposed definitions. See comparison:

	GHS Flammable Liquid				
	Category 1	Category 2	Category 3	Category 4	N/A
FL IA	FP < 73°F, BP < 100°F				
FL IB		FP < 73°F, BP >100°F			
FL IC			FP < 100°F		
CL II			FP > 100°F		
CL IIIA				140°F > FP < 200 °F	
CL IIIB					FP > 200°F

FL – Flammable Liquid (IFC)

CL – Combustible Liquid (IFC)

FP – Flash point

BP – Boiling Point

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F12-24

F13-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Andrew Klein, A S Klein Engineering, PLLC, Self Storage Association (andrew@asklein.com)

2024 International Fire Code

Revise as follows:

COMMERCIAL MOTOR VEHICLE. A motor vehicle used to transport passengers or property in commerce where the motor vehicle:

1. Has a gross vehicle weight rating of 10,000 pounds (454 kg) or more; or
2. Is designed to transport 16 or more passengers, including the driver.

2024 International Building Code

Revise as follows:

[F] COMMERCIAL MOTOR VEHICLE. A motor vehicle used to transport passengers or property in commerce where the motor vehicle meets one of the following:

1. Has a gross vehicle weight rating of 10,000 pounds (4540 kg) or more.
2. Is designed to transport 16 or more passengers, including the driver.

Reason: The current definition in the IFC for “Commercial Motor Vehicle is from 49 CFR Part 390.5, Federal Motor Carrier Safety Regulations, however the scope of those regulations deals exclusively with commercial motor vehicles which transport property or passengers in interstate commerce. This code change to the ICC aligns the IFC more closely with that federal regulation and helps avoid the improper application of this definition to RVs or vehicles used for van pools.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00 Construction costs for RV and van pool storage buildings could decrease.

Estimated Immediate Cost Impact Justification (methodology and variables):

Facilities designed for the storage of RVs and van pool vehicles will have a 12,000 SF threshold per fire area as opposed to a 5,000 SF threshold per fire area before sprinklers are required.

Estimated Life Cycle Cost Impact:

n/a

Estimated Life Cycle Cost Impact Justification (methodology and variables):

n/a

F13-24

F14-24

IFC: SECTION 202, SECTION 202 (New); IBC: SECTION 202, SECTION 202 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

COMPRESSED GAS. A material, or mixture of materials that:

1. Is a gas at 68°F (20°C) or less at 14.7 psia (101 kPa) of pressure; and
2. Has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa) which is either liquefied, nonliquefied (gaseous) or in solution (dissolved), except those gases which have no other health- or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68°F (20°C).

~~The states of a compressed gas are categorized as follows:~~

1. ~~Nonliquefied compressed gases are gases, other than those in solution, which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C).~~
2. ~~Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C).~~
3. ~~Compressed gases in solution are nonliquefied gases that are dissolved in a solvent.~~
4. ~~Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.~~

Add new definition as follows:

COMPRESSED GAS, DISSOLVED. Dissolved compressed gases, or gases in solution, are non-liquefied gases that are dissolved in a solvent. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Dissolved Gas.

COMPRESSED GAS, GASEOUS. Gaseous compressed gases are non-liquefied gases, other than those in solution (dissolved) which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C). Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Compressed Gas.

COMPRESSED GAS, LIQUEFIED. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C). Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Liquefied Gas.

2024 International Building Code

Revise as follows:

[F] COMPRESSED GAS. A material or mixture of materials that meets both of the following:

1. Is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure.
2. Has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa) which is either liquefied, nonliquefied (gaseous) or in solution (disolved), except those gases which have no other health- or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68°F (20°C).

~~The states of a compressed gas are categorized as follows:~~

1. ~~Nonliquefied compressed gases are gases, other than those in solution, which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C).~~
2. ~~Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially *liquid* at a temperature of 68°F (20°C).~~
3. ~~Compressed gases in solution are nonliquefied gases that are dissolved in a solvent.~~
4. ~~Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.~~

Add new definition as follows:

[F] COMPRESSED GAS, DISSOLVED. Dissolved compressed gases, or gases in solution, are non-liquefied gases that are dissolved in a solvent. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Dissolved Gas.

[F] COMPRESSED GAS, GASEOUS. Gaseous compressed gases are non-liquefied gases, other than those in solution (dissolved) which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C). Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Compressed Gas.

[F] COMPRESSED GAS, LIQUEFIED. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C). Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Liquefied Gas.

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

Revisions to the Compressed Gas definition and terms are proposed to better align with similar definitions and terms used by OSHA and the GHS. The GHS identifies four distinct categories of Gases Under Pressure (Compressed, Liquefied, Refrigerated Liquefied and Dissolved), while the IFC identifies four 'states' of Compressed Gas (non-liquefied, liquefied, gases in solution, and gas mixtures).

The definition of Compressed Gas has been restructured to provide three sub-definitions: Dissolved, Gaseous, and Liquefied. Dissolved gases are gases in solution. This term, 'gases in solution', is currently used in several places in Chapter 58. This proposal creates a new definition for Dissolved Compressed Gas, which contains the phrase 'gases in solution', so code users can continue to find the meaning of this term.

Non-liquefied compressed gases are referred to as Gaseous in Chapter 50. Thus, a new sub-definition is proposed to clarify and define this term. The comparable OSHA/GHS term is Compressed gas.

Liquefied compressed gases are defined and used similarly, and a relevant sub-definition is proposed.

Cryogenic Fluids, which are Refrigerated Liquefied Gases under the GHS, are defined separately under the IFC, and although they are liquefied gases, they are treated by the code as a separate hazard class. See Cryogenic Fluid defintion.Item 4, which addresses gas mixtures under the current definition, is proposed to be deleted. IFC Section 5001.2.1 currently addresses the classification of mixtures for all hazardous materials.

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F14-24

F15-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

CORROSIVE. <u>A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Skin Corrosion (Category 1A, 1B, or 1C), or Serious Eye Damage (Category 1). Where the GHS category is not known, the following is acceptable for classificationpurposes:</u>
A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method described in DOTn 49 CFR 173.137, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.

2024 International Building Code

Revise as follows:

[F] CORROSIVE. <u>A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Skin Corrosion (Category 1A, 1B, or 1C), or Serious Eye Damage (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method described in DOTn 49 CFR, Part 173.137, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS. The current IFC definition for Corrosive materials is well aligned with the definitions of the GHS categories listed in that they both use destruction, or irreversible damage, of living tissue during a 4-hour exposure period to establish corrosivity.

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F15-24

F16-24

IFC: SECTION 202, SECTION 202 (New); IBC: SECTION 202, SECTION 202 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

CRYOGENIC FLUID. A fluid having a *boiling point* lower than -130°F (-89.9°C) at 14.7 pounds per square inch atmosphere (psia) (an absolute pressure of 101.3 kPa).Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Cryogenic Fluids are categorized as a Gas Under Pressure – Refrigerated Liquefied Gas. However, not all GHS Refrigerated Liquefied Gases are Cryogenic Fluids.

Add new definition as follows:

CRYOGENIC FLUID, FLAMMABLE. A cryogenic fluid that is a flammable gas in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Flammable Gas, Category 1A or Category 1B and Gases Under Pressure - Refrigerated Liquefied Gas.

CRYOGENIC FLUID, INERT. A cryogenic fluid that is an inert gas in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Gases Under Pressure - Refrigerated Liquefied Gas.

CRYOGENIC FLUID, OXIDIZING. A cryogenic fluid that is an oxidizing gas in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Oxidizing Gas, Category 1 and Gases Under Pressure - Refrigerated Liquefied Gas.

Revise as follows:

FLAMMABLE CRYOGENIC FLUID. ~~A *cryogenic fluid* that is flammable in its vapor state.~~ See *cryogenic fluid, flammable.*

OXIDIZING CRYOGENIC FLUID. ~~An oxidizing gas in the cryogenic state.~~See *cryogenic fluid, oxidizing*.

2024 International Building Code

Revise as follows:

[F] CRYOGENIC FLUID. A *liquid* having a *boiling point* lower than -150°F (-101°C) at 14.7 pounds per square inch atmosphere (psia) (an absolute pressure of 101 kPa). Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Cryogenic Fluids are categorized as a Gas Under Pressure – Refrigerated Liquefied Gas. However, not all GHS Refrigerated Liquefied Gases are Cryogenic Fluids.

Add new definition as follows:

[F] CRYOGENIC FLUID, FLAMMABLE. A cryogenic fluid that is a flammable gas in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Flammable Gas, Category 1A or Category 1B and Gases Under Pressure - Refrigerated Liquefied Gas.

[F] CRYOGENIC FLUID, INERT. A cryogenic fluid that is an inert gas in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Gases Under Pressure - Refrigerated Liquefied Gas.

[F] CRYOGENIC FLUID, OXIDIZING. A cryogenic fluid that is an oxidizing gas in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Oxidizing Gas, Category 1 and Gases Under Pressure - Refrigerated Liquefied Gas.

[F] FLAMMABLE CRYOGENIC FLUID. See cryogenic fluid, flammable.

[F] OXIDIZING CRYOGENIC FLUID. See cryogenic fluid, oxidizing.

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

Cryogenic Fluids, also referred to as cryogenic liquids, are always refrigerated liquefied gases and are defined in the IFC based on a material's boiling point at atmospheric pressure. However, under the GHS, the category Gases Under Pressure - Refrigerated Liquefied Gas is not prescriptively defined. Thus, a Refrigerated Liquefied Gas under the GHS may or may not be a Cryogenic Fluid under the IFC. Carbon dioxide and Nitrous oxide are refrigerated liquefied gases that do not technically meet the IFC definition of a cryogenic fluid, although both can present similar hazards due to their extremely cold temperature.

This proposal does not change the current prescriptive definition of Cryogenic Fluid, but simply adds a reference to the applicable GHS category as further guidance. Code users will still be required to look at the boiling point of a material to establish whether it is actually a Cryogenic Fluid.

Definitions for Flammable, Inert and Oxidizing Cryogenic Fluids are proposed to be included as sub-definitions under the primary Cryogenic Fluid definition to enable code users to more easily identify the sub-categories of Cryogenic Fluids regulated by the IFC.

Minor revisions are proposed to the existing definitions of Flammable Cryogenic Fluid and Oxidizing Cryogenic Fluid to reflect that in its vapor state, a cryogenic fluid must meet the IFC definition of a 'flammable gas' or 'oxidizing gas', respectively, to be so defined. A new definition for Inert Cryogenic Fluid is proposed to ensure each cryogenic fluid category referred to in the code (e.g., see Chapter 50 Maximum Allowable Quantity Tables) is defined. And, a new definition of Inert Gas is proposed under a separate code change proposal.

The applicable GHS hazard category is proposed to be included in each of the sub-definitions to provide additional guidance to the code user. Flammable cryogenic fluid and oxidizing cryogenic fluid are proposed to be retained in the alphabetical listing in Section 202, but revised to reflect they are sub-definitions of cryogenic fluid.

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F16-24

F17-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

CONTROL AREA. ~~Spaces within a~~A building, or portion of a building, bounded by exterior walls, fire walls, fire barriers or horizontal assemblies where quantities of hazardous materials not exceeding the *maximum allowable quantities per control area* are stored, dispensed, used or handled. See also the definition of “Outdoor control area.”

2024 International Building Code

Revise as follows:

[F] CONTROL AREA. ~~Spaces within a~~A *building*,or portion of a building, bounded by exterior walls, fire walls, fire barriers or horizontal assemblies where quantities of *hazardous materials* not exceeding the maximum allowable quantities per control area are stored, dispensed, *used* or handled. See the definition of “Outdoor control area” in the International Fire Code.

Reason: This proposal is intended to clarify the application of the control area concept. Currently, there is some confusion as to how to deal with a single control area in a building.

The control area concept is based on the assumption that a single building is a creates a single control area. Where fire-resistance-rated construction is utilized, additional control areas can be added. However, this is not clear to all readers of the code.

The definition of control area simply states that it is a space in a building where the MAQ is not exceeded. Then in IFC Section 5003.8.3.1 (IBC Section 414.2.1) the code requires fire-resistance-rated construction to “separate from each other,” implying that if only 1 control area is provided there is nothing to separate. But this section has been applied to require a an enclosed room for storage of haz mat to be of a 1-hour rated room even though there is no haz mat or control area needed outside the enclosed room—which is not the code’s intent.

The definition of fire area provides more guidance—it states that a fire area is bounded by fire walls, fire barriers, exterior walls or horizontal assemblies. This definition provides clarity that the exterior walls of a building can create a fire area even when they are not fire-resistance-rated.

That language proposed to revise the control area definition correlates with that used for the fire area definition, and clarifies that a building can be a control area and that the exterior walls create that control area. Additional control areas can be constructed if separated from each other by fire walls, fire barriers or horizontal assemblies as indicated in Section 5003.8.3.1 (IBC Section 414.2.1).

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal correlates and clarifies the requirements. See reason statement.

F17-24

F18-24

IFC: SECTION 202 (New); IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

EXPLOSIVE.
A chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord and igniters.
The term “explosive” includes any material determined to be within the scope of USC Title 18: Chapter 40 and also includes any material classified as an explosive by the *hazardous materials* regulations of DOTn 49 CFR Parts 100–185.

High explosive. Explosive material, such as dynamite, which can be caused to detonate by means of a No. 8 test blasting cap when unconfined.
Low explosive. Explosive material that will burn or deflagrate when ignited. It is characterized by a rate of reaction that is less than the speed of sound. Examples of low explosives include, but are not limited to: black powder; safety fuse; igniters; igniter cord; fuse lighters; fireworks; and propellants, 1.3C.
Mass-detonating explosives. Division 1.1, 1.2 and 1.5 explosives alone or in combination, or loaded into various types of ammunition or containers, most of which can be expected to explode virtually instantaneously when a small portion is subjected to fire, severe concussion, impact, the impulse of an initiating agent or the effect of a considerable discharge of energy from without. Materials that react in this manner represent a mass explosion hazard. Such an explosive will normally cause severe structural damage to adjacent objects. Explosive propagation could occur immediately to other items of ammunition and explosives stored sufficiently close to and not adequately protected from the initially exploding pile with a time interval short enough so that two or more quantities must be considered as one for quantity-distance purposes.
UN/DOTn Class 1 explosives. The former classification system used by DOTn included the terms “high” and “low” explosives as defined herein. The following terms further define explosives under the current system applied by DOTn for all explosive materials defined as hazard Class 1 materials. Compatibility group letters are used in concert with the division to specify further limitations on each division noted (i.e., the letter G identifies the material as a pyrotechnic substance or article containing a pyrotechnic substance and similar materials).
Division 1.1.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.1). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.
Division 1.2.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.2). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Explosives that have a projection hazard but not a mass explosion hazard.
Division 1.3.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.3). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.
Division 1.4.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.4). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

Division 1.5.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.5). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Very insensitive explosives. This division is comprised of substances that have a mass explosion hazard, but that are so insensitive there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.
Division 1.6.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.6). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Extremely insensitive articles which do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

2024 International Building Code

Revise as follows:

[F] EXPLOSIVE. A chemical compound, mixture or device, the primary or common purpose of which is to function by *explosion*. The term includes, but is not limited to: dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, and igniters. The term “explosive” includes any material determined to be within the scope of USC Title 18: Chapter 40 and also includes any material classified as an *explosive* other than consumer *fireworks*, 1.4G by the *hazardous materials* regulations of DOTn 49 CFR Parts 100-185.

High explosive. Explosive material, such as dynamite, which can be caused to detonate by means of a No. 8 test blasting cap when unconfined.

Low explosive. Explosive material that will burn or deflagrate when ignited. It is characterized by a rate of reaction that is less than the speed of sound. Examples of low explosives include, but are not limited to: black powder; safety fuse; igniters; igniter cord; fuse lighters; fireworks; and propellants, 1.3C.

Mass-detonating explosives. Division 1.1, 1.2 and 1.5 explosives alone or in combination, or loaded into various types of ammunition or containers, most of which can be expected to explode virtually instantaneously when a small portion is subjected to fire, severe concussion, impact, the impulse of an initiating agent or the effect of a considerable discharge of energy from without. Materials that react in this manner represent a mass explosion hazard. Such an explosive will normally cause severe structural damage to adjacent objects. Explosive propagation could occur immediately to other items of ammunition and explosives stored sufficiently close to and not adequately protected from the initially exploding pile with a time interval short enough so that two or more quantities must be considered as one for quantity-distance purposes.

UN/DOTn Class 1 explosives. The former classification system used by DOTn included the terms “high” and “low” explosives as defined herein. The following terms further define explosives under the current system applied by DOTn for all explosive materials defined as hazard Class 1 materials. Compatibility group letters are used in concert with the division to specify further limitations on each division noted (i.e., the letter G identifies the material as a pyrotechnic substance or article containing a pyrotechnic substance and similar materials).
Division 1.1.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.1). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.
Division 1.2.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.2). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Explosives that have a projection hazard but not a mass explosion hazard.
Division 1.3.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.3). Where the GHS category is not known, the following is acceptable for classification purposes:</u>
Explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.
Division 1.4.
<u>A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.4). Where the GHS category is not known, the following is acceptable for classification purposes:</u>

Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

Division 1.5.

A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.5). Where the GHS category is not known, the following is acceptable for classification purposes:

Very insensitive explosives. This division is comprised of substances that have a mass explosion hazard, but that are so insensitive there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.

Division 1.6.

A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.6). Where the GHS category is not known, the following is acceptable for classification purposes:

Extremely insensitive articles which do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners which continues to be a challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs). This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS. The six hazard class divisions of explosives in the IFC are aligned with the GHS subdivisions. The IFC definitions for explosives have historically been based on the classification system used by the US DOT which continues to remain aligned with accepted international standards.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System (GHS) of Classification and Labelling of Chemicals which is used globally and by OSHA. These revised definitions are well aligned with GHS and are not expected to impact to cost of construction.

F18-24

F19-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

FLAMMABLE GAS. A material that is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa)] subdivided as follows:

1. Category 1A. A gas that meets either of the following:
   1.1. Ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air.

   1.2. A flammable range at 14.7 psia (101 kPa) with air of not less than 12 percent, regardless of the lower limit, unless data shows compliance with Category 1B.

2. Category 1B. A gas that 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 percent by volume of air.

   2.2. A fundamental burning velocity of less than 3.9 inches/second (99 mm/s).

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E681.

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

<u>Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Flammable Gases are categorized as a Flammable Gas (Category 1A or 1B).</u>

2024 International Building Code

Revise as follows:

[F] FLAMMABLE GAS. A material that is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa)] subdivided as follows:

1. Category 1A. A gas that meets either of the following:
   1.1. Ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air.

   1.2. A flammable range at 14.7 psia (101 kPa) with air of at least 12 percent, regardless of the lower limit, unless data shows compliance with Category 1B.

2. Category 1B. A gas that meets the flammability criteria for Category 1A, is not pyrophoric or chemically unstable, and meets one or more of the following:
   2.1. A lower flammability limit of more than 6 percent by volume of air.

   2.2. A fundamental burning velocity of less than 3.9 inches/second (99 mm/s).

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E681.Where not otherwise specified, the term "flammable gas" includes both Category 1A and 1B.

Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Flammable Gases are categorized as a Flammable Gas (Category 1A or 1B).

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

The IFC definition of Flammable Gas was revised in the 2024 IFC to align with the GHS, so this proposal does not change the technical definition. Still, it adds the GHS categories users will find identified in a Safety Data Sheet for a Flammable Gas in order to be consistent with the overall effort to provide additional guidance to code users on GHS classification.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F19-24

F20-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com)

2024 International Fire Code

Revise as follows:

FLAMMABLE SOLID. A solid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Solid (Category 1 or 2). Where the GHS category is not known, the following is acceptable for classification purposes: > A solid, other than a blasting agent or *explosive*, that is capable of causing fire through friction, absorption of moisture, spontaneous chemical change or retained heat from manufacturing or processing, or which has an ignition temperature below 212°F (100°C) or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid as determined in accordance with the test method of CPSC 16 CFR Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than 0.0866 inch (2.2 mm) per second along its major axis.

2024 International Building Code

Revise as follows:

[F] FLAMMABLE SOLID. A solid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Solid (Category 1 or 2). Where the GHS category is not known, the following is acceptable for classification purposes: A *solid*, other than a blasting agent or *explosive*, that is capable of causing fire through friction, absorption or moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which has an ignition temperature below 212°F (100°C) or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable *solid* as determined in accordance with the test method of CPSC 16 CFR; Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than 0.1 inch (2.5 mm) per second along its major axis.

Reason:
Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners which continues to be a challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

The current IFC definition for Flammable solids is fairly well aligned with the definitions of the GHS Flammable solid categories. However, the GHS definitions incorporate additional testing criteria which has not historically been used to assess IFC flammable solids, including a separate test for metal powders, which are reflected in the proposed definition change. The updated GHS test criteria is also utilized in NFPA 484, the Standard for Combustible Metals. Alignment with GHS and NFPA may, in some cases, expand the scope of current IFC flammable solids.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will make compliance more straightforward. In some cases, this revised definition may more heavily regulate materials for new buildings as the revised definition widens what is considered a Flammable Solid. However, this is balanced out by the coordination and ease of enforcement that comes with being aligned with GHS, NFPA and OSHA. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F20-24

F21-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com); Julius Ballanco, P.E., JB Engineering and Code Consulting, P.C., Self (jbengineer@aol.com)

2024 International Fire Code

Revise as follows:

FLAMMABLE GAS. A material that is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa)] subdivided as follows:

1. Category 1A. A gas that meets either of the following:
   1.1. Ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air.
   1.2. A flammable range at 14.7 psia (101 kPa) with air of not less than 12 percent, regardless of the lower limit, unless data shows compliance with Category 1B.
2. Category 1B. A gas that 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 percent by volume of air.
   2.2. A fundamental burning velocity of less than 3.9 inches/second (99 mm/s).

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E681.

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

<u>In the absence of test data demonstrating classification into Category 1B, a flammable gas that meets the criteria of a Category 1A gas shall default into Category 1A.</u>

2024 International Building Code

Revise as follows:

[F] FLAMMABLE GAS. A material that is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a *boiling point* of 68°F (20°C) or less at 14.7 psia (101 kPa)] subdivided as follows:

1. Category 1A. A gas that meets either of the following:
   1.1. Ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air.
   1.2. A flammable range at 14.7 psia (101 kPa) with air of at least 12 percent, regardless of the lower limit, unless data shows compliance with Category 1B.
2. Category 1B. A gas that meets the flammability criteria for Category 1A, is not pyrophoric or chemically unstable, and meets one or more of the following:
   2.1. A lower flammability limit of more than 6 percent by volume of air.
   2.2. A fundamental burning velocity of less than 3.9 inches/second (99 mm/s).

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E681.

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

In the absence of test data demonstrating classification into Category 1B, a flammable gas that meets the criteria of a Category 1A gas shall default into Category 1A

Reason: This additional language is a correlation with the definition in GHS version 7. It provides additional guidance to the code user on application of the definition. GHS 7 includes similar language to make it clear if the data is not available, particularly burning rate, then the flammable gas defaults to a Category 1A flammable gas.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The added language simply correlates with GHS version 7 the source for the current definition. It simply provides additional guidance for the code user in terms of whether it is required to be classified as Category 1A or 1B.

F21-24

F22-24

IFC: SECTION 202

Proponents: John Swanson, NFSA, National Fire Sprinkler Association (swanson@nfsa.org); Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Revise as follows:

HIGH-PILED COMBUSTIBLE STORAGE. Storage of combustible materials in closely packed piles or combustible materials on pallets, in racks or on shelves where the top of storage is greater than 12 feet (3658 mm) in height. ~~Where required by the *fire code official*,~~ High ~~*h*~~*igh-piled combustible storage* also includes ~~certain~~ high-hazard commodities, such as rubber tires, Group A plastics, *flammable liquids*, idle pallets and similar commodities, where the top of storage is greater than 6 feet (1829 mm) in height.

Reason: Commodities considered “high-hazard” are in that category because of the burning characteristics and heat release rate for the particular product. The prescriptive high-hazard requirements in Chapter 32 should be applicable regardless of the code official’s position. Removing the fire code official text and the word "certain" is a better definition.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Proposal clarifies the objective nature of the definition.

F22-24

F23-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com)

2024 International Fire Code

Revise as follows:

HIGHLY TOXIC. ~~A material which produces a lethal dose or lethal concentration which falls within any of the following categories:~~ A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Acute Toxicity Oral Category 1 or 2, Dermal Category 1 or 2, Inhalation Gases Category 1, Inhalation Vapors Category 1, or Inhalation Dusts and Mists Category 1 or 2. Where the GHS category is not known, one of the following is acceptable for classification purposes:

1. A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2. A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3. A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist~~, fume~~ or dust, when administered by continuous inhalation for one hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Mixtures of these materials with ordinary materials, such as water, might not warrant classification as highly toxic. While this system is basically simple in application, any hazard evaluation that is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons.

TOXIC. ~~A chemical falling within any of the following categories:~~A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Acute Toxicity Oral Category 3 or 4, Dermal Category 3, Inhalation Gases Category 2 or 3, Inhalation Vapors Category 2 or 3, or Inhalation Dusts and Mists Category 3 or 4. Where the GHS category is not known, one of the following is acceptable for classification purposes:

1. A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2. A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3. A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter of mist~~, fume~~ or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

2024 International Building Code

Revise as follows:

[F] HIGHLY TOXIC. ~~A material which produces a lethal dose or lethal concentration that falls within any of the following categories:~~ A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Acute Toxicity Oral Category 1 or 2, Dermal Category 1 or 2, Inhalation Gases Category 1, Inhalation Vapors Category 1, or Inhalation Dusts and Mists Category 1 or 2. Where the GHS category is not known, one of the following is acceptable for classification purposes:

1. A chemical that has a median lethal dose (LD_{50}) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2. A chemical that has a median lethal dose (LD_{50}) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3. A chemical that has a median lethal concentration (LC_{50}) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Mixtures of these materials with ordinary materials, such as water, might not warrant classification as *highly toxic*. While this system is basically simple in application, any hazard evaluation that is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons.

[F] TOXIC. ~~A chemical falling within any of the following categories:~~
A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Acute Toxicity Oral Category 3 or 4, Dermal Category 3, Inhalation Gases Category 2 or 3, Inhalation Vapors Category 2 or 3, or Inhalation Dusts and Mists Category 3 or 4. Where the GHS category is not known, one of the following is acceptable for classification purposes:

1. A chemical that has a median lethal dose (LD_{50}) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2. A chemical that has a median lethal dose (LD_{50}) of more than 200 milligrams per kilogram, but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3. A chemical that has a median lethal concentration (LC_{50}) in air of more than 200 parts per million, but not more than 2,000 parts per million by volume of gas or vapor, or more than 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners which continues to be a challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

The GHS and current IFC definitions for Highly toxic materials are the same (perfect alignment), except that “fumes” are not included in GHS terminology. The term “fume” is not defined in the IFC and is likely to be included in the measurements for vapors, dusts, and/or mists. The table below shows the alignment between current IFC Highly Toxic (dark blue shading) and GHS Categories. Definitions for Toxic materials align perfectly between current IFC and GHS definitions based on dermal exposure routes and for inhalation dusts and mists exposure routes. However, Toxic materials by oral, inhalation gases, and inhalation vapors routes of exposure have different cut-off values between current IFC and GHS definitions. For the sake of alignment with GHS, this proposal expands the current IFC Toxic definitions for these three routes of exposure. This Table demonstrates the alignment for each exposure route. Current IFC Toxic is shaded in medium blue. The proposed definition of Toxic (aligns with GHS) is expanded to include the area shaded in light blue. Unshaded (white) areas are not regulated.

IFC current	IFC proposal
Highly Toxic	Highly Toxic
Toxic	Toxic
	Toxic

		GHS				
Exposure Route	**Category 1**	**Category 2**	**Category 3**		**Category 4**	
Oral (LD50, mg/kg)	<5	5 - 50	50 - 300		300 - 500	500 - 2,000
Dermal (LD50, mg/kg)	<50	50-200	200-1,000		1,000 – 2,000	
Inhalation – Gases (LC50 ppm, 4 hr)	<100	100 - 500	500 - 1,000	1,000 – 2,500	2,500 - 20,000	
Inhalation – Vapors (LC50 mg/L, 4 hr)*	<0.5	0.5 - 2	2 - 4	4 - 10	10 - 20	
Inhalation – Dusts and Mists (LC50 mg/L, 4 hr)	<0.05	0.05 - 0.5	0.5 - 1		1 - 5	

Inhalation values in the above table use 4-hr exposure values. IFC values have been converted from 1-hr to 4-hr exposures per GHS Section 3.1.2.6.1: divide by 2 for gases and vapors, divide by 4 for dusts and mists. *Because ppm is a mass-to-mass or volume-to-volume ratio and mg/l is a mass-to-volume ratio, the following conversion was used for vapors: To convert from units of mg/L to ppm, use the following equation. Endpoint (ppm) = [Endpoint (mg/L) x 1000 x 24.5] / [Molecular Weight] Source: https://www.epa.gov/rmp/toxic-endpoints-are-milligrams-liter-mg-l-equivalent-parts-million-ppm

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System (GHS) of Classification and Labelling of Chemicals which is used globally and by OSHA. This revised definition will make compliance more straightforward. In some cases, this revised definition may more heavily regulate additional materials for new buildings as the revised definition widens what is considered Toxic. However, this is balanced out by the coordination and ease of enforcement that comes with being aligned with GHS and OSHA. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F23-24

F24-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

INERT COMPRESSED GAS. A compressed gas that is capable of reacting with other materials only under abnormal conditions such as high temperatures, pressures and similar extrinsic physical forces. Within the context of the code, inert compressed gases do not exhibit either physical or *health hazard* properties as defined (other than acting as a simple asphyxiant) or hazard properties other than those of a *compressed gas*. Some of the more common inert compressed gases include argon, helium, krypton, neon, nitrogen and xenon.

2024 International Building Code

Revise as follows:

[F] INERT COMPRESSED GAS. A compressed gas that is capable of reacting with other materials only under abnormal conditions such as high temperatures, pressures and similar extrinsic physical forces. Within the context of the code, inert compressed gases do not exhibit either physical or health hazard properties as defined (other than acting as a simple asphyxiant) or hazard properties other than those of a *compressed gas*. Some of the more common inert compressed gases include argon, helium, krypton, neon, nitrogen and xenon.

Reason: This modification is a clarification and is intended to distinguish inert compressed gases, which may be gaseous or liquefied, from inert cryogenic fluids. It aligns with the revised definition of Compressed Gas submitted under a separate proposal.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide clarification and correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F24-24

F25-24

IFC: SECTION 202, SECTION 202 (New); IBC: SECTION 202, SECTION 202 (New), [F] 412.5.5, [F] 415.9.1, [F] 415.9.1.1, [F] 415.9.1.4, 415.9.2 (New), 415.9.2.1 (New), 415.9.2.2 (New), 415.9.2.3 (New), 415.9.2.4 (New), 415.9.3 (New), 415.9.3.1 (New), 415.9.3.2 (New), [F] 415.9.3, [F] 415.9.2

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

LIQUID STORAGE ROOM. A room ~~classified as a Group H-3 occupancy~~ used for the storage of *flammable* or *combustible liquids* in ~~a closed condition~~ amounts exceeding the maximum allowable quantity per control area.

LIQUID STORAGE WAREHOUSE. A building ~~classified as a Group H-2 or H-3 occupancy~~or portion of a building used for the storage of *flammable* or *combustible liquids* in ~~a closed condition~~unlimited amounts.

Add new definition as follows:

LIQUID USE, DISPENSING AND MIXING ROOM. A room in which Class I, II and IIIA flammable or combustible liquids are stored, used, dispensed or mixed in amounts exceeding the maximum allowable quantity per control area.

2024 International Building Code

Revise as follows:

[F] LIQUID STORAGE ROOM. A room ~~classified as a Group H-3 occupancy~~ used for the storage of *flammable* or *combustible liquids* in ~~a closed condition~~amounts exceeding the maximum allowable quantity per control area.

Add new definition as follows:

[F] LIQUID STORAGE WAREHOUSE. A building or portion of a building used for the storage of flammable or combustible liquids in unlimited amounts.

Revise as follows:

[F] LIQUID USE, DISPENSING AND MIXING ROOM. A room in which Class I, II and IIIA *flammable* or *combustible liquids* are stored, *used*, dispensed or mixed in ~~open containers~~amounts exceeding the maximum allowable quantity per control area.

[F] 412.5.5 Storage.
Storage of *flammable or combustible liquids* exceeding the maximum allowable quantities per *control area* in Table 307.1(1) and not exceeding Table 5704.3.6.3(2) in the *International Fire Code* shall be in a *liquid storage room*. shall be in a liquid storage room. Storage of flammable or combustible liquids exceeding Table 5704.3.6.3(2) in the *International Fire Code* shall be in a liquid storage warehouse.

[F] 415.9.1 Flammable and combustible liquids.
The storage, *handling*, processing and transporting of *flammable* and *combustible liquids* in Group H-2 and H-3 occupancies shall be in accordance with Sections 415.9.1.1 through ~~415.9.1.9~~415.9.5, the *International Mechanical Code* and the *International Fire Code*.

[F] 415.9.1.1 ~~Mixed occupancies~~Storage in tanks.
Where ~~the storage tank area is~~stationary storage tanks are located in a *building* of two or more occupancies and the quantity of *liquid* exceeds the maximum allowable quantity for one *control area*, the use shall be completely separated from adjacent occupancies in accordance with the requirements of Section 508.4.

[F] 415.9.1.4 ~~Leakage containment~~ Containment.
~~A liquid-tight containment area compatible with the stored *liquid* shall be provided. The method of spill control, drainage control and~~

~~secondary containment shall be in accordance with the *International Fire Code*.~~

~~**Exception:** Rooms where only double-wall storage tanks conforming to Section 415.9.1.3 are used to store Class I, II and IIIA *flammable* and *combustible liquids* shall not be required to have a leakage containment area.~~

Spill control and secondary containment shall be provided as required in the *International Fire Code*.

Add new text as follows:

415.9.2 Storage. Indoor storage of flammable and combustible liquids in containers or portable tanks exceeding those quantities set forth in Table 307.1.1 shall be in a liquid storage room or liquid storage warehouse.

415.9.2.1 Liquid storage rooms. Liquid storage rooms shall be constructed as a Group H-2 or H-3 occupancy as applicable. The aggregate quantities shall not exceed those allowed in a liquid storage room in Table 5704.3.6.3(2) of the *International Fire Code.* Liquid storage rooms shall be separated from other portions of the building as required by Table 508.4.

415.9.2.2 Liquid storage warehouses. Liquid storage warehouses shall be constructed as a Group H-2 or H-3 occupancy as applicable. Liquid storage warehouses shall be constructed as a detached building or separated from other portions of the building by a fire wall with a minimum fire-resistance rating of 3-hours.

415.9.2.3 Explosion control. Liquid storage rooms and liquid storage warehouses shall be provided with explosion control where required by Table 414.5.1.

415.9.2.4 Basements. Liquid storage rooms and liquid storage warehouses shall not be located in basements.

415.9.3 Liquid use, dispensing and mixing rooms. Indoor use, dispensing and mixing of Class I, II or IIIA liquids exceeding those quantities set forth in Table 307.1.1 shall be in liquid use, dispensing and mixing rooms classified as Group H-2 or H-3 as applicable, and shall comply with this section and the *International Fire Code*.

415.9.3.1 Basements. Liquid use, dispensing and mixing rooms shall not be located in basements.

415.9.3.2 Explosion control. Liquid use, dispensing and mixing rooms shall be provided with explosion control where required by Table 414.5.1.

Revise as follows:

[F] ~~415.9.3~~415.9.4 Dry cleaning plants.

The construction and installation of dry cleaning plants shall be in accordance with the requirements of this code, the *International Mechanical Code*, the *International Plumbing Code* and NFPA 32. Dry cleaning solvents and systems shall be classified in accordance with the *International Fire Code*.

[F] ~~415.9.2~~415.9.5 Liquefied petroleum gas facilities.

The construction and installation of liquefied petroleum gas *facilities* shall be in accordance with the requirements of this code, the *International Fire Code*, the International Fuel Gas Code, the *International Mechanical Code* and NFPA 58.

Reason: Section 5704.3.8 in the IFC sends the code user to the IBC for construction and separation of a Liquid Storage Warehouse. However, the term “liquid storage warehouse” does not appear in the IBC and there is no specific guidance for construction of a liquid storage warehouse. This proposal intends to remedy this broken reference and provide construction criteria for liquid storage warehouses.

Background:

The definition of liquid storage room indicates clearly that it is a room within a building, and reads as follows:

LIQUID STORAGE ROOM. A room classified as a Group H-3 occupancy used for the storage of flammable or combustible liquids in a closed condition.

The definition of liquid storage warehouse indicates clearly that it is a building, and reads as follows:
LIQUID STORAGE WAREHOUSE. A building classified as a Group H-2 or H-3 occupancy used for the storage of flammable or combustible liquids in a closed condition.

Therefore, the code currently intends that a liquid storage warehouse is a separate building. This is logical because the aggregate quantities of flammable and combustible liquids are unlimited in a liquid storage warehouse.

Code Change Revisions:
The specific revisions in this proposal consist of the following:

1. The definitions of liquid storage room and liquid storage warehouse are revised. The occupancy classification is removed from the definitions. Occupancy classification is a requirement and should not be located in the definition. The appropriate classification would be determined by evaluating the amount, storage condition and characteristics of the liquids. The phrase “in amounts exceeding the maximum allowable quantity per control area” is utilized rather than the occupancy classification. It is correct, that the classification will be Group H-2 or H-3, but specifying it in the definition and not clarifying when one or the other applies can lead to confusion and misapplication.
2. The definition of liquid storage warehouse is revised to specify “building or portion of a building”. Since the construction of a fire wall no longer creates a separate building, when a liquid storage warehouse is attached, but separated by a 3-HR fire wall it is now a portion of the building. This revision will allow the building to be attached and not be misapplied to require a detached building.
3. The definition of liquid use, dispensing and mixing (UDM) room is modified in the IBC by deleting “open containers”. The IFC contains requirements applicable use-open activities and use-closed activities for UDM rooms. Also, the criteria for quantities above the MAQ is added since these requirements apply when above the MAQ. The definition of liquid use, dispensing and mixing room was also modified to include storage. This reflects the reality that in most of these rooms there is some storage of material waiting to be used. The definition of UDM room is not currently in the IFC, so it is proposed to be added.
4. Section 412.5.5 is revised to correlate with the requirements in the IFC and the maximum allowable quantity in a liquid storage room.
5. Section 415.9.1.1 contains editorial changes and a revised title because the section and the subsequent sections address storage tanks. Also, it is clarified to apply to stationary tanks. Section 415.9.1 covers storage in stationary tanks, Section 415.9.2 covers portable stationary tanks.
6. Section 415.9.1.4 is revised to match the appropriate language for spill control and secondary containment in the IFC. The exception is deleted, but not lost since secondary containment tanks are allowed as an approved method of secondary containment in IFC Section 5704.2.10.
7. Section 415.9.2 is added to address the requirement that when the MAQ is exceeded the IFC and IBC require storage in a liquid storage room.
8. Section 415.9.2.1 addresses liquid storage rooms. The occupancy classification is dependent on the pressure of the stored liquids, although most frequently will be Group H-3. These rooms must be separated as required for a mixed occupancy. The IFC limits the aggregate quantities in a liquid storage room.
9. Section 415.9.2.2 addresses liquid storage warehouses. The occupancy classification is again dependent on the pressure of the stored liquids, although most frequently will be Group H-3. The aggregate quantities in a liquid storage warehouse are unlimited, and the definition indicates that liquid storage warehouses are buildings, not a portion of a building. Therefore, this section requires a detached building or separation by a 3-hr fire wall. The 3-hr requirement is based on IBC Table 706.4 for Group H-3 occupancies. prior to the 2018 IBC, a fire wall was considered to create a separate building. Therefore, this section allows a 3-hr fire wall or requires a detached building.
10. Section 415.9.2.3 refers to Table 414.5.1 for explosion control which is dependent on the liquids.
11. Section 415.9.2.4 prohibits such uses in a basement.
12. Sections 415.9.3 through 415.9.3.2 address use, dispensing and mixing rooms and prohibit such rooms in basements and also refer to Table 414.5.1 for explosion control.

This proposal clarifies that a liquid storage warehouse is a detached building or separated by a fire wall, and provides requirements for the construction of a liquid storage warehouse. This will complete the reference from the IFC to the IBC for construction of a liquid storage warehouse.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This provisions in this proposal are currently contained in the I-Codes. This proposal simply completes the IFC reference for construction in accordance with the IBC.

F25-24

F26-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

ORGANIC PEROXIDE. Liquid or solid ~~An~~ organic ~~compound~~ substances that contain~~s~~ the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by ~~an~~ organic radicals. The term also includes organic peroxide formulations (mixtures). Organic peroxides ~~can present an explosion hazard (*detonation* or *deflagration*) or they can be shock sensitive~~ are thermally unstable substances or mixtures, which can undergo exothermic self-accelerating decomposition. In addition, they can have one or more of the following properties:

1. Be liable to explosive decomposition;
2. Burn rapidly;
3. Be sensitive to impact or friction;
4. React dangerously with other substances;
5. ~~They can also decompose~~ Decompose into various unstable compounds over an extended period of time.

Class I. Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type B). Where the GHS Category is not known, the following is acceptable for classification purposes:
~~Describes t~~Those formulations that are capable of *deflagration* but not *detonation*.

Class II. Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type C) or (Type D). Where the GHS Category is not known, the following is acceptable for classification purposes:
~~Describes t~~Those formulations that burn very rapidly and that pose a moderate reactivity hazard.

Class III.
Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type E). Where the GHS Category is not known, the following is acceptable for classification purposes:

~~Describes t~~T

hose formulations that burn rapidly and that pose a moderate reactivity hazard.

Class IV. Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type F). Where the GHS Category is not known, the following is acceptable for classification purposes:
~~Describes t~~Those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.

Class V. Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type G). Where the GHS Category is not known, the following is acceptable for classification purposes:
~~Describes t~~Those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.

Unclassified detonable.
Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type A). Type A Organic Peroxides are forbidden in transportation. Where the GHS Category is not known, the following is acceptable for classification purposes:
Organic peroxides that are capable of *detonation*. These peroxides pose an extremely high *explosion* hazard through rapid *explosive* decomposition.

2024 International Building Code

Revise as follows:

[F] ORGANIC PEROXIDE. Liquid or solid ~~An~~ organic ~~compound~~ substances that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by ~~an~~ organic radicals. The term also includes organic peroxide formulations (mixtures). Organic peroxides ~~can pose an *explosion* hazard (*detonation* or *deflagration*) or they can be shock sensitive~~ are thermally unstable substances or mixtures, which can undergo exothermic self-accelerating decomposition. In addition, they can have one or more of the following properties:

1. Be liable to explosive decomposition;
2. Burn rapidly;
3. Be sensitive to impact or friction;
4. React dangerously with other substances;
5. ~~They can also decompose~~ Decompose into various unstable compounds over an extended period of time.

Class I.
Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type B). Where the GHS Category is not known, the following is acceptable for classification purposes:
~~Describes t~~Those formulations that are capable of *deflagration* but not *detonation*.

Class II.
Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type C) or (Type D). Where the GHS Category is not known, the following is acceptable for classification purposes:
~~Describes t~~Those formulations that burn very rapidly and that pose a moderate reactivity hazard.

Class III.
Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type E). Where the GHS Category is not known, the following is acceptable for classification purposes:

~~Describes t~~T

hose formulations that burn rapidly and that pose a moderate reactivity hazard.

Class IV.
Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type F). Where the GHS Category is not known, the following is acceptable for classification purposes:
~~Describes t~~Those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.

Class V.
Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type G). Where the GHS Category is not known, the following is acceptable for classification purposes:
~~Describes t~~Those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.

Unclassified detonable.
Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type A). Type A Organic Peroxides are forbidden in transportation. Where the GHS Category is not known, the following is acceptable for classification purposes:
Organic peroxides that are capable of *detonation*. These peroxides pose an extremely high *explosion* hazard through rapid *explosive* decomposition.

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS. The current definition for Organic Peroxide in the IFC is subjective and is not based on a defined test method or standardized set of criteria. Under the GHS, Organic Peroxide types are assigned based on the physical state, a determination of the formulations control and emergency temperature if applicable, and its performance under the testing protocol specified in the UN Manual of Tests and Criteria for Organic Peroxides. The GHS types and definitions proposed here are comparable to the generic transport types defined by the US Department of Transportation and reflect the relative hazard when packaged for transportation. This proposal aligns six DOT and GHS transport types with the five existing sub-categories of IFC Organic Peroxides. In that regard, transport Types C and D are proposed to be classified as Class II Organic Peroxides since both Types can present a moderate reactivity hazard.

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition is not likely to affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F26-24

F27-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com)

2024 International Fire Code

Revise as follows:

OXIDIZER. A material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials and, if heated or contaminated, can result in vigorous self-sustained decomposition.

Class 1.

<u>A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 3) or Oxidizing Liquids (Category 3). Where the GHS category is not known, the following is acceptable for classification purposes:</u>

An oxidizer that does not moderately increase the burning rate of combustible materials.

Class 2.

<u>A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 2) or Oxidizing Liquids (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes:</u>

An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.

Class 3.

<u>A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 1) or Oxidizing Liquids (Category 1) and is not otherwise classified as Class 4. Where the GHS category is not known, the following is acceptable for classification purposes:</u>

An oxidizer that causes a severe increase in the burning rate of combustible materials with which it comes in contact.

Class 4.

<u>A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 1) or Oxidizing Liquids (Category 1) and which have evidence of explosive properties or are packaged for transport in Packing Group I. Where the GHS category is not known, the following is acceptable for classification purposes:</u>

An oxidizer that can undergo an *explosive* reaction due to contamination or exposure to thermal or physical shock and that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.

2024 International Building Code

Revise as follows:

[F] OXIDIZER. A material that readily yields oxygen or other *oxidizing gas*, or that readily reacts to promote or initiate combustion of combustible materials and, if heated or contaminated, can result in vigorous self-sustained decomposition.

Class 1.

<u>A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 3) or Oxidizing Liquids (Category 3). Where the GHS category is not known, the following is acceptable for classification purposes:</u>

An oxidizer that does not moderately increase the burning rate of combustible materials.

Class 2.

<u>A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 2) or Oxidizing Liquids (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes:</u>

An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.

Class 3.

A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 1) or Oxidizing Liquids (Category 1) and is not otherwise classified as Class 4. Where the GHS category is not known, the following is acceptable for classification purposes:

An oxidizer that causes a severe increase in the burning rate of combustible materials with which it comes in contact.

Class 4.

A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 1) or Oxidizing Liquids (Category 1) and which have evidence of explosive properties or are packaged for transport in Packing Group I. Where the GHS category is not known, the following is acceptable for classification purposes:

An oxidizer that can undergo an *explosive* reaction due to contamination or exposure to thermal or physical shock and that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.

Reason:

Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners which continues to be a challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

Oxidizing solids and liquids can cause fires to burn more intensely, they can cause substances that do not normally burn to ignite, and can even cause explosions due to shock or contamination. Oxidizers are commonly used in the pool industry, in agriculture (fertilizers), in healthcare (disinfectants), and are precursors to explosives (rocket fuel, ammunition, and improvised explosive devices).

Unregulated storage of oxidizers has led to serious injuries, property damage, and hundreds of deaths, including the ammonium nitrate explosion in West Texas in 2013 where 150 buildings were damaged or destroyed and 15 people (mostly emergency responders) were killed. In Beirut, Lebanon in 2020, unregulated storage of ammonium nitrate caused an explosion resulting in over 200 deaths, 300,000 displaced people, and over $15 billion in damage.

The current IFC definitions of oxidizers are largely subjective, making it difficult for Fire Code officials to verify accurate classification of different oxidizers and to enforce proper storage and use. The GHS definitions, however, are based upon prescriptive, quantitative test criteria outlined in the UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria (Revision 6). Use of standardized, quantitative test methodology to classify chemicals with physical hazards is expected to provide more accurate and consistent classification. Consequences of missing or incorrect classification include increased risk of fires that burn more intensely than expected. This puts people at risk, elevates danger to fire fighters who may enter spaces with unknown physical hazards, and increases preventable hazards in locations that may store any quantity of oxidizer.

IFC and GHS alignment:

The proposed alignment with IFC oxidizer classes and GHS oxidizer categories is based upon comparison of 30 oxidizing solids defined by the International Fire Code (Appendix E) and the Globally Harmonized System (GHS) of classification. Alignment, as outlined below, was not statistically different between IFC and GHS oxidizers (Chi-Squared goodness of fit test, $p = 0.102$).

GHS H271, Category 1 Oxidizers include IFC **Oxidizers, Class 4 and Class 3**
GHS H272, Category 2 Oxidizers are equivalent to IFC **Oxidizers, Class 2**

GHS H272, Category 3 Oxidizers align with IFC **Oxidizers, Class 1**

Although GHS Category 1 Oxidizers include both IFC Class 3 and 4 Oxidizers, there are additional methods which the Code Official can use to identify more hazardous Class 4 Oxidizers. If the Category 1 Oxidizer has either evidence of explosive properties or is packaged for transport in accordance with US DOT regulations in Packing Group I, then the materials are considered Class 4 Oxidizers. In the absence of any evidence of explosive properties or if the material is packaged for transport in Packing Group II or III, a Category 1 Oxidizer is considered Class 3.

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System (GHS) of Classification and Labelling of Chemicals which is used globally and by OSHA. This revised definition will make compliance more straightforward. In some cases, this revised definition may more heavily regulate additional materials for new building; conversely, in other cases this definition will result in reduced classification of materials as the revised definitions use explicit quantitative test criteria to classify Oxidizing solids and liquids. However, any differences are balanced out by the coordination and ease of enforcement that comes with being aligned with GHS and OSHA. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F27-24

F28-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com)

2024 International Fire Code

Revise as follows:

OXIDIZING GAS. A compressed gas that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Oxidizing Gas, Category 1. Where the GHS category is not known, the following is acceptable for classification purposes: A gas that can support and accelerate combustion of other materials more than air does.

2024 International Building Code

Revise as follows:

[F] OXIDIZING GAS. A compressed gas that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Oxidizing Gas, Category 1. Where the GHS category is not known, the following is acceptable for classification purposes:A gas that can support and accelerate combustion of other materials more than air does.

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.Oxidizing gas definitions are virtually identical between IFC and GHS. No changes are anticipated by using the proposed definition.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F28-24

F29-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

PYROPHORIC. A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Pyrophoric Gas, Pyrophoric Solid (Category 1), or Pyrophoric Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: A chemical with an autoignition temperature in air, at or below a temperature of 130°F (54.4°C).

2024 International Building Code

Revise as follows:

[F] PYROPHORIC. A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Pyrophoric Gas, Pyrophoric Solid (Category 1), or Pyrophoric Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: A chemical with an auto-ignition temperature in air, at or below a temperature of 130°F (54.4°C).

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS. The current IFC definition of Pyrophoric is somewhat aligned with the definitions of the GHS categories listed. The IFC definition, which applies to all physical states; solids, liquids and gases, is identical to the GHS definition for Pyrophoric Gases. However, the GHS definitions and test methods (*UN Manual of Tests and Criteria, 33.4.4 Test N.2 and 33.4.5 Test N.3*) used for evaluating liquids and solids specifies testing at high temperatures and prescribes a time limit (5 minutes) within which the material must demonstrate pyrophoricity. The IFC does not currently specify a time period, nor a specific test method, to evaluate materials. Rather, under the IFC, pyrophorocity is entirely dependent on autoignition temperature, a physical property of the material. Thus, there may be some liquids and solids that are classified as Pyrophoric under the IFC that do not meet the prescriptive pyrophoric test criteria under the GHS. And, some materials, like powdered metals, that do not have an autoignition temperature below 130°F may be categorized as Pyrophoric under the GHS. Liquids and solids that do not meet the GHS definition of pyrophoric, but are capable of spontaneous combustion may be categorized under the GHS as self-heating substances.The minor change reflecting a more accurate unit conversion from Fahrenheit to Celsius is intended to align with the unit conversion existing in the IBC.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. In some cases, this revised definition may regulate additional materials as the revised definition potentially widens what is considered Pyrophoric. However, this is balanced out by the coordination and ease of enforcement that comes with being aligned with the GHS and OSHA. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F29-24

F30-24

IFC: SECTION 202 (New)

Proponents: Geoffrey Raifsnider, Global Finishing Solutions, Self (graifsnider@globalfinishing.com)

2024 International Fire Code

Add new definition as follows:

SMOKING. Possessing a pipe, cigar or cigarette or operation of an e-cigarette, vape pen or similar apparatus that is heated, lighted or burning.

Reason: Adding definition of smoking to include vaping so that current no smoking requirements would also be applicable for vaping.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal will not increase or decrease the cost of construction as the cost of the proposed sign does not appear to be significantly different than current no smoking signs.

F30-24

F31-24

IFC: SECTION 202

Proponents: Jonathan Siu, Jon Siu Consulting, LLC, Self

2024 International Fire Code

Revise as follows:

TEMPORARY SPECIAL EVENT STRUCTURE. Any temporary ground-supported structure, platform, stage, stage scaffolding or rigging, canopy, tower ~~supporting audio or visual effects equipment or similar structures not regulated within the scope of the *International Building Code*~~<u>or similar structure supporting entertainment-related equipment or signage</u>.

Reason: This proposal is intended to align the 2027 IFC with the 2024 IBC, as well as clarify that most temporary special event structures are regulated by the IFC, making the code internally consistent.

Aside from the actual text of the definitions being misaligned in the two codes, in the process of investigating the application of the building code and the fire code to temporary structures for a separate proposal, it became apparent that there are some discrepancies between the provisions in the 2024 IFC and my understanding of current practice.

- The current definition of Temporary Special Event Structure says that they are "temporary...structures not regulated by the building code." However, the only temporary structures that aren't in the scope of the IBC are those that are less than 120 square feet in area and are for gatherings of less than 10 people (see 2024 IBC 3103.1.3). It is clear that the intent of having regulations for temporary special event structures in the IFC is that the code would apply to more than just the limited subset of small temporary structures that are not regulated by the IBC. IFC Section 3105.2 requires compliance when a permit is required by Section 105.5 or 105.6. Section 105.5.51 scopes in all special event structures, with a couple of exceptions for tents. (Section 105.6.25 just points back to 105.5.51.) This intent is reflected in current practice, in my experience.
- Code Change Proposal G147-18 introduced the definition of "Special Event Structure" to the 2021 IBC. According to the reason statement, the intent was to coordinate the IBC with a change made to the IFC by F308-16, introduced by FCAC. However, the definition in G147-18 differs from F308-16, and the published reason statements by the proponent and the IBC General Committee for G147-18 did not address the difference (primarily, elimination of the "not regulated by the building code" language). I could find no record of a follow-up code change to re-align the IFC definition with the IBC in the 2024 I-codes cycle.

This proposal takes the approach that the definitions in the IFC and IBC should be essentially the same, with the exception that the IFC refers to "temporary" special event structures, whereas the IBC refers to all special event structures. In addition, the reference to "structures not regulated by the IBC" in the IFC definition is unnecessary and limiting, thus the proposal to change the IFC's definition rather than the IBC's. Removing the phrase will have no effect on whether the IBC applies but will clarify the language of the IFC to cover the intent and current practice.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The clear intent of the regulations in the IFC is that the code would apply to all temporary special event structures, not just the small structures that aren't in the scope of the IBC. This proposed change aligns the language in the code with current practice, so there is no change in enforcement.

F31-24

F32-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu)

2024 International Fire Code

Revise as follows:

UNSTABLE (REACTIVE) MATERIAL. A material, other than an *explosive*, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor~~, or in the presence of contaminants, or in contact with *incompatible materials*~~. Unstable (reactive) materials are subdivided as follows:

Class 1. Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure. This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category E or F).

Class 2. Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at *normal temperatures and pressures*, and that can undergo violent chemical change at elevated temperatures and pressures. This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category C or D).

Class 3. Materials that in themselves are capable of *detonation* or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category B) and can include compressed gases categorized as Chemically Unstable (Type B).

Class 4. Materials that in themselves are readily capable of *detonation* or explosive decomposition or explosive reaction at *normal temperatures and pressures*. This class includes materials that are sensitive to mechanical or localized thermal shock at *normal temperatures and pressures*. This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category A) and can include compressed gases categorized as Chemically Unstable (Type A).

2024 International Building Code

Revise as follows:

[F] UNSTABLE (REACTIVE) MATERIAL. A material, other than an *explosive* , which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including *explosion*, when exposed to heat, friction or shock, or in the absence of an inhibitor, ~~or in the presence of contaminants, or in contact with *incompatible materials.*~~ Unstable (reactive) materials are subdivided as follows:

Class 1. Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure. This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category E or F).

Class 2. Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at *normal temperatures and pressures*, and that can undergo violent chemical change at elevated temperatures and pressures. This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category C or D).

Class 3. Materials that in themselves are capable of *detonation* or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive

(Category B) and can include compressed gases categorized as Chemically Unstable (Type B).

Class 4. Materials that in themselves are readily capable of *detonation* or explosive decomposition or explosive reaction at *normal temperatures and pressures*. This class includes materials that are sensitive to mechanical or localized thermal shock at *normal temperatures and pressures*. This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category A) and can include compressed gases categorized as Chemically Unstable (Type A).

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners and is an ongoing challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

Like the GHS definition of Self-reactive, the IFC definition of Unstable (reactive) considers a material's potential to react with itself to create a hazardous condition. However, unlike the GHS definition, the IFC definition also considers the stability of a material in the presence of contaminants and incompatible materials. Given the nearly infinite number of possible contaminants and incompatible materials a substance could be exposed to, it does not seem reasonable to include this as a criterion to define Unstable (reactive). Further, the current definitions of the individual classes of unstable (reactive) materials all begin with the phrase "materials that in themselves are...". This phrase implies that a hazardous reaction or condition must occur without influence, introduction, or combination with any other material, which is then in conflict with the primary definition of Unstable (reactive). For this reason, this proposal modifies the primary definition by striking the phrase "or, in the presence of contaminants or in contact with incompatible materials". It is expected that a proper evaluation and risk assessment of storage and use conditions will be conducted to ensure contaminants are kept away and contact with incompatible materials is prevented.

Because the GHS definition of Self-reactive applies only to liquid and solid substances, the GHS category Chemically Unstable gases could also apply to gases the IFC currently defines as an Unstable (reactive) gas. Under the GHS, Chemically Unstable gases are always Class 1A Flammable Gases, but it is possible that some nonflammable gases are defined as Unstable (reactive) under the IFC such as, phosphorus trichloride and chlorine dioxide. As a result, for gases the current IFC definition is broader that the GHS. This proposal adds the GHS categories that are expected to best align with the current IFC classes for Unstable (reactive) materials, however because there is not clear and direct correlation, they are only provided as guidance for code users.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will not affect the application of the code and will make compliance more straightforward. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F32-24

F33-24

IFC: SECTION 202; IBC: SECTION 202

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Megan Hall, UC Berkeley Fire Prevention, self (mchall@berkeley.edu); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com)

2024 International Fire Code

Revise as follows:

WATER-REACTIVE MATERIAL. A material that explodes; violently reacts; produces flammable, toxic or other hazardous gases; or evolves enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Water-reactive materials are subdivided as follows:

Class 1. Materials that react with water with some release of energy, but not violently. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 3).

Class 2. Materials that react violently with water or have the ability to boil water. Materials that produce *flammable*, *toxic* or other hazardous gases or evolve enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 2).

Class 3. Materials that react explosively with water without requiring heat or confinement. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 1).

2024 International Building Code

Revise as follows:

[F] WATER-REACTIVE MATERIAL. A material that explodes; violently reacts; produces *flammable*, *toxic* or other hazardous gases; or evolves enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Water-reactive materials are subdivided as follows:

Class 1. Materials that react with water with some release of energy, but not violently. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 3).

Class 2. Materials that react violently with water or have the ability to boil water. Materials that produce *flammable*, *toxic* or other hazardous gases or evolve enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 2).

Class 3. Materials that react explosively with water without requiring heat or confinement. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 1).

Reason: Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners which continues to be a challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

The current IFC definitions of water reactive materials are largely subjective, making it difficult for Fire Code officials to verify accurate classification of different water reactives and to enforce proper storage and use. The GHS definitions, however, are based upon prescriptive, quantitative test criteria outlined in the *UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria* (Revision 6). Use of standardized, quantitative test methodology to classify chemicals with physical hazards is expected to provide more accurate and consistent classification.

One notable difference between IFC and GHS definitions of water reactive materials is that the GHS test methods do not account for the formation of toxic or other hazardous gases when materials come in contact with water. The proposed definitions use the original IFC water reactive criteria, with added reference to GHS classifications. While GHS water reactives will also be IFC water reactives, the reverse is not necessarily true.

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This revised definition will make compliance more straightforward. In some cases, this revised definition may more heavily regulate additional materials for new buildings; conversely, in other cases this definition will result in reduced classification of materials. However, any differences are balanced out by the coordination and ease of enforcement that comes with being aligned with GHS and OSHA. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F33-24

F34-24

IFC: 203.6.1

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

203.6.1 Occupancy exemptions. Storage, use and handling of hazardous materials in accordance with Table ~~307.1.1 of the *International Building Code*~~ 5003.1.1(5) shall not be counted as contributing to maximum allowable quantities and shall not cause classification of an occupancy to be Group H. Such storage, use and handling shall comply with applicable provisions of this code.

Staff Analysis: Note that this section is correlated with IBC Section 307.1.1 but is looking for an IFC specific reference.

Reason: The new section 203 dealing with occupancies will be a great benefit to code users and assist in the application of the code.

Section 203.6.1 refers to a table of functions and activities where the quantity of hazardous materials is not included in the maximum allowable quantity. This section refers to table in the IBC. This means that to properly classify an occupancy with hazardous materials it takes both the IFC and the IBC to accomplish the evaluation.

The reality is that the table is located in the IFC, and is the new Table 5003.1.1(5). The table in the IFC and the table in the IBC are identical. therefore, rather than sending the code user to the IBC, the reference is changed to Table 5003.1.1(5) in the IFC. In this manner, the code user can complete the occupancy classification using either the IBC or IFC, but does not need to use both.

This is an editorial change to simply reference the table in the IFC.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is an editorial code change. The reference is changed from a table in the IBC to a table in the IFC.

F34-24

F35-24

IFC: SECTION 303, 303.1, 303.2, 303.3, 303.4, 303.5, 303.6, 303.7, 303.8, 303.9, 3305.10, 3305.10.1, 3305.10.2

Proponents: Mark Graham, National Roofing Contractors Association (NRCA) (mgraham@nrca.net)

2024 International Fire Code

Revise as follows:

SECTION 303
ROOFING KETTLES

303.1 Transporting. ~~Asphalt (tar)~~ Roofing kettles shall not be transported over any highway, road or street when the heat source for the kettle is operating.

Exception: ~~Asphalt (tar)~~ Roofing kettles in the process of patching road surfaces.

303.2 Location. ~~Asphalt (tar)~~ Roofing kettles shall not be located within 20 feet (6096 mm) of any combustible material, combustible building surface or any building opening and within a controlled area identified by the use of traffic cones, barriers or other *approved* means. ~~Asphalt (tar)~~ Roofing kettles and pots shall not be utilized inside or on the roof of a building or structure. Roofing kettles and operating ~~asphalt (tar)~~ roofing kettles shall not block *means of egress*, gates, roadways or entrances.

303.3 Location of fuel containers. Fuel containers shall be located not less than 10 feet (3048 mm) from the burner.

Exception: Containers properly insulated from heat or flame are allowed to be within 2 feet (610 mm) of the burner.

303.4 Attendant. An operating roofing kettle shall be attended by not less than one employee knowledgeable of the operations and hazards. The employee shall be within 100 feet (30 480 mm) of the kettle and have the kettle within sight. Ladders or similar obstacles shall not form a part of the route between the attendant and the kettle.

Revise as follows:

303.5 Fire extinguishers. There shall be a portable fire extinguisher complying with Section 906 and with a minimum 40-B:C rating within 25 feet (7620 mm) of each ~~asphalt (tar)~~ roofing kettle during the period such kettle is being utilized. Additionally, there shall be one portable fire extinguisher with a minimum 3-A:40-B:C rating on the roof being covered.

303.6 Lids. ~~Asphalt (tar)~~ Roofing kettles shall be equipped with tight-fitting lids.

303.7 Hi-boys. Hi-boys shall be constructed of noncombustible materials. Hi-boys shall be limited to a capacity of 55 gallons (208 L). Fuel sources or heating elements shall not be allowed as part of a hi-boy.

303.8 Roofing kettles. Roofing kettles shall be constructed of noncombustible materials.

303.9 Fuel containers under air pressure. Fuel containers that operate under air pressure shall not exceed 20 gallons (76 L) in capacity and shall be *approved*.

3305.10 Safeguarding roofing operations.
Roofing operations utilizing heat-producing systems or other ignition sources shall be conducted in accordance with Sections 3305.10.1 and 3305.10.2 and Chapter 35.

Revise as follows:

3305.10.1 ~~Asphalt and tar~~ Roofing kettles.

~~Asphalt and tar~~ Roofing kettles shall be operated in accordance with Section 303.

3305.10.2 Fire extinguishers for roofing operations.
Fire extinguishers shall comply with Section 906. There shall be not less than one multiple-purpose portable fire extinguisher with a minimum 3-A 40-B:C rating on the roof being covered or repaired.

Reason: This code change proposal is intended to clarify the code by using terminology consistently. The term "...asphalt (tar) kettle..." and "...roofing kettle..." are used interchangeably in Section 303. Usages of "...asphalt (tar) kettle..." are changed to "...roofing kettle..." in Section 303 and Section 3305.10 for consistency and clarity.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This change is strictly editorial and does not increase or decrease the stringency of the code.

F35-24

F36-24

IFC: 304.1.3

Proponents: Matthew Dobson, VSI, VSI (mdobson@vinylsiding.org)

2024 International Fire Code

Revise as follows:

304.1.3 Vegetation and Combustible Mulch.
Weeds, grass, vines, combustible mulch or other growth that is capable of being ignited and endangering property, shall be cut down or prohibited and removed by the *owner* or occupant of the premises. Vegetation and combustible mulch clearance requirements in wildland-urban interface areas shall be in accordance with the *International Wildland-Urban Interface Code*.

Reason: Over the past code cycles there has been concern over smoker habits and wildfires and combustible mulch, and the potential hazard they pose with combustion of exterior walls. This change focuses on providing protections from two ignition sources discarded cigarettes or pre-rolls (joints) and wildfires. Many fire service members, the UL fire fighter safety institute, and other material stakeholders, like the Vinyl Siding Institute, have been focused on this issue over close to 10 years or more. The problem identified is the spread of fire from the exterior into the unprotected attic space and then spreading quickly to other parts of the building either through discarded cigarettes or wildfire. The term that is used in the proposal is "combustible mulch" rather than "combustible ground cover" because there is the potential for misinterpretation when describing "ground cover", as it might be thought to refer to products placed on the ground during repairs or renovations and should not be regulated.

Over the decade, fire departments in the Washington, DC region (Loudon County, VA) have been confronted with structure fires which have demonstrated a consistent pattern of starting on the outside. These fires have the potential for rapid loss of structural integrity and catastrophic collapse before occupants are alerted. As attention has grown locally, it is apparent that this type of fire is becoming common on a national basis.

These fires tend to follow a distinct pattern. These fires start at a low point on the exterior ground or in a waste basket with discarded cigarette and spread vertically along the exterior wall producing flammable gases, which are readily admitted into the attic area through ventilation soffits. If not cooled, these heated gases accumulate and combust, creating rapidly spreading fire conditions in the attic area, often without occupant awareness. The unchecked fire can result in full roof involvement, creating a dangerous and difficult situation for occupants and fire fighters.

The group examined a number of structure fires which have exhibited the pattern described above. There is agreement over 3 common aspects. First, these fires often result from careless smoking habits or wildfires. Second, when the smoking materials are not properly disposed of, they come into contact with combustible ground cover adjacent to a building and, very commonly, this is mulch or wildfires (flying embers) start the combustible ground cover (kindling). And, last, the combustible exterior wall is a factor in the the growth of these fires into the attic space.

The careless smoker is an impediment to effective fire prevention efforts. The fire service has consistently provided data that shows smoking is the leading cause of fatal fires in the United States. Public fire and life safety efforts have been reasonably effective at communicating the message to not smoke in bed, and various medical organizations have demonstrated the health risk associated with “second hand” smoke. We now see that people are routinely smoking outside, at or near the entrance to a building, which increases the possibility of an accidental ignition of outside combustibles.

If one were to chronicle the actions of today’s smoker, it shows the last action they take when exiting a building is to “light up.” When returning inside, they often drop the cigarette near the entrance. Many smokers seem to believe that dropping a match or cigarette onto the combustible ground cover or into a flower pot is an effective method of extinguishment, however, this behavior often places the smoking material directly into the mulch, initiating the low fire described earlier.

Combustible mulch has become a common exterior decorative material which aids in suppressing weed growth while enhancing a building’s curb appeal. However, most mulch is a dead organic material, comprised of chipped wood, tree bark or pine needles. Mulch is most effective when it is maintained in a moist state, however it can dry out very quickly and become a readily ignitable fuel source. Because of its relatively small mass in comparison to its surface area, when ignited, it will progress and sustain open flame.

The group discussed a method in which to proceed, the interest being to add ress, in the quickest manner, industrial and social changes which could reduce the possibility of a fire on the outside of a building. Each aspect presents unique challenges for fire prevention efforts:

1. Changing the behavior of the smoker is an ongoing and difficult challenge, especially as social pressures have resulted in regulatory changes to require people to smoke outside of a building. Further development of the “fire safe” cigarette, by way of testing using mulch, could be deemed too costly for the industry, and would have no effect on improper disposal of matches. Thus, the quickest and most practical strategy for this aspect of the problem is to expand public fire and life safety education to focus on the hazards of improper disposal of smoking materials, coupled with enforcement of applicable requirements for regulation of smoking and disposal of products. However, in this age of “information overflow” it is questionable if this would result in widespread behavioral changes for smokers.

2. Regulating the use and placement of mulch, that the study group believes could have the quickest and most significant impact toward reducing the exterior fire problem, while additional strategies to address the other problems noted are pursued. The use of wood and wood related mulch for building decoration is purely optional. It is not a required construction component under current building codes. Therefore, regulations to curtail its use or require that it be separated from a building’s combustible exterior are reasonable and could be codified on a national basis. On a large scale, the mere action of creating separation of combustible materials has been a wildland fire tactic for years. Several states and local jurisdictions have already employed this theory by either recommending or requiring that wood-based mulch be separated from exterior combustible walls:

1. The Virginia Department of Forestry recommends to “provide a minimum of an 18 inch clearance between landscaping mulch beds and combustible building materials” and to “ensure proper clearance to electric devices, such as decorative lights, by following the manufacturer’s instructions;”

2. In Raleigh, NC, following a disastrous fire in a multi-family building, the city passed a pine straw mulch ordinance that bans the use of pine straw as ground cover within 10 feet of multi-family dwellings. The ordinance exempts 1 and 2-family dwellings, however, the city strongly encourages these homeowners to comply with the pine straw restrictions;

3. The Commonwealth of Massachusetts prohibits the new application of mulch within 18 inches around combustible exteriors of buildings, such as wood or vinyl but not brick or concrete. Residential buildings with six units or less are exempted from this regulation, but it is recommended that all homeowners adopt these safety practices. The regulation applies to all other buildings including commercial properties.

4. Ventura County, CA prohibits mulch and wood chips within the required “defensible space” zone (which ranges from 0’ to 30’ from the exterior of a building).

Cost Impact: Increase

Estimated Immediate Cost Impact:

This change could increase the cost of construction and maintenance, as non-combustible mulch can be more expensive than combustible mulch.

Estimated Immediate Cost Impact Justification (methodology and variables):

Typical retail cost of non-combustible mulch (pea gravel) vs. combustible mulch, can range from 2-5 times more expensive.

Estimated Life Cycle Cost Impact:

However typical combustible mulch will need to be replaced every 1-2 years vs. non-combustible mulch which may last 10+ years.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Based on estimated lifecycle of typical combustible mulch vs. non-combustible mulch.

F36-24

F37-24

IFC: 304.3.2, O102.5

Proponents: Marcelo Hirschler, GBH International, GBH International (mmh@gbhint.com)

2024 International Fire Code

304.3.2 Low heat release materials.
Where required by this section, low heat release materials shall exhibit a peak rate of heat release not exceeding 300 kW/m^2 where tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

Revise as follows:

O102.5 Construction materials.
Containers and lids used for *valet trash collections* shall be constructed entirely of noncombustible materials or of materials that comply with Section 304.3.2 ~~meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation~~.

Reason: At the last cycle, most of the requirements for waste container materials from chapters 3 and 8 were consolidated so that the requirements for low heat release materials (which are the same in various locations in the 2021 code) have all been placed into a new section 304.3.2 in the 2024 code. This proposal simply does the same with the heat release requirements for valet trash containers in Appendix O. The proposal deletes the details from the Appendix section and sends the user to that same section in Chapter 3, which can be used for these containers also.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
This is purely editorial and simply consolidates requirements.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The requirements are not being changed. Instead a reference is simply being made back to the identical requirements in the body of the code.

F37-24

F38-24

IFC: 304.3.2, 318.1, 2310.5.3, 3304.1.3, 3603.4

Proponents: Marcelo Hirschler, GBH International, GBH International (mmh@gbhint.com)

2024 International Fire Code

304.3.2 Low heat release materials.
Where required by this section, low heat release materials shall exhibit a peak rate of heat release not exceeding 300 kW/m^2 where tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

Revise as follows:

318.1 Laundry carts with a capacity of 1 cubic yard or more.
Laundry carts with an individual capacity of 1 cubic yard [200 gallons (0.76 m^3)] or more, used in laundries within Group B, E, F-1, I, M and R-1 occupancies, shall be constructed of noncombustible materials or <u>of </u>materials <u>complying with Section 304.3.2</u> ~~having a peak rate of heat release not exceeding 300 kW/m² at a flux of 50 kW/m² where tested in a horizontal orientation in accordance with ASTM E1354~~.

Exceptions:

1. Laundry carts in areas protected by an *approved automatic sprinkler system* installed throughout in accordance with Section 903.3.1.1.
2. Laundry carts in coin-operated laundries.

2310.5.3 Rubbish containers.
Containers with tight-fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material. The rubbish containers shall be constructed entirely of <u>noncombustible materials or of materials complying with Section 304.3.2.</u> ~~materials that comply with any one of the following:~~

1. ~~Noncombustible materials.~~
2. ~~Materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.~~

3304.1.3 Rubbish containers.
Where rubbish containers with a capacity exceeding 5.33 cubic feet (40 gallons) (0.15 m^3) are used for temporary storage of combustible debris, rubbish and waste material, they shall have tight-fitting or self-closing lids. Such rubbish containers shall be constructed entirely of <u>noncombustible materials or of materials complying with Section 304.3.2.</u>~~materials that comply with either of the following:~~

1. ~~Noncombustible materials.~~
2. ~~Materials that meet a peak rate of heat release not exceeding 300 kW/m² when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.~~

3603.4 Rubbish containers.
Containers with tight-fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material. The rubbish containers shall be constructed entirely of <u>noncombustible materials or of materials complying with Section 304.3.2.</u> ~~materials that comply with any one of the following:~~

1. ~~Noncombustible materials.~~
2. ~~Materials that meet a peak rate of heat release not exceeding 300 kW/m² where tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation.~~

Reason: At the last cycle, all the requirements for waste container materials from chapters 3 and 8 were consolidated (as a result of proposal F9-21) so that the requirements for low heat release materials for most such containers (which are the same in various locations in the code) have all been placed into a new section 304.3.2. This proposal simply does the same with the heat release requirements for rubbish containers (and laundry carts) elsewhere in the code and deletes the details from the sections where they are now and sends the user to that same section (304.3.2) in Chapter 3, which can be used for all of them.

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This change is purely editorial since it sends the code user for the remaining requirements based on cone calorimeter testing of laundry carts and rubbish containers towards Chapter 3, where several other are already contained.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The requirements are not being changed. See reason statement.

F38-24

F39-24

IFC: 307.5, 307.5.1 (New), 307.5.2 (New)

Proponents: Scott Plumer, Arvada Fire Protection District, Arvada Fire Protection District

2024 International Fire Code

Revise as follows:

307.5 Attendance.
Open burning, *bonfires*, *recreational fires* and use of *portable outdoor fireplaces* shall be constantly attended until the fire is verified to be fully extinguished.~~Not fewer than one portable fire extinguisher complying with Section 906 with a minimum 4-A rating or other approved on-site fire-extinguishing equipment, such as dirt, sand, water barrel, garden hose or water truck, shall be available for immediate utilization.~~

Add new text as follows:

307.5.1 Open burning and bonfire extinguishing equipment. Not fewer than one means of fire-extinguishing equipment located on site and approved by the fire code official shall be available for immediate utilization.

307.5.2 Recreational fires and portable outdoor fireplaces extinguishing equipment. Not fewer than one portable fire extinguisher complying with Section 906 with a minimum 4-A rating or other approved on-site fire-extinguishing equipment, such as a garden hose, shall be available for immediate utilization.

Reason: This proposal seeks to clean up the language surrounding open burning extinguishment methods/equipment. The current code allows for a 4-A rated fire extinguisher for open burning and bonfires. For reference, UL 711 Rating and Fire Testing of Fire Extinguishers states that a 4-A rating can extinguish a wood crib that is 36" (914mm) high by 29" (483mm) wide by 29" (483mm) deep (per UL 711 Table 2). This is just slightly larger than the pile size allowed for a recreational fire. The lower bound for pile size of open burning is 36" (914mm) wide by 24" (610mm) high. However, by definition, open burning has no upper bound for the pile size. Therefore, it is inappropriate to allow a single 4-A extinguisher for open burning and bonfires. The size/type of extinguishing method should be left up to the fire code official to be determined during the permit process since open burning requires an operational permit per section 105.6.32. This proposal also removes sand, dirt, water barrel, and a water truck as suggested extinguishing methods. The 2021 Marshall Fire outside Boulder, Colorado, which killed two people, destroyed over 1,000 buildings, and caused hundreds of millions of dollars in damage is reported to have started from open burning that was "extinguished" using dirt which was later blown away during a high wind event, per the United States Forest Service investigation report. The added language regarding verification of extinguishment further reinforces the need for the entity conducting the burning to verify the fire has been extinguished and not just covered with dirt or sprayed with water. A water barrel and water truck should also be removed from the suggestions because they are not available for immediate utilization. Since this proposal still has the word *approved* in the code, a fire code official could still allow sand, dirt, water barrel, or a water truck, but it would have to be acceptable to the fire code official rather than explicitly being in the code.

Bibliography: United States Forest Service investigation report: https://assets.bouldercounty.gov/wp-content/uploads/2023/06/usfs-case-report-lunders-1.pdf

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no immediate or ongoing cost impact for this proposal as it only seeks to clarify language and extinguishment methods.

F39-24

F40-24

IFC: APPENDIX O, SECTION 202, 304.1.1, O101.1, O102.1, O102.2, O102.3, O102.4, O102.5, O103.1, O103.2, O103.3, O104.1, O104.2, O104.3, SECTION O101, SECTION O102, SECTION O103, SECTION O104, SECTION O105, O105.1, TABLE O105.1

Proponents: William Koffel, Koffel Associates, Inc., National Trash and Recycling Valet Association (wkoffel@koffel.com)

2024 International Fire Code

Delete and substitute as follows:

~~APPENDIX O VALET TRASH AND RECYCLING COLLECTION IN GROUP R-2 OCCUPANCIES~~

SECTION 305 VALET TRASH COLLECTION

Revise as follows:

VALET TRASH COLLECTION. A~~n intermediary~~ service that removes trash or recycling materials placed outside of *dwelling units* or *sleeping units* for ~~final~~ collection.

Delete without substitution:

~~**304.1.1 Valet trash.**~~
~~*Valet trash collection* shall be permitted only where *approved*. The *owner* and *valet trash collection* service provider shall comply with the rules and limitations established by the jurisdiction.~~

Revise as follows:

~~O101.1~~ 305.1 General..
Valet trash collection in Group R-2 occupancies shall comply with this ~~appendix~~ section.

~~O102.1~~ 305.2 ~~General~~ Containers.
Containers used for *valet trash collection* shall comply with Sections ~~O102.2~~ 305.2.1 through ~~O102.5~~ 305.2.4.

~~O102.2~~ 305.2.1 Integrity.
Valet trash or recycling materials shall be stored in containers that are of liquid-tight construction and equipped with lids. Lids shall be in the fully closed position.

~~O102.3~~ 305.2.2 Height.
Containers shall not exceed 30 inches (762 mm) in height.

~~O102.4~~ 305.2.3 Capacity and limit.
Individual containers shall not exceed 2.0 cubic feet (15 gallons; 56.8 L) in capacity. Only one trash or recycling container per *dwelling unit*or*sleeping unit*shall be permitted to be placed outside the *dwelling unit*or *sleeping unit*at one time. Trash and recycling containers shall not be placed outside a *dwelling unit*or *sleeping unit* at the same time.

~~O102.5~~ 305.2.4 Construction materials.
Containers and lids used for *valet trash collections* shall be constructed entirely of noncombustible materials or of materials that meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

~~O103.1~~ 305.3 ~~General~~ Placement of containers..
Placement of containers used for *valet trash collection* outside a *dwelling unit* or *sleeping unit* shall comply with Sections ~~O103.2~~ 305.3.1

and ~~O103.3~~ 305.3.2.

~~O103.2~~ 305.3.1 Minimum means of egress width.
Containers used for *valet trash collection* shall not obstruct the minimum required egress width.

~~O103.3~~ 305.3.2 Stairways.
Containers used for *valet trash collection*shall not be placed on stair risers, within minimum required stairway landing dimensions or anywhere in an *interior exit stairway*.

~~O104.1~~ 305.4 Time limits.
Filled containers used for valet trash or recycling services shall not be placed outside a *dwelling unit* for more than 6 hours within any 24-hour period. Empty *approved* containers used for valet trash or recycling services shall not remain in a *corridor* for more than 12 continuous hours in a 24-hour period.

~~O104.2~~ 305.5 Collection rules.
The property owner or manager shall have written valet service rules, hours and penalties provided to all tenants and occupants. The property owner or manager shall be responsible for implementing, monitoring and enforcing all *valet trash collection* rules. A copy of the rules shall be provided to the *fire code official*upon request.

~~O104.3~~ 305.6 Suspension of service.
The *fire code official* has the authority to order the suspension of *valet trash collection* that is not in compliance with this ~~appendix~~ Section.

Delete without substitution:

~~SECTION O101~~ ~~SCOPE~~

~~SECTION O102~~ ~~CONTAINERS~~

~~SECTION O103~~ ~~CONTAINER LOCATION~~

~~SECTION O104~~ ~~ADDITIONAL REQUIREMENTS~~

~~SECTION O105~~ ~~REFERENCED STANDARDS~~

~~O105.1 General.~~
~~See Table O105.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.~~

~~TABLE O105.1 REFERENCED STANDARDS~~

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
ASTM E1354—17	*Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*	O102.5

Reason: The proponents of F8-21 indicated that Section 304.1.1 was needed because prior editions of the IFC did not prohibit valet trash collection services. As such, the proponents felt the need for users of valet trash collection serviced to receive approval and for the owner and code official to determine the appropriate requirements.

At the same time, the FCAC and industry worked to develop Appendix O which contains requirements for valet trash collection services where Appendix O is adopted. The purpose of the proposal is to relocate the provisions of Appendix O into a new Section of the IFC. As such, there will be specific requirements that apply to valet trash collection services.

The proposed text requires that the collection rules established between the service provider and the building owner/manager be provided to the fire official. The fire official has the authority to suspend the service when the collection rules and the requirements of Section 305 are not met. As such, the intent of the proponents of F8-21 is met because the fire official has stated requirements that must be met and ability to suspend the service when the requirements are not met.

Technically, the proposal does not change the provisions of Appendix O.

It should also be noted that similar provisions are included in the 2024 Edition of NFPA 101.

The change to the definition is consistent with concerns expressed during the last revision cycle related to the definition contained in F8-21. Actually, the ICC membership approved two definitions during the last cycle since there was also a definition in Appendix O that was also approved. The concern with the existing definition is that it could apply more broadly to the curb side trash collection services.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Moving the requirements in Appendix O do the body of the IFC does not result in an impact on the cost of construction.

F40-24

F41-24

IFC: 308.3.1 (New)

Proponents: Bruce Swiecicki, National Propane Gas Association, National Propane Gas Association (bswiecicki@npga.org)

2024 International Fire Code

Add new text as follows:

308.3.1 Open-flame decorative devices. Open-flame decorative devices shall comply with all of the following restrictions:

1. Class I and Class II liquids shall not be used.
2. Fuel gas appliances shall be listed and installed in accordance with the *International Fuel Gas Code*.
3. Liquid- or solid-fueled lighting devices containing more than 8 ounces (237 ml) of fuel must self-extinguish and not leak fuel at a rate of more than 0.25 teaspoon per minute (1.26 ml per minute) if tipped over.
4. The device or holder shall be constructed to prevent the spillage of liquid fuel or wax at the rate of more than 0.25 teaspoon per minute (1.26 ml per minute) when the device or holder is not in an upright position.
5. The device or holder shall be designed so that it will return to the upright position after being tilted to an angle of 45 degrees (0.79 rad) from vertical.

   Exception: Devices that self-extinguish if tipped over and do not spill fuel or wax at the rate of more than 0.25 teaspoon per minute (1.26 ml per minute) if tipped over.

6. The flame shall be enclosed except where openings on the side are not more than 0.375-inch (9.5 mm) diameter or where openings are on the top and the distance to the top is such that a piece of tissue paper placed on the top will not ignite in 10 seconds.
7. Chimneys shall be made of noncombustible materials and securely attached to the open-flame device.

   Exception: A chimney is not required to be attached to any open-flame device that will self-extinguish if the device is tipped over.

8. Fuel canisters shall be safely sealed for storage.
9. Storage and handling of *combustible liquids* shall be in accordance with Chapter 57.
10. Shades, where used, shall be made of noncombustible materials and securely attached to the open-flame device holder or chimney.
11. Candelabras with flame-lighted candles shall be securely fastened in place to prevent overturning, and shall be located away from occupants using the area and away from possible contact with drapes, curtains or other combustibles.

Reason: There is no reason to prohibit fuel gas appliances for use with natural gas or propane when those appliances are listed and installed in accordance with the fuel gas code. The International Fuel Gas Code references the following decorative appliances that may have open flames:

ANSI Z21.60 Decorative Gas Appliances for Installation in Solid-Fuel Burning Fireplaces

ANSI Z21.97 Outdoor Decorative Appliances

There are potentially other listed appliances that may be suitable for this application as well. LP-Gas systems are closed systems that cannot spill like a container for a combustible or flammable liquid. There are safety features built into the performance standards for these appliances that other open flame devices may not have.

Bibliography: The following documents are referenced in the reason statement:

International Fuel Gas Code

ANSI Z21.60 Decorative Gas Appliances for Installation in Solid-Fuel Burning Fireplaces

ANSI Z21.97 Outdoor Decorative Appliances

Cost Impact: Increase

Estimated Immediate Cost Impact:

There may be an increased cost associated with installing fuel gas decorative appliances as opposed to other open flame, decorative appliances. The cost of the appliance installed can be a few hundred dollars. If the appliance is fueled by a hard-piped gas system, the cost to run that piping may be a few hundred dollars as well. Total cost could be between $500 and $1,000, depending on the type of appliance and additional features.

Estimated Immediate Cost Impact Justification (methodology and variables):

The methodology I used to determine the cost impact was based on personal experience.

Estimated Life Cycle Cost Impact:

Assuming that the fuel gas appliance functions properly for 15 years, the life cycle cost impact would include the initial installation and the fuel gas that it takes to operate the appliance. Roughly, the cost of the fuel gas over that 15-year period would be $1,500, so the total life cycle cost impact would be between $2,000 and $2,500.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

I used current gas pricing for propane and an estimated 200 hours of operation per year, or 3,000 hours over the life of the appliance. For a 20,000 Btuh appliance, that equates to about 750 gallons of propane. At $2.00 per gallon, that equates to $1,500 over the life cycle.

F41-24

F42-24

IFC: SECTION 202 (New), SECTION 202, SECTION 309, 309.1, 309.2.1 (New), 309.3, 309.4, 309.5, 309.6, 309.3.1 (New), 309.3.2 (New), 309.3.3 (New), 309.4 (New), 309.5 (New), 309.7

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new definition as follows:

FUEL-POWERED INDUSTRIAL EQUIPMENT.
A motorized hand truck, floor scrubber or buffer or similar device with an internal combustion engine intended to be personally driven or guided, powered by a hydrogen fuel cell, flammable or combustible liquid or flammable gas.

Revise as follows:

FUEL-POWERED INDUSTRIAL TRUCK. A forklift, tractor, platform lift truck or similar apparatus ~~motorized hand truck~~ powered by an ~~electrical motor~~ or internal combustion engine fueled by a hydrogen fuel-cell, flammable or combustible liquid or flammable gas. ~~Powered industrial trucks do not include farm vehicles or automotive vehicles for highway use.~~

SECTION 309
FUEL-POWERED INDUSTRIAL TRUCKS AND EQUIPMENT

309.1 General.
Fuel-Powered industrial trucks and *fuel-powered industrial equipment* ~~similar equipment including, but not limited to, floor scrubbers and floor buffers~~, shall be operated and maintained in accordance with this Section ~~Sections 309.2 through 309.7.~~

Add new text as follows:

309.2.1 Fuel-powered industrial equipment.. *Fuel-powered industrial equipment* shall be *listed* for their intended use and shall be operated in accordance with their listing and the manufacturer’s instructions.

Delete without substitution:

~~**309.3 Battery chargers.** Battery chargers shall be of an *approved* type. Combustible storage shall be kept not less than 3 feet (915 mm) from battery chargers. Battery charging shall not be conducted in areas open to the public.~~

~~**309.4 Ventilation.** Ventilation shall be provided in an *approved* manner in battery-charging areas to prevent a dangerous accumulation of *flammable gases*.~~

~~**309.5 Fire extinguishers.**~~
~~Battery-charging areas shall be provided with a fire extinguisher complying with Section 906 having a minimum 4-A:20-B:C rating within 20 feet (6096 mm) of the battery charger.~~

Revise as follows:

~~309.6~~ 309.3 Refueling.
Fuel-Powered industrial trucks ~~using liquid fuel, LP-gas or hydrogen~~ shall be refueled outside of buildings or in areas specifically *approved* for that purpose. ~~Fixed fuel-dispensing equipment and associated fueling operations shall be in accordance with Chapter 23. Other fuel-dispensing equipment and operations, including cylinder exchange for LP-gas-fueled vehicles, shall be in accordance with Chapter 57 for *flammable* and *combustible liquids* or Chapter 61 for LP-gas.~~

Add new text as follows:

309.3.1 Fuel dispensing equipment. Fixed fuel-dispensing equipment and associated fueling operations shall be in accordance with Chapter 23.

309.3.2 Fuel dispensing operations.. Other fuel-dispensing equipment and operations, including cylinder exchange for LP-gas-fueled vehicles, shall be in accordance with Chapter 57 for *flammable* and *combustible liquids* or Chapter 61 for LP-gas.

309.3.3 Fire extinguishers.. Indoor refueling areas shall be provided with a fire extinguisher complying with Section 906 having a minimum 4-A:20-B:C rating within 20 feet (6096 mm) of the refueling area.

309.4 Hydrogen fueled industrial trucks. Fuel-powered industrial trucks utilizing hydrogen as a fuel shall be operated and maintained in accordance with applicable requirements in Chapter 23 of this code, the International Mechanical Code and NFPA 2.

309.5 Automatous fuel-powered industrial trucks. Automatous fuel-powered industrial trucks shall immediately return to an approved predetermined location upon activation of the manual fire alarm system or automatic fire detection system and shall remain stationary until manually reactivated following the reset of the fire alarm system.

Revise as follows:

~~**309.7**~~ **309.6 Repairs.** Repairs to fuel systems~~, electrical systems~~ and repairs utilizing open flame or welding shall be done in *approved* locationsoutside of buildings or in areas specifically *approved* for that purpose in accordance with applicable requirements in Section 2311.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

This proposal adds a new definition (FUEL-POWERED INDUSTRIAL EQUIPMENT) and revises the definition (FUEL-POWERED INDUSTRIAL TRUCK).

Section 309 will now contain only requirements for fuel-powered industrial trucks and equipment. All requirements for battery powered equipment, devices and similar apparatus will be consolidated into a new IFC Section (322).This proposal also clarifies and contains the requirements for all types of fuel sources, other than those that are battery-powered, used in powered trucks and equipment.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There are no new requirements associated with this proposal and no impact to cost of construction. This simply focuses on the requirements for industrial trucks and equipment other than those powered by batteries.

F42-24

F43-24

IFC: 309.2

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Revise as follows:

309.2 ~~Use in hazardous (classified) locations~~ Listing.
Powered industrial trucks ~~used in areas designated as hazardous (classified) locations in accordance with NFPA 70~~ shall be *listed* and *labeled* for use in the environment intended in accordance with NFPA 505.

Reason: Regardless of the environment where used, powered industrial trucks should be listed and labeled for the environment intended in accordance with NFPA 505 (Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations).

This proposal clarifies the intended reference to and compliance with NFPA 505. The scope of NFPA 505 covers all environments, not just hazardous (classified) environments.

The standards, UL 558 (Industrial Trucks, Internal Combustion Engine Powered and UL 583 (Electric Battery Powered Industrial Trucks) are both referenced in NFPA 505 and address the associated hazards for both internal combustion engine powered (such as LP-gas, gasoline, diesel and CNG) and electric battery powered (such as Li-ion battery) industrial trucks.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

No increase in the cost of construction. NFPA 505 is already in use and compliance is an existing IFC requirement.

F43-24

F44-24

IFC: CHAPTER 3, SECTION 310, 310.1, 310.1.1 (New), 310.2, 310.2.1, 310.3, 310.4, 310.5, 310.6, 310.7, 310.8, 1207.10.4.1, 1207.10.7.7

Proponents: Marcelo Hirschler, GBH International, GBH International (mmh@gbhint.com); Geoffrey Raifsnider, Global Finishing Solutions, Self (graifsnider@globalfinishing.com)

2024 International Fire Code

CHAPTER 3 GENERAL REQUIREMENTS

Revise as follows:

SECTION 310
SMOKING AND VAPING

310.1 General.
~~The smoking~~ Smoking, vaping or carrying of a lighted pipe, cigar, cigarette or any other type of smoking or vaping paraphernalia or material is prohibited in the areas indicated in Sections 310.2 through 310.8.

Add new text as follows:

310.1.1 Applicability. Wherever, sections of the present code reference smoking, both smoking and vaping are intended to be referenced, unless otherwise stated.

Revise as follows:

310.2 Prohibited areas. Smoking and vaping shall be prohibited where conditions are such as to make such practices ~~smoking~~ a hazard, and in spaces where flammable or combustible materials are stored or handled.

Exception: In Group I-2 occupancies, patients shall be permitted to smoke or vape in designated patient care areas based on the clinical needs of the patient.

310.2.1 Group I-2. In Group I-2 occupancies, smoking and vaping shall be prohibited in patient care areas or where oxygen is used, stored or handled.

310.3 "No Smoking" signs.
The *fire code official* is authorized to order the posting of "No Smoking" or "No Vaping" signs or the international symbol for no smoking in a conspicuous location in each structure or location in which smoking or vaping is prohibited. The content, lettering, size, color and location of required "No Smoking" or "No Vaping" signs shall be *approved*.

Exception: "No Smoking" or "No Vaping" signs are not required in interior locations of the facility where signs are displayed at all major entrances into the facility.

310.4 Removal of signs prohibited. ~~A posted~~ Posted "No Smoking" or "No Vaping" signs ~~sign~~ shall not be obscured, removed, defaced, mutilated or destroyed.

310.5 Compliance with "No Smoking" or "No Vaping" signs. Smoking or vaping shall not be permitted nor shall a person smoke, vape, throw or deposit any lighted or smoldering substance in any place where "No Smoking" or "No Vaping" signs are posted.

310.6 Ash trays. Where smoking or vaping are ~~is~~ permitted, suitable noncombustible ash trays or match receivers shall be provided on each table and at other appropriate locations. In Group I-2 occupancies, noncombustible metal containers with self-closing covers shall be provided in areas where smoking is permitted.

310.7 Burning objects. Lighted matches, cigarettes, cigars or other burning object shall not be discarded in such a manner that could cause ignition of other combustible material.

Revise as follows:

310.8 Hazardous environmental conditions. Where the *fire code official* determines that hazardous environmental conditions necessitate controlled use of smoking or vaping materials, the ignition or use of such materials in mountainous, brush-covered or forest-covered areas or other designated areas is prohibited except in *approved* designated smoking or vaping areas.

1207.10.4.1 Deployment documents.
The following information shall be provided with the operation permit applications for mobile ESS deployments:

1. Relevant information for the mobile ESS equipment and protection measures in the *construction documents* required by Section 1207.1.5.
2. Location and layout diagram of the area in which the mobile ESS is to be deployed, including a scale diagram of all nearby exposures.
3. Location and content of signage, including no smoking or no vaping signs.
4. Description of fencing to be provided around the ESS, including locking methods.
5. Details on fire suppression, smoke and automatic fire detection, system monitoring, thermal management, exhaust ventilation and explosion control, if provided.
6. For deployment, the intended duration of operation, including anticipated connection and disconnection times and dates.
7. Location and description of local staging stops during transit to the deployment site. See Section 1207.10.7.5.
8. Description of the temporary wiring, including connection methods, conductor type and size, and circuit overcurrent protection to be provided.
9. Description of how fire suppression system connections to water supplies or extinguishing agents are to be provided.
10. Contact information for personnel who are responsible for maintaining and servicing the equipment, and responding to emergencies as required by Section 1207.1.8.1. [material based on NFPA 855 (2023)]

1207.10.7.7 Smoking and Vaping.
Smoking and vaping shall be prohibited within 10 feet (3048 mm) of mobile ESS. Signs shall be posted in accordance with Section 310.

Reason: Recently it was found that vaping and vaping materials can also provide an ignition hazard. In fact, in California a severe fire incident has been determined to be related to vaping.

Cost Impact: Increase

Estimated Immediate Cost Impact:

There will be some added cost associated with revised or new signs dealing with vaping. Research indicates that new “no smoking signs” and “no smoking no vaping signs” are available at the same cost. The additional cost would be in the replacement of existing signage. The cost impact for new construction should be negligible or $0.

Estimated Immediate Cost Impact Justification (methodology and variables):

The submitters are not able to estimate the added cost.

F44-24

F45-24

IFC: SECTION 312, 312.1, 312.2, 312.3, 1207.11.7.1, FIGURE 1207.11.7.1, 1207.11.7.2, 1207.11.7.3, 1207.11.7

Proponents: Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com); Darcy Davidson, Carlsbad Fire Department, California Fire Prevention Officers (darcy.davidson@carlsbadca.gov)

2024 International Fire Code

SECTION 312
VEHICLE IMPACT PROTECTION

Revise as follows:

312.1 General.
Vehicle impact protection required by this code within a garage or elsewhere ~~shall be provided by posts that comply with Section 312.2 or by other *approved* physical barriers that comply with Section 312.3~~ in accordance with Section 312.1.1 or 312.1.2 shall be provided with impact protection in accordance with Section 312.1.3.

Delete without substitution:

~~**312.2 Posts.** Guard posts shall comply with all of the following requirements:~~

1. ~~Constructed of steel not less than 4 inches (102 mm) in diameter and concrete filled.~~
2. ~~Spaced not more than 4 feet (1219 mm) between posts on center.~~
3. ~~Set not less than 3 feet (914 mm) deep in a concrete footing of not less than a 15-inch (381 mm) diameter.~~
4. ~~Set with the top of the posts not less than 3 feet (914 mm) above ground.~~
5. ~~Located not less than 3 feet (914 mm) from the protected object.~~

~~**312.3 Other barriers**~~.
~~Barriers, other than posts specified in Section 312.2, that are designed to resist, deflect or visually deter vehicular impact commensurate with an anticipated impact scenario shall be permitted where *approved*.~~

Revise as follows:

~~1207.11.7.1~~ 312.1.1 Garages.
Where ~~an ESS~~ equipment or appliances are ~~is~~ installed or located in the normal driving path of vehicle travel within a garage, impact protection complying with Section ~~1207.11.3~~ 312.1.3 shall be provided. The normal driving path is a space between the garage vehicle opening and the interior face of the back wall to a height of 48 inches (1219 mm) above the finished floor. The width of the normal driving path shall be equal to the width of the garage door opening. Impact protection shall also be provided for an ESS installed at either of the following locations (see Figure ~~1207.11.7.1~~ 312.1.2):

1. On the interior face of the back wall and located within 36 inches (914 mm) to the left or to the right of the normal driving path.
2. On the interior face of a side wall and located within 24 inches (610 mm) of the back wall and 36 inches (914 mm) of the normal driving path.

Exception: Where the clear height of the vehicle garage opening is 7 feet 6 inches (2286 mm) or less, ~~ESS~~ equipment or appliances installed not less than 36 inches (914 mm) above the finished floor are not subject to vehicle impact protection requirements.

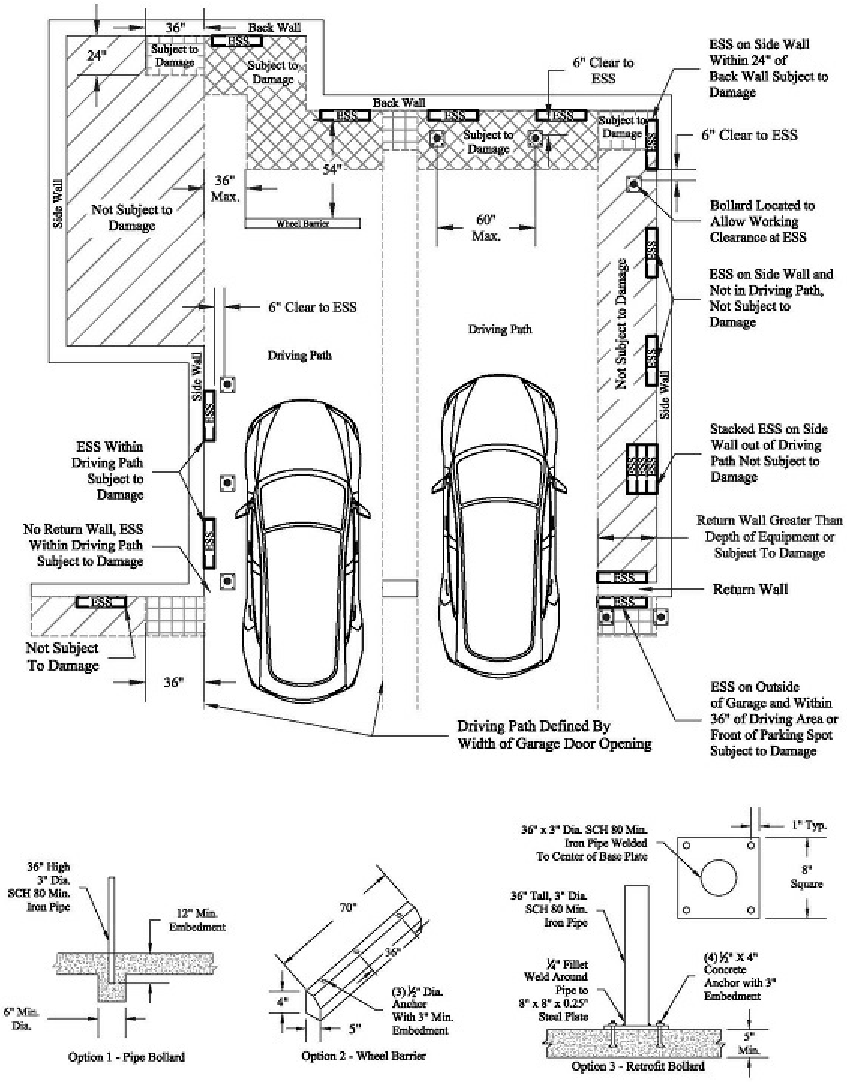


FIGURE ~~1207.11.7.1~~ 312.1.1 ~~ESS~~ VEHICLE IMPACT PROTECTION

~~1207.11.7.2~~ 312.1.2 Other locations subject to vehicle impact.

Where ~~an ESS~~ a feature, appliance or equipment is installed in a location other than as defined in Section ~~1207.11.7.1~~ 312.1.1 and is subject to vehicle damage, impact protection shall be provided in accordance with Section ~~1207.11.7.3~~ 312.1.3.

~~1207.11.7.3~~ 312.1.3 Impact protection options.

Where ~~ESS~~ a feature, appliance or equipment is required to be protected from impact in accordance with Section ~~1207.11.7.1~~ 312.1.1 or ~~1207.11.7.2~~ 312.1.2, such protection shall comply with one of the following:

1. Bollards constructed in accordance with one of the following:
   1.1. Minimum 48 inches (1219 mm) in length by 3 inches (76 mm) in diameter Schedule 80 steel pipe embedded in a concrete pier not less than 12 inches (304 mm) deep and 6 inches (152 mm) in diameter, with at least 36 inches (914 mm) of pipe exposed, filled with concrete and spaced at a maximum interval of 5 feet (1524 mm). Each bollard shall be located not less than 6 inches (152 mm) from ~~an ESS~~ a feature appliance or equipment.
   1.2. Minimum 36 inches (914 mm) in height by 3 inches (76 mm) in diameter Schedule 80 steel pipe fully welded to a minimum 8 inches (203 mm) by ¼-inch (6.4 mm) thick steel plate and bolted to a concrete floor by means of four ½-inch (13 mm) concrete anchors with 3-inch (76 mm) minimum embedment. Spacing shall be not greater than 60 inches (1524 mm), and each bollard shall be located not less than 6 inches (152 mm) from the ~~ESS~~ feature, appliance or equipment.
   1.3. Premanufactured steel pipe bollards shall be filled with concrete and anchored in accordance with the manufacturer's installation instructions, with spacing not greater than 60 inches (1524 mm). Each bollard shall be located not less than 6 inches (152 mm) from the ~~ESS~~ feature, appliance or equipment.

2. Wheel barriers constructed in accordance with one of the following:
   2.1. Four inches (102 mm) in height by 5 inches (127 mm) in width by 70 inches (1778 mm) in length wheel barrier made of concrete or polymer, anchored to the concrete floor not less than every 36 inches (914 mm) and located not less than 54 inches (1372 mm) from the ~~ESS~~ feature, appliance or equipment. Minimum 3½-inch (89 mm) diameter concrete anchors with 3-inch (76 mm) embedment per barrier shall be used. Spacing between barriers shall be not greater than 36 inches (914 mm).
   2.2. Premanufactured wheel barriers shall be anchored in accordance with the manufacturer's installation instructions.
3. *Approved* method designed to resist a 2,000-pound-force (8896 N) impact in the direction of travel at 24 inches (610 mm) above grade.

1207.11.7 Protection from impact.
ESS installed in a location subject to vehicle damage ~~in accordance with Section 1207.11.7.1 or 1207.11.7.2~~ shall be provided with impact protection in accordance with Section ~~1207.11.7.3~~ 312.

Reason: Last cycle comprehensive guidance was developed in Section 1207 for ESS subject to vehicle impact due to the lack of sufficient guidance within the International Series of codes. Recognized options for impact protection within garages was added in addition to ballads.

This proposal takes that comprehensive language and replaces the existing language in Section 312 to provide for the more comprehensive guidance for any location the fire code requires impact protection for.

Section 1207.11.7 is modified to point to Section 312 as occurs throughout the fire code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal does not create a new reuirement, it takes existing language proividing greater detail and increased methods of compliance and relocates it to a section covering the same topic.

F45-24

F46-24

IFC: 315.3.4; IBC: 311.1.2, 413.1, 413.2

Proponents: Jeffrey Michael Hugo, National Fire Sprinkler Association, National Fire Sprinkler Association (hugo@nfsa.org); John Swanson, National Fire Sprinkler Association, NFSA (swanson@nfsa.org)

2024 International Fire Code

Revise as follows:

315.3.4 Attic, under-floor and concealed spaces. Attic, under-floor and concealed spaces used for storage of combustible materials shall be protected on the storage side as required for 1-hour *fire-resistance-rated* construction. Openings shall be protected by assemblies that are self-closing and are of noncombustible construction or solid wood core not less than 1$^{3}/_{4}$ inches (44.5 mm) in thickness. Storage shall not be placed on exposed joists.

Exceptions:

1. Where spaces are ~~Areas~~ protected by *approved automatic sprinkler systems*.
2. Group R-3 and Group U occupancies.

2024 International Building Code

Revise as follows:

311.1.2 Combustible storage.
High-piled *combustible* ~~stock or rack~~ *storage,* or *attic*, under-floor and concealed spaces used for storage of combustible materials, shall be in accordance with Section 413.

413.1 General.
High-piled *combustible* ~~stock or rack~~ *storage* in any occupancy group shall comply with Section 315 or Chapter 32 of the *International Fire Code* .

413.2 Attic, under-floor and concealed spaces.
Attic, under-floor and concealed spaces used for storage of combustible materials shall be protected on the storage side as required for 1-hour fire-resistance-rated construction. Openings shall be protected by assemblies that are *self-closing* and are of noncombustible construction or solid wood core not less than 1$^{3}/_{4}$ inches (45 mm) in thickness.

Exception: Neither fire-resistance-rated construction nor opening protectives are required in any of the following locations:

1. Where spaces are ~~Areas~~ protected by *approved automatic sprinkler systems*.
2. Group R-3 and U occupancies.

Reason: This proposal addresses the combustible storage references in the IBC and IFC.

Throughout: Removes the specific terms “stock and rack” as these terms limit the application of this section. Storage protection can be high-piled and rack, but these terms leave out other methods, such as shelf storage. This change uses the IFC definition of high-piled combustible storage, which reads:

> *HIGH-PILED COMBUSTIBLE STORAGE. Storage of combustible materials in closely packed piles or combustible materials on pallets, in racks or on shelves where the top of storage is greater than 12 feet (3658 mm) in height. Where required by the fire code official, high-piled combustible storage also includes certain high-hazard commodities, such as rubber tires, Group A plastics, flammable liquids, idle pallets and similar commodities, where the top of storage is greater than 6 feet (1829 mm) in height.*

IBC 413.1: Uses the italicized definition of high-piled storage and then points the IBC user to the specific sections of the IFC.

IBC 413.2 and IFC 315.3.4: The title of these sections and the first sentence of these sections use the term “space”, but both exception 1 uses the term “areas”. It would be important to have these terms correlated for consistency in the document. The change in both exception 1 sections clarify that sprinklers would be required in these spaces to gain the exception. NFPA 13 does prohibit storage in unsprinklered concealed spaces but would require sprinklers in these spaces if storage is present. This change notifies the user that sprinklers would need to be installed in these spaces if storage is present.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is a correlation on the application of the codes.

F46-24

F47-24

IFC: 316.5

Proponents: Stephen Burd, VP Enterprise Security, Essence USA, Essence USA (stephenbu@essence-usa.com)

2024 International Fire Code

Revise as follows:

316.5 Security device. Any security device or system that unexpectedly emits any medium that could obscure a *means of egress* in any building, structure or premise shall be prohibited.

Reason: Unfortunately, the nature of crime has changed for the worse with more violent crimes, shootings, and smash-and-grabs causing high levels of retail theft and personnel safety issues. Security systems like all technology must be allowed to evolve to address these issues. When properly installed and with proper 1st responder prior notification, a controlled partial obscuration can effectively address these issues and save property and lives without egress concerns.

Bibliography: Vice President, Enterprise Security Solutions, Vice President Enterprise Security Solutions

- - Essence is a global provider of IoT connected-living and cybersecurity solutions for communication, security, and healthcare service providers, serving households and small-medium businesses. Leveraging 25 years of experience and innovation with a global presence and 50 million devices deployed worldwide, Essence is committed to developing and supporting solutions that enhance partners' businesses and enable people to live fuller, better lives. The Essence USA video solutions and security division is committed to serving smart-city and enterprise space with camera with AI and edge-analytics as well as personal security devices to ensure the safety of our people and investments.

    In the Vice President and Business Development role, supporting Essence efforts to introduce new technologies into the North American market in the video, AI, security, smart home, IoT, 5G, personal safety and healthcare markets.

https://www.linkedin.com/in/stephenburd/

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This change will have no cost impact on construction.

F47-24

F48-24

IFC: 316.7 (New), 316.7.1 (New), 316.7.2 (New), 316.7.2.1 (New), 316.7.2.2 (New), 316.7.3 (New)

Proponents: James Carver, Self, Southern California Fire Prevention Officer's Association

2024 International Fire Code

Add new text as follows:

316.7 Electrified fences. Electrified fences for securing commercial and industrial property shall meet the requirements of Sections 316.7.1 to 316.7.3.

316.7.1 Power requirements. The fence shall be powered by an electrical energizer with both of the following output characteristics:

1. The impulse repetition rate does not exceed 1 hertz (hz).
2. The impulse duration does not exceed 10 milliseconds, or $^{10}/_{10000}$ of a second.

316.7.2 Signage. The fence shall be identified by prominently placed and legible warning signs.

316.7.2.1 Placement. The warning signs shall be placed at each gate and access point, and on both sides of the fence, at intervals along the fence not exceeding 30 feet.

316.7.2.2 Marking. The warning signs shall be marked with a written warning or a commonly recognized symbol for shock, a written warning or a commonly recognized symbol to warn people with pacemakers, and a written warning or commonly recognized symbol about the danger of touching the fence in wet conditions.

316.7.3 System shut off switch. An approved shut off switch shall be installed allowing controlled access to the electrified fence system for the fire department to shut of power. The shut off switch shall be readily marked.

Reason: Electrified fences have been used for a very long time but have seen an increase for protecting commercial and warehouse properties from theft. Often, these fences are not marked or identified and pose a hazard to firefighters responding to emergencies. This section is provided to bring requirements for electrified fences, including electrical charge and pulse rate, signage and emergency shut of by firefighters to the Fire Code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

These requirements are only applicable if an electrified fence system is being installed, there is no additional cost to comply with the proposed sections. The requirements coincide with electrified fence requirements in the California Civil Code, and are considered an industry standard.

F48-24

F49-24

IFC: SECTION 317, 317.1, 317.2, 317.2.1, 317.2.2, 317.3, 317.4

Proponents: Mark Chubb, ManitouNW LLC, ManitouNW LLC (mark.chubb@manitounw.com)

2024 International Fire Code

Revise as follows:

SECTION 317
VEGETATIVE <u>WALLS</u> AND LANDSCAPED ROOFS

317.1 General.
Vegetative ~~roofs~~ <u>walls</u> and landscaped roofs shall comply with Sections <u>1405, 1412,</u> 1505 and 1507.15 of the International Building Code and be installed and maintained in accordance with Sections 317.2 through 317.4.

317.2 Vegetation.
Vegetation shall be maintained in accordance with Sections 317.2.1 and 317.2.2.

Revise as follows:

317.2.1 Irrigation. Supplemental irrigation shall be provided to maintain levels of hydration necessary to keep green plants alive and to keep dry foliage to a minimum.

317.2.2 Dead foliage. Excess biomass, such as overgrown vegetation, leaves and other dead and decaying material, shall be removed at regular intervals not less than two times per year.

Revise as follows:

317.3 Maintenance plan.
The *fire code official* is authorized to require a maintenance plan for ~~vegetation placed on roofs due to the size of a vegetative roof or landscaped roof area, materials used or where a fire hazard exists to the building or exposures doe to the lack of maintenance~~ vegetative walls and landscaped roofs. <u>The maintenance plan shall specify the number and types of plants used, the level of irrigation required to maintain plant health, the manner in which plant growth will be managed, and the manner and method for removing, collecting, and disposing dead foliage or biomass.</u>

317.4 Maintenance equipment.
Fueled equipment ~~stored on roofs and used~~ for the care and maintenance of vegetation on walls or roofs of buildings or structures shall be stored in accordance with Section 313.

Reason: The introduction and use of landscaping features to reduce climate impacts on buildings has expanded to include vertical as well as horizontal surfaces. Demand for vegetative wall features as a biophilic design element or as a measure for reducing urban heat island effects has become more common. These features, like landscaped roofs, have the potential to affect fire growth and spread via internal and external wall assemblies. The addition of language to this section expands and clarifies the intention to address these hazards whether they involve horizontal or vertical elements of the building, Changes in the section on maintenance equipment bring the language into closer alignment with the scope of the referenced section, which is unconcerned with whether the equipment is stored on the roof or elsewhere in or around the building.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The application of these requirements to vertical as well as horizontal surfaces is consistent with the original intent of the provisions and reflects changes in the demand for the biophilic building features. The proposed language addresses a hazard that introduces additional fixed and ongoing costs without adding a substantial additional cost burden beyond that already associated with the features themselves.

F49-24

F50-24

IFC: SECTION 202, 319.2.1, 319.3.2, 319.3.7

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

ADDITIVE MANUFACTURING. A process of joining materials to make objects from 3D model data, usually layer upon layer, sometimes referred to as 3D printing. This code recognizes two types of additive manufacturing:

Revise as follows:

319.2.1 Listing.
3D printers used in nonindustrial *additive manufacturing* shall be *listed* and *labeled* in accordance with ~~UL 2011~~, UL 60950-1 or UL 62368-1. The listing shall also verify:

1. The 3D printers are self-contained, ~~and~~ utilize maximum 6-liter ~~30-liter~~ prepackaged production materials, and have a maximum 3-liter build volume.
2. The operation of the 3D printers shall not create a hazardous (classified) electrical area or zone outside the unit.
3. If any hazardous (classified) electrical area or zone exists inside the unit's outer enclosure, the area shall be protected by intrinsically safe electrical construction or other acceptable protection methods.
4. The 3D printers shall not utilize inert gas or an external *combustible dust* collection system.

319.3.2 Listing.
~~3D printers used in~~ Industrial *additive manufacturing* equipment shall be *listed* and *labeled* in accordance with UL 2011 ~~or *approved* for the application based on a field evaluation conducted by an *approved* agency~~

319.3.7 Ancillary equipment. Pre-processing and post-processing ~~Ancillary~~ equipment used in industrial additive manufacturing, including equipment provided for recycling, sieving, vacuuming or handling combustible powders, shall comply with 319.3.2 ~~be designed and *approved* for such use~~.

Reason:

1. Revises the definition of industrial additive manufacturing to clarify that it also covers pre-processing and post-processing operations. Examples of typical post-processing equipment are included in 319.3.7. Also, depending on the equipment and production materials used, the process may or may not include inert gases and dust collection.
2. Corrects a typo in the nonindustrial manufacturing definition.
3. Revises 319.2.1 to deletes reference to UL 2011 since the scope of that standard covers industrial machines (not nonindustrial equipment). Also adds limits on 3D printer build volume and pre-packaged production material package size that are appropriate for nonindustrial 3D printing in offices and other non-factory settings where this equipment is typically used.
4. 319.3.2 - The listing in this section should cover all 3D printing equipment not just the printer. This includes the 3D printer and ancillary equipment (319.3.7) used for pre-processing and post-processing operations.
5. 319.3.2 - The reference to a field evaluation was deleted because this already an option for any equipment, not just 3D printers, and is addressed in Section 104.
6. The 319.3.7 requirements for ancillary equipment were revised to clarify that they only apply to industrial additive manufacturing operations, and that this equipment should comply with the 319.3.2 listing requirements. As written no guidance is provided to the code official on how to approve this equipment.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The changes in the definitions provide clarification and correct a typo. Deleting UL 2011 from 319.2.1 has no cost impact because we are not aware of any 3D printers intended for use in nonindustrial applications that are listed to UL 2011, or exceed the build and prepackaged sizes noted.

The change to 319.3.2 provides clarification on the types of industrial additive manufacturing equipment that are to be listed.

Among other things the change to 319.3.7 clarifies that the requirements do not apply to ancillary equipment used in nonindustrial additive manufacturing applications.

F50-24

F51-24

IFC: 320.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

320.1 General. The storage of lithium-ion and lithium metal batteries shall comply with Section 320.

Exceptions:

1. New or refurbished batteries installed in the equipment, devices or vehicles they are designed to power.
2. New or refurbished batteries packed for use with the equipment, devices or vehicles they are designed to power.
3. Batteries in original retail packaging that are rated at not more than 300 watt-hours for lithium-ion batteries or contain not more than 25 grams of lithium metal for lithium metal batteries.
4. Temporary storage of batteries or battery components during the battery manufacturing process prior to completion of final quality control checks.
5. Temporary storage of batteries during the vehicle manufacturing or repair process.
6. Batteries in use, staged for use after charging, or charging for use with equipment that are rated at 300 watt-hours or less for lithium-ion batteries or contain 25 grams or less of lithium metal for lithium metal batteries.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

This proposal adds Exemption 6 to clarify it is not the intent of this section to regulate miscellaneous small consumer size batteries in equipment (radios, power tools, etc.) or batteries staged or charging as is commonly found in maintenance areas, fire stations, contractor shops, etc.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal is editorial in nature to clarify small battery-powered equipment are not intended to be regulated by the Section of the IFC. It reduces cost by eliminating incorrect application of the section's requirements.

F51-24

F52-24

IFC: 320.4, 320.4.1 (New), 320.4.1, 320.4.1.2 (New), 320.4.1.3 (New), 320.4.2.3

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

320.4 Storage requirements.
Lithium-ion and lithium metal batteries shall be stored in accordance with Section 320.4.1, 320.4.2 or 320.4.3, as applicable.

Add new text as follows:

320.4.1 Limited indoor storage in containers. A maximum volume of 15 cubic feet (0.42 m3) of lithium-ion or lithium metal batteries per fire area shall be permitted where stored in accordance with any of the methods provided in Sections 320.4.1.1 through 320.4.1.3.

Revise as follows:

~~320.4.1~~ 320.4.1.1 ~~Limited indoor storage in containers~~ Used or unwanted battery collection.. ~~Not more than 15 cubic feet (0.42 m^3) of lithium-ion or lithium metal batteries be permitted to be stored in containers in accordance with all of the following:~~
Areas where used or unwanted lithium-ion or lithium metal batteries are collected from the public or employees shall comply with all of the following:

1. Containers shall be open top and constructed of noncombustible materials or shall be *approved* for battery collection.
2. Individual containers and groups of containers shall not exceed a capacity of 7.5 cubic feet (0.21 m^3).
3. A second container or group of containers shall be separated by not less than 3 feet (914 mm) of open space or 10 feet (3048 mm) of space that contains combustible materials.
4. Containers shall be located not less than 5 feet (1524 mm) from *exits* or *exit access* doors.

Add new text as follows:

320.4.1.2 Waste storage. Waste batteries that are packaged in accordance with DOTn shipping requirements.

320.4.1.3 Miscellaneous storage. Limited storage of lithium-ion or lithium metal batteries, other than collection of used or unwanted batteries, or waste storage, shall comply with any of the following:

1. Stored in containers complying with Section 320.4.1.1.
2. Stored in original wholesale packaging or containers complying with DOTn regulations.
3. Approved battery storage cabinets.
4. Other approved storage methods.

Revise as follows:

320.4.2.3 Fire protection systems.
Indoor storage areas for lithium-ion and lithium metal batteries shall be protected by an *automatic sprinkler system* complying with Section 903.3.1.1 or an *approved* alternative fire suppression system. ~~The system design shall be based on recommendations in the *approved* technical opinion and report required by Section 320.4.2.1.~~

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

This proposal accomplishes several things:

320.4.1.1 Revised the Limited Storage section to clarify the open top container storage (e.g., batteries placed loose into drums) are for collection of used or unwanted batteries from public or employees (identical to NFPA 855).

320.4.1.2 adds a provision for limited storage DOTn regulations require batteries placed in bags to prevent short circuiting, and space between filled with vermiculite. This is common practice and is safer than loose used battery collection into open drums. The quantity limit is still limited to 15 cf.

320.4.1.3 Adds a section general miscellaneous storage (still limited to 15 cf) to clarify that other storage configurations are allowed, and often are safer, than just the open top unwanted battery collection. This includes storage in original wholesale shipping containers and DOT packaging which has undergone extensive testing for shipping for lithium-ion batteries and cells. Tests include impact, crushing, altitude, discharge, overcharge, thermal testing, external short circuit, vibration, and shock. Batteries and cells in packaging complying with transport regulations provide a high-level of safety. See https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2021-09/Lithium-Battery-Guide.pdf

320.4.2.3 – A revision is included to correct an oversight in this section. It required the automatic fire sprinkler system design to be based on a Technical Report per 320.4.2.1, however many scenarios will have batteries with less than 30% SOC which exempts the Technical Report requirement. 903.3.1.1 has also been revised to provide additional guidance on the automatic fire sprinkler system design for lithium-ion battery protection. This section should simply point to 903.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

The core requirements relating to construction costs are currently included in the code now. Other than editorial clarifications, this proposal increases recognition of other currently available safe storage methods and eliminates an unnecessary technical report for those cases where storage is of batteries at 30% or less state of charge. These modifications reduce operating costs.

F52-24

F53-24

IFC: 320.4.3, 320.4.3.1 (New), 320.4.3.1, 320.4.3.2, 320.4.3.3, 320.4.3.5 (New), 320.4.3.6 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

320.4.3 Outdoor storage.
Outdoor storage of lithium-ion or lithium metal batteries shall comply with Sections 320.4.3.1 through ~~320.4.3.3~~ 320.4.3.6.

Add new text as follows:

320.4.3.1 Technical opinion and report. A technical opinion and report complying with Section 104.8.2 shall be prepared to evaluate the fire and explosion risks associated with outdoor storage of lithium ion and lithium metal batteries and to make recommendations for fire and explosion protection. The report shall be submitted to the fire code official and shall require the fire code official's approval. In addition to the requirements of Section 104.2.2, the technical opinion and report shall evaluate all of the following:

1. Compliance with this section.
2. Firefighting access and water supply for emergencies involving outdoor battery storage.
3. Outdoor battery fire and explosion hazards
4. Hazards involving flying debris during fire incidents igniting adjacent storage areas, buildings, or other exposure hazards.
5. Handling, storage and monitoring of damaged batteries and post-fire monitoring.

Revise as follows:

~~320.4.3.1~~ 320.4.3.2 Distance from storage to exposures. Outdoor storage of lithium-ion or lithium metal batteries~~, including storage beneath weather protection in accordance with Section 414.6.1 of the *International Building Code*,~~ shall comply with one of the following:

1. Battery storage shall be located not less than 20 feet (6096 mm) from any building, *lot line*, public street, public alley, public way or *means of egress*.
2. Battery storage shall be located not less than 3 feet (914 mm) from any building, *lot line*, public street, public alley, public way or *means of egress*, where the battery storage is separated by a 2-hour fire-resistance-rated assembly without openings or penetrations and extending 5 feet (1524 mm) above and to the sides of the battery storage area.
3. Battery storage shall be located not less than 3 feet (914 mm) from any building, *lot line*, public street, public alley, public way or *means of egress*, where batteries are contained in *approved,* prefabricated portable structures providing a complete 2-hour fire-resistance-rated enclosure.
4. A maximum of 15 cubic feet of lithium-ion or lithium metal batteries or cells packaged in accordance with DOTn shipping requirements where not less than 3 feet (914 mm) from any building with non-combustible exterior walls, lot line, public street, public alley, public way or means of egress.

~~320.4.3.2~~ 320.4.3.3 Storage area size limits and separation.
Outdoor storage areas for lithium-ion or lithium metal batteries~~, including storage beneath weather protection in accordance with Section 414.6.1 of the *International Building Code*,~~ shall not exceed 900 square feet (83.6 m^2). The height of battery storage in such areas shall not exceed 10 feet (3048 mm). Multiple battery storage areas shall be separated from each other by not less than ~~10 feet (3048 mm)~~ 20 feet (6096 mm) of open space.

~~320.4.3.3~~ 320.4.3.4 Fire detection.

Outdoor storage areas for lithium-ion or lithium metal batteries exceeding 900 sq. ft. (371 m^2), regardless of whether such areas are open, under weather protection or in a prefabricated portable structure, shall be provided with an *approved* automatic fire detection and alarm system complying with Section 907. The fire detection system shall use radiant energy-sensing fire detection.

Add new text as follows:

320.4.3.5 Containers. Containers for outdoor storage of used or waste batteries shall be open-top and constructed of noncombustible materials; containers complying with DOTn regulations for lithium-ion and lithium metal transportation or shall be approved for battery collection and storage.

320.4.3.6 Weather protection. Where weather protection is provided for sheltering outdoor lithium ion or lithium metal battery storage or use areas, such areas shall be considered outdoor storage or use where the weather protection structure complies with all of the following:

1. Walls shall not obstruct more than one side or more than 25 percent of the perimeter of the storage area.
2. The overhead structure shall be of approved noncombustible construction with a maximum area of 3,600 square feet (334.5 m2).
3. The distance from the structure to buildings, lot lines, public ways or means of egress to a public way shall be not less than the distance required for an outside storage in Section 320.4.3.2.
4. Weather protection structures used for sheltering lithium ion or lithium metal battery storage shall be separated from lithium ion or lithium metal battery piles or additional weather protection structures used to shelter lithium ion or lithium metal battery storage by no less than 20 feet (4572mm).
5. The height of battery storage in such areas shall not exceed 10 feet (3048 mm).

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

This proposal accomplishes the following:

320.4.3.1 removed reference to IBC Weather protection which only applies to hazardous materials, currently we don't treat this battery storage as hazardous materials, but we were pointing to a hazardous material provision for the weather protection. Added 320.4.3.6 to provide weather protection specific to battery storage which is consistent with the requirements of NFPA 855.

320.4.3.1 #4: provides some relief by adding a provision for limited storage for waste batteries as they are collected/packaged for offsite shipping (typically in 55-gallon drums) with batteries in bags to prevent short circuiting, and space between filled with vermiculite. This is common practice and allows for waste pack containers to be outside vs inside, which is generally a much safer option. The quantity limit is still limited to 15 cf consistent with indoor storage allowance. See https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/2021-09/Lithium-Battery-Guide.pdf

320.4.3.2 eliminates the reference to IBC weather protection, it is now addressed directly in its own section.

320.4.3.4 Adds a size threshold for fire detection, which can be complicated and expensive for outdoor design and maintenance. Increases consistency with NFPA 855.

320.4.3.5 Adds a container section for outdoor storage which prescribes allowable container types. .

320.4.3.5 Adds the weather protection requirements.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

The provisions of this revised section are focused upon outdoor storage and generally do not affect construction costs. This proposal increases storage options at locations where lithium-ion or lithium metal batteries are being stored outside, though the required technical report could present additional cost for locations that only have outdoor storage, (the report is currently necessary for any indoor storage over 15 cu. ft.), the permit costs are what are potentially increased in the short term, but overall costs are reduced in the long term by providing for an increase in storage options, increased weather protection structure size and allowance for small quantities in DOT shipping containers.

The justification is that by providing for recognition of approved DOT shipping container use and increasing the permissible size of the weather enclosure the over costs to a site storing batteries outside are reduced. Increasing storage options provides for cost containment. Requiring the technical report upfront identifies hazards and mitigation methods for those hazards, reducing long term operational costs for the facility and the emergency responders.

F53-24

F54-24

IFC: SECTION 320, 320.1, 320.1.1 (New), 320.1.2 (New), 320.5 (New), 320.5.1 (New), 320.5.2 (New), 320.5.3 (New), 320.5.4 (New), 320.5.5 (New), 320.5.6 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

Revise as follows:

SECTION 320
~~LITHIUM-ION AND LITHIUM METAL~~ BATTERY STORAGE

320.1 General. The storage of ~~lithium-ion and lithium metal~~ batteries shall comply with Section 320.

Exceptions:

1. New or refurbished batteries installed in the equipment, devices or vehicles they are designed to power.
2. New or refurbished batteries packed for use with the equipment, devices or vehicles they are designed to power.
3. Batteries in original retail packaging that are rated at not more than 300 watt-hours for lithium-ion batteries or contain not more than 25 grams of lithium metal for lithium metal batteries.
4. Temporary storage of batteries or battery components during the battery manufacturing process prior to completion of final quality control checks.
5. Temporary storage of batteries during the vehicle manufacturing or repair process.

Add new text as follows:

320.1.1 Lithium-ion and lithium metal batteries.. The storage of Lithium-ion and lithium metal batteries shall comply with Sections 320.2 through 320.4.3.3.

320.1.2 Other battery types. Batteries in storage, other than Lithium-Ion or Lithium metal batteries, shall comply with 320.5 through 320.5.6.

320.5 Other battery types general. Batteries in storage, other than Lithium-Ion or Lithium metal batteries, with a volume more than 15 cubic feet (0.42 m3) within a fire area shall be in compliance with 320.5.1 through 320.5.6.

320.5.1 Structural and seismic design.. Storage shall be protected against accidental dislodgement. Racks and shelving used for storage shall be designed in accordance with the *International Building Code* as applicable.

320.5.2 Impact protection.. Where battery storage is subject to vehicle traffic, the storage shall be protected against impact in accordance with Section 312 or other approved method.

320.5.3 Battery charging.
Battery charging shall be performed in accordance with manufacturer instructions utilizing listed or approved charging devices.

320.5.4 Mechanical exhaust system.. Where battery charging can produce flammable gases a mechanical exhaust system shall be provided in accordance with the International Mechanical Code. The mechanical exhaust system shall be designed to limit the maximum concentration of flammable gas to 25 percent of the lower flammable limit (LFL) of the total volume of the room, or area during the worst-case event of simultaneous charging of batteries at the maximum charge rate, in accordance with nationally recognized standards.

320.5.5 Spill control. Spill control supplies shall be provided to control liquid electrolyte spills. The method shall be capable of controlling a spill from the single largest battery stored or handled.

320.5.6 Hazard warning signage.. The entrances to battery storage areas shall be provided with warning signage that states, “BATTERY STORAGE AREA”, “ENERGIZED ELECTRICAL DEVICES" and lists the types of batteries present. The size, color and lettering shall be *approved.*

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

The purpose of this proposal is to provide some general guidance for safe storage of batteries other than lithium-ion and lithium metal. Numerous battery types can present a hazard if damaged or involved in an event. The basic requirements added here are current standards of care in the industry.

Structural and seismic protection are current code requirements, and that section reminds the user of this code that the topics be addressed as required in the International Building Code.

Impact protection is an industry regulatory standard and is a level of care applied by responsible operators.

Battery charging does occur if batteries are stored long enough for a discharge to occur down to an unacceptable level, that section informs the user of the code that the charging must be done properly.

Mechanical exhaust would be required currently based upon the general requirements of the IFC and IMC, this provision highlights that for the code user.

Spill control capabilities has long been a core requirement within the code, this section highlights the need and provides for the level of capability expected to be present.

The hazard warning sign is for emergency responder awareness, some jurisdictions require NFPA 704 placarding, but from a practical matter it is difficult to decide what the NFPA 704 markings should be when dealing with articles such as batteries. We went thru the same issue with ESS signage requirements an settled on straight forward informational signage as to the hazard which is what this requirement does.

In summary, there is nothing new in this new language that isn't already an industry requirement, adding the language gives all building owner/operators and code officials guidance on the standard of care. This proposal is part of a set of broader proposals including the creation of a new chapter addressing batteries.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The items provided in this proposal are either currently required by code in some manner or a current industry standard. Including these sections in the code provides necessary guidance for code officials and facility owner/operators who may lack knowledge of the current standards of care. They deal with operations someone chooses to move into a building, not the direct construction of the building itself.

F54-24

F55-24

IFC: 321.1

Proponents: Marcelo Hirschler, GBH International, GBH International (mmh@gbhint.com); Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

321.1 Artificial combustible vegetation on roofs and near buildings.
Artificial combustible vegetation exceeding 6 feet (1829 mm) in height and permanently installed outdoors within 5 feet (1524 mm) of a building or on the roof of a building shall comply with Section 807.4.1. The placement of artificial combustible vegetation shall also comply with Sections 806.3 and 807.4.2.

~~**Exception:** Artificial decorative vegetation located more than 30 feet (9144 mm) from the *exterior wall* of a building.~~

Reason: This proposal deletes the exception because the exception contradicts the provisions in the charging section.

The charging section states that artificial combustible vegetation must comply with the requirements if located within 5 feet of a building, and states that when there is more than a 5 foot separation the artificial vegetation does not need to comply.

The exception applies to artificial combustible vegetation located more than 30 feet from the *exterior wall* of a building, stating that if more than 30 feet. If it is more than 30 feet away from the building it is clearly more than 5 feet away and the section does not apply. The exception is not needed.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The exception has no affect and by deleting the exception it still has no affect.

This proposal removes an exception that is unclear on its application and contradicts the main requirement. If this requirement was actually being enforced, then there will be a decrease in construction costs because the owner will not need to purchase artificial vegetation meeting the flammability requirements.

F55-24

F56-24

IFC: SECTION 322 (New), 322.1 (New), 322.2 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new text as follows:

SECTION 322
NONCOMBUSTIBLE MATERIALS

322.1 Testing. Noncombustible materials shall be those materials that comply with Section 703.3.1 of the *International Building Code.*

322.2 Inherently noncombustible materials. Inherently noncombustible materials, such as concrete and steel, shall not be required to be tested to be acceptable as noncombustible materials.

Reason: In the area of material regulation, materials that pass ASTM E136 have long been considered to be those that are noncombustible materials.

Note that ASTM E136 is one of the very few ASTM fire test standards that has acceptance criteria. The acceptance criteria are different from the theoretical definition of a noncombustible material. The IBC includes in Chapter 7 added details on testing building materials to ASTM E136. Section 703.3.1 of the IBC includes also an exception that clarifies that some materials are acceptable for use as noncombustible materials irrespective of whether they "pass" ASTM E136.

There are definitions contained in the 2024 IMC and 2024 IFGC, and in the 2021 IPC, but they are actually more of a requirement than a definition.

In the area of material regulation, materials that pass ASTM E136 have long been considered in the US to be those that are noncombustible materials, and that concept is consistent with what IBC section 703.3 states.

The requirement for what constitutes a noncombustible material should be placed in a general requirement section, in Chapter 3.

If no requirement (or a definition containing a requirement) exists experience indicates that some material manufacturers have claimed that their material is noncombustible when it simply exhibits improved fire performance. When searching the internet, multiple web sites offer materials or products that are alleged to be noncombustible when that claim is incorrect. There is often a confusion in the public mind when considering a material that performs better than typical combustible materials, but should not be considered noncombustible.

This proposal recommends including a correct requirement for what materials shall be considered noncombustible materials and it is to comply with the IBC section 703.3.1. A second section states that a requirement for what is a noncombustible material does not mean that clearly noncombustible materials, such as steel, concrete, or masonry, need to be tested (for example to ASTM E136).

The language in section 703.3.1 of the IBC reads as follows:

> ***703.3.1 Noncombustible materials.*** *Materials required to be noncombustible shall be tested in accordance with ASTM E136. Alternately, materials required to be noncombustible shall be tested in accordance with ASTM E2652 using the acceptance criteria prescribed by ASTM E136.*
>
> ***Exception:*** *Materials having a structural base of noncombustible material as determined in accordance with ASTM E136, or with ASTM E2652 using the acceptance criteria prescribed by ASTM E136, with a surfacing of not more than 0.125 inch (3.18 mm) in thickness having a flame spread index not greater than 50 when tested in accordance with ASTM E84 or UL 723 shall be acceptable as noncombustible.*

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The code change proposal will not increase or decrease the cost of construction

This proposal adds a definition, which is consistent with long-held understanding of what is a noncombustible material.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal simply adds a clarification that is consistent with the existing requirement in the IBC.

F56-24

F57-24

IFC: 105.5.5 (New), SECTION 322, 322.1, 322.6 (New), 322.6.1 (New), 322.6.2 (New), 322.7 (New), UL Chapter 80 (New)

Proponents: Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

Add new text as follows:

105.5.5 Battery exchange operations. An operational permit is required for facilities providing battery exchange programs, or equipment provided for exchange of li-ion batteries, as regulated by Section 322.

SECTION 322
POWERED MICROMOBILITY DEVICES

Revise as follows:

322.1 General.
Lithium-ion and lithium metal battery *powered micromobility devices* shall be operated , charged, and maintained in accordance with this section.

Exceptions:

1. Storage, repair and charging in residential occupancies of *powered mobility devices*, provided that such devices are for personal use by its owner.
2. Charging of a single *powered mobility device* in any occupancy by its owner.

Add new text as follows:

322.6 Battery exchange.. Equipment or facilities providing battery exchange operations shall comply with Sections 322.6.1 and 322.6.2, and be *approved* by the fire code official.

322.6.1 Permit.. Facilities providing battery exchange programs or equipment provided for exchange of li-ion batteries shall require an operational permit in accordance with Section 105.5.5.

322.6.2 Listed and labeled.. Charging equipment utilized for battery exchange facilities or equipment shall be listed and labeled in accordance with UL 4900.

322.7 Damaged equipment.. The charging of damaged devices or batteries shall be prohibited.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

4900-2023 Outline of Investigation for Micromobility Charging Equipment

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Outline of Investigation for Micromobility Charging Equipment (UL 4900-2023)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: A new and growing operation is to provide for battery exchanges for devices that have removable batteries. As has been identified with mobility devices and batteries, approval and listing of the equipment used to charge the batteries is important to prevent thermal runaway events.

This proposal provides for an operation permit for these activities, approval of the fire code official and listing and labeling of the equipment used for charging activities.

An additional section added is to prohibit the charging of damage devices or batteries.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This new language does not impact construction. It provides for safely conducting battery charging operations.

F57-24

F58-24

IFC: SECTION 202, SECTION 202 (New), 105.5, 105.5.5 (New), SECTION 322, 322.1, 322.1.1, 322.1.1 (New), 322.2, 322.1.3 (New), 322.1.4 (New), 322.1.5 (New), 322.1.5.1 (New), 322.2 (New), 322.2.1 (New), 322.2.2 (New), 322.2.2.1 (New), 322.2.2.2 (New), 322.2.2.3 (New), 322.2.2.4 (New), 322.2.2.5 (New), 322.2.2.6 (New), 322.2.2.7 (New), 322.2.2.8 (New), 322.3 (New), 322.4, 322.4 (New), 322.5, 322.3, 322.6.1 (New), 322.6.2 (New), 322.6.3 (New), 322.6.4 (New), 322.7 (New), TABLE 903.2.11.6, UL Chapter 80 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

BATTERY-POWERED MICROMOBILITY DEVICES. Products or equipment that include Motorized bicycles, motorized scooters and other personal mobility devices intended for one or more riders powered by a lithium-ion or lithium metal battery. The term does not include automobiles and trucks built to DOT requirements. ~~motor vehicles that are required to be registered with the Department of Motor Vehicles for the state or jurisdiction~~

Add new definition as follows:

BATTERY-POWERED APPLIANCE.
A device or apparatus with an electric motor powered by a battery.

BATTERY-POWERED INDUSTRIAL EQUIPMENT.
A motorized hand truck, floor scrubber or buffer or similar device with an electric motor intended to be personally driven or guided, powered by a battery.

BATTERY-POWERED INDUSTRIAL TRUCK.
A forklift, tractor, platform lift truck or similar apparatus with an electric motor powered by a battery.

BATTERY-POWERED AUTOMATED MOBILE PLATFORMS (AMPs).
A device with an electric motor powered by a battery that provides an automated function involving lifting, carrying, product picking, towing, and similar operations. These devices may also be capable of automatous movement including operating, moving and completing automated functions independently, without direct human guidance or control.

BATTERY POWERED ROBOTIC EQUIPMENT.
A machine or device with an electric motor powered by a battery capable of automatically carrying out a complex series of actions using computer programing. This equipment may be permanently mounted or capable of autonomous movement where they have the means to determine path selection by processing data from sensors, powered by a battery.

Revise as follows:

105.5 Required operational permits.
The *fire code official* is authorized to issue operational permits for the operations set forth in Sections 105.5.2 through ~~105.5.54~~ 105.5.58.

Add new text as follows:

105.5.5 Battery powered devices, trucks, equipment and appliances. An operational permit is required for the use of a battery powered device, truck, equipment or appliance with a battery capacity greater than 300 Whs.

Revise as follows:

SECTION 322
BATTERY-POWERED ~~MICROMOBILITY~~ DEVICES, TRUCKS, EQUIPMENT

AND APPLIANCES

322.1 General.
~~Lithium-ion and lithium metal~~ *Battery-powered micromobility devices, battery-powered industrial trucks, battery-powered industrial equipment, battery-powered robotic equipment and battery-powered appliances* shall be operated and maintained in accordance with this section.

Exceptions:

1. Batteries with a capacity less than 300 Whs.
2. ~~1.~~ 2. Storage, ~~repair~~ and use ~~charging in residential occupancies~~ of powered mobility devices, in Group R-2 dwelling units or detached one- and two-family dwellings and townhouses, other than Group R-4, Condition 2 Occupancies, provided that such devices are for personal use by its owner. The charging location shall not obstruct the means of egress.
3. ~~2. Charging of a single powered mobility device in any occupancy by its owner.~~

Delete without substitution:

~~322.1.1 Prohibited locations~~.
~~The use of a residential occupancy as a business for the charging of commercially owned *powered micromobility devices* as part of a rental or sales service shall not be permitted.~~

Add new text as follows:

322.1.1 Operational permit. An operational permit shall be obtained from the *fire code official* in accordance with Section 105.5 for the use and battery charging operations regulated by this Section.

Revise as follows:

~~322.2~~ 322.1.2 Battery charging operations ~~chargers and equipment~~.
~~*Powered micromobility devices* shall be charged~~ Battery charging operations shall be in accordance with their device listing and the manufacturer’s instructions using only the original equipment manufacturer-supplied charging equipment or charging equipment in accordance with the listing and manufacturer’s instructions.

Add new text as follows:

322.1.3 Ventilation. Mechanical exhaust ventilation to the exterior shall be provided at the source in the charging location in accordance with *the International Mechanical Code*Chapter 5 to prevent the dangerous accumulation of any flammable or other hazardous gases that are produced or discharged by the battery during normal charging operation.

322.1.4 Spill control and neutralization. Approved methods and materials shall be provided for the control and neutralization of spills of electrolyte or other hazardous materials in areas containing batteries as follows:

1. For batteries with free-flowing electrolyte, the method and materials shall be capable of neutralizing a spill of the total capacity from the largest cell or block to a pH between 5.0 and 9.0.2.
2. For batteries with immobilized electrolyte, the method and material shall be capable of neutralizing a spill of 3.0 percent of the capacity of the largest cell or block in the room to a pH between 5.0 and 9.0.

322.1.5 Battery charging locations. Charging of any battery powered industrial equipment, battery powered industrial truck, battery powered robotic equipment or battery-powered appliance in any occupancy shall be in an approved outdoor location or in an indoor area that complies with Section 322.2.

322.1.5.1 Prohibited locations. Repair or charging operations for business purposes shall not be permitted in the following locations:

1. In a detached one- and two-family dwelling or townhouse occupied under the International Residential Code or R2, R3, or R4 Occupancies
2. In sleeping rooms or means of egress paths of R-1 Occupancies.

322.2 Requirements for indoor charging locations. Indoor charging operations shall be provided with fire detection, fire suppression and other hazard mitigation measures as required by this Section.

322.2.1 Charging requirements for lead-acid batteries. Indoor charging areas for lead-acid batteries shall comply with Section 322.1 and 322.2.2.8

322.2.2 Charging requirements for lithium-ion and lithium metal batteries. Indoor charging areas for lithium-ion and lithium metal batteries shall comply with Section 322.1 and 322.2.2.1 through 322.2.2.8

322.2.2.1 Fire suppression. The *fire area* containing the indoor charging location shall be protected by an *automatic sprinkler system* installed in accordance with Section 903.3.

322.2.2.2 Fire detection. The indoor charging location shall be protected by a fire alarm system utilizing a smoke detection system, thermal imaging system or radiant energy-sensing fire detection system

322.2.2.3 Electrical recepticles. The indoor charging location shall be provided with sufficient electrical receptacles to allow the charging equipment for each device to be directly connected to a receptacle installed in accordance with NFPA 70. The use of extension cords or relocatable power taps shall not be permitted.

322.2.2.4 Prohibited storage. Storage of combustible materials, combustible waste or hazardous materials shall not be permitted in the indoor charging location.

322.2.2.5 Means of egress. The charging operation shall not be conducted in or obstruct any required means of egress.

322.2.2.6 Storage enclosure. Removable batteries shall not be stacked or stored in an enclosed cabinet unless the cabinet is *listed* or is a specially designed battery containment enclosure *approved* for such purpose.

322.2.2.7 Battery charging seperation. A minimum distance of 18 inches (457.2 mm) shall be maintained between each removable storage battery during charging operations unless each battery is isolated from neighboring batteries by an *approved* fire-resistant material or is within a specially designed rack or cabinet designed and *approved* for such purpose.

322.2.2.8 Device charging seperation. A minimum of 18 inches (457.2 mm) shall be maintained between the locations of the batteries on each powered micromobility device, industrial truck, equipment, robot or appliance during charging operations.

322.3 Repairs. Repairs of *battery-powered micromobility devices*, *battery-powered industrial trucks*, *battery-powered industrial equipment*, *battery-powered appliances* and *battery-powered robotic equipment* shall be performed in *approved* locations outside of buildings or within buildings in areas specifically *approved* for that purpose.

Delete without substitution:

~~**322.4 Battery charging areas.**~~
~~Where *approved*, *powered micromobility devices* shall permitted to be charged in a room or area that complies with all of the following:~~

1. ~~Only *listed* devices utilizing *listed* charging equipment shall be permitted to be charged.~~

2. ~~Is provided with sufficient electrical receptacles to allow the charging equipment for each device to be directly connected to a receptacle. Extension cords and relocatable power taps shall not be used.~~
3. ~~Storage of combustible materials, combustible waste or hazardous materials shall not be permitted.~~
4. ~~The charging operation shall not be conducted in or obstruct any required means of egress.~~
5. ~~Removable storage batteries shall not be stacked or charged in an enclosed cabinet unless the cabinet is specially designed and *approved* for such purpose.~~
6. ~~A minimum distance of 18 inches (457.2 mm) shall be maintained between each removable storage battery during charging operations unless each battery is isolated from neighboring batteries by an *approved* fire-resistant material.~~
7. ~~A minimum of 18 inches (457.2 mm) shall be maintained between the location of the battery on each *powered micromobility device* during charging operations.~~
8. ~~The indoor room or area shall be protected by a *fire alarm system* utilizing air-aspirating smoke detectors or radiant energy-sensing fire detection.~~

Add new text as follows:

322.4 Replacement batteries and chargers. Replacement batteries and chargers shall be the equipment manufacturer supplied or the replacement battery or charger shall be in compliance with the manufacturer's instructions for the certified equipment or device.

Revise as follows:

322.5 Fire safety plan.
A fire safety plan shall be provided in accordance with Section 403.10.6. In addition, the fire safety plan shall include emergency response actions to be taken upon detection of a fire or possible fire involving lithium-ion or lithium metal battery storage.

~~322.3~~ 322.6 Listing.
~~*Powered micromobility devices*~~ Battery powered equipment shall be *listed* and *labeled* in accordance with this Section where applicable and shall be operated and charged in accordance with its listing and the manufacturers instructions. ~~with UL 2272 or UL 2849, as applicable.~~

Add new text as follows:

322.6.1 Battery-powered micromobility devices. Battery-powered micromobility devices shall be listed and labeled in accordance with UL 2272 or UL 2849, as applicable.

322.6.2 Battery-powered Automated mobile platforms (AMPs). Battery-powered Automated mobile platforms (AMPs) shall be listed and labeled in accordance with UL 3100.

322.6.3 Battery-powered Robotic equipment. Battery-powered robotic equipment shall be *listed* and *labeled* in accordance with UL 3300.

322.6.4 Portable battery-powered equipment and appliances. Where installed or used, portable battery-powered equipment and appliances shall be *listed* and *labeled* in accordance with UL 2595 or the applicable standard for its use.

322.7 Hazardous (classified) locations. Battery powered micromobility devices, trucks, equipment, appliances and battery powered tools operated in in areas designated as hazardous (classified) locations in accordance with NFPA 70 shall be *listed* and *labeled* or approved for use in the environment intended.

Revise as follows:

TABLE 903.2.11.6 ADDITIONAL REQUIRED FIRE PROTECTION SYSTEMS

SECTION	SUBJECT
320.2	Lithium-ion and lithium metal battery storage
322.2.2.1	Lithium-ion and lithium metal battery charging locations
903.2.10.2	Mechanical-access enclosed parking garages
914.2.1	Covered and open mall buildings
914.3.1	High-rise buildings
914.4.1	Atriums
914.5.1	Underground structures
914.6.1	Stages
914.7.1	Special amusement area
914.8.2	Airport traffic control towers
914.8.3, 914.8.6	Aircraft hangars
914.9	Flammable finishes
914.10	Drying rooms
914.11.1	Ambulatory care facilities
1030.6.2.3	Smoke-protected assembly seating
1103.5.1	Existing Group A occupancies
1103.5.5	Pyroxylin plastic storage in existing buildings
1103.5.2	Existing Group I-2 occupancies
1103.5.3	Existing Group I-2, Condition 2 occupancies
1103.5.5	Pyroxylin plastics
Table 1206.9, Table 1206.10, Table 1207.7, Table 1207.8	Stationary and mobile energy storage systems
2108.2	Dry cleaning plants
2108.3	Dry cleaning machines
2309.3.1.5.2	Hydrogen motor fuel-dispensing area canopies
2404.4	Spray finishing in Group A, E, I or R
2404.6	Spray booths and spray rooms
2405.2	Dip-tank rooms in Group A, I or R
2405.4.1	Dip tanks
2405.9.4	Hardening and tempering tanks
2703.10	HPM facilities
2703.10.1.1	HPM workstation exhaust
2703.10.2	HPM gas cabinets and exhausted enclosures
2703.10.3	HPM exit access corridor
2703.10.4	HPM exhaust ducts
2703.10.4.1	HPM noncombustible ducts
2703.10.4.2	HPM combustible ducts
2807.3	Lumber production conveyor enclosures
2808.7	Recycling facility conveyor enclosures
3006.1	Class A and B ovens
3006.2	Class C and D ovens
Table 3206.2	Storage fire protection
3206.4	Storage
3210.1.1	Record storage over 12 feet
3704.5	Storage of more than 1,000 cubic feet of loose combustible fibers
5003.8.4.1	Gas rooms
5003.8.5.3	Exhausted enclosures
5004.5	Indoor storage of hazardous materials
5005.1.8	Indoor dispensing of hazardous materials
5104.4.1	Aerosol product warehouses
5106.3.2	Aerosol display and merchandising areas
5306.2.1	Exterior medical gas storage room
5306.2.2	Interior medical gas storage room
5306.2.3	Medical gas storage cabinet
5606.5.2.1	Storage of smokeless propellant
5606.5.2.3	Storage of small arms primers
5704.3.7.5.1	Flammable and combustible liquid storage rooms
5704.3.8.4	Flammable and combustible liquid storage warehouses
5705.3.7.3	Flammable and combustible liquid Group H-2 or H-3 areas
6004.1.2	Gas cabinets for highly toxic and toxic gas
6004.1.3	Exhausted enclosures for highly toxic and toxic gas
6004.2.2.6	Gas rooms for highly toxic and toxic gas
6004.3.3	Outdoor storage for highly toxic and toxic gas
6504.1.1	Pyroxylin plastic storage cabinets
6504.1.3	Pyroxylin plastic storage vaults
6504.2	Pyroxylin plastic storage and manufacturing

For SI: 1 cubic foot = 0.023 m^3.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

3100-2021	Automated Mobile Platforms
3300-2020	Outline of Investigation for Service, Communication, Information, Education and Entertainment Robots
2595-2015	General Requirements for Battery-Powered Appliances

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024:

- ***Automated Mobile Platforms (UL 3100-2021)***
- ***Outline of Investigation for Service, Communication, Information, Education and Entertainment Robots (UL 3300-2020)***
- ***General Requirements for Battery-Powered Appliances (UL 2595-2015)***

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

This proposal does several things.

The proposal consolidates all the requirements for battery powered *micromobility devices*, *industrial trucks*, *industrial equipment*, *robotic equipment* and *appliances* into this section.

Definitions are added for guidance on what types of devices, trucks, equipment and appliances are intended to be regulated.

Where a code requirement is specifying the “use” of a battery powered device, “use” is intended to be all operations relating to the device, including battery charging operations.

Further to the definition for BATTERY POWERED ROBOTIC EQUIPMENT, the automated functions of a battery-powered automated mobile platform (AMPs) may be provided by a gripping, suction attachment, scope or similar attachment to lift or carry the load, powered by a battery.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

The building and fire code already have triggers in current editions for fire suppression and detection, so there are no increases in construction cost associated with this proposal.

The proposal does impose operational requirements based on the storage, use, repair and/or charging of battery powered devices and equipment, but those requirements do not impose or increase construction cost.

F58-24

F59-24

IFC: 322.6 (New), UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Add new text as follows:

322.6 Battery containment enclosures. Where provided, containment enclosures for storage or charging of lithium-ion batteries or lithium-ion battery powered appliances shall be in accordance with one of the following:

1. *Listed* and *labeled* in accordance with UL 1487.
2. Specially designed and *approved* for such purpose.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

1487-2024 Battery Containment Enclosures

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Battery Containment Enclosures (UL 1487-2024)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: This proposal will require that all battery containment enclosures be either listed or specifically approved (nonlisted) for the intended purpose. This option provides the fire code official with flexibility to approve battery enclosures that they determine provide appropriate safety measures (thermal runaway hazard mitigation) for unique applications or require a listed battery enclosure.

UL 1487, Standard for Battery Containment Enclosures evaluates the ability of an enclosure product to mitigate the fire and explosion hazards generated by lithium-ion battery thermal runaway. These products may be used for permanent (stationary)or temporary storage of lithium-ion cells, batteries, and battery packs for short-term or long-term storage. The enclosures are not intended for use in transportation applications.

The enclosure product may also include internal power distribution for charging lithium-ion cells, batteries, battery packs and battery-powered devices.

This new UL Standard is currently under review by the Standard Technical Committee. A draft of this Standard will be provided to ICC Staff in accordance with CP-28. It is anticipated that the final version will be published as ANSI Consensus Standard late in 2024.

Cost Impact: Increase

Estimated Immediate Cost Impact:

This proposal allows for the use of either listed or approved (non-listed) battery containment enclosures. The cost for obtaining listed battery containment enclosures may or may not represent an increase over obtaining non-listed battery containment enclosures that have not been independently investigated to applicable product safety standards. Data is not available to accurately estimate the exact cost impact of the proposal, but the factors identified below can be considered in determining cost differentials.

Estimated Immediate Cost Impact Justification (methodology and variables):

Obtaining and maintaining a listing for battery containment enclosures involves both product investigation costs and costs for periodic inspection of production, as required by the definition of "listed". These costs are often insignificant compared to the overall production, distribution, marketing and installation costs associated with the product. However, the impact of any potential cost increase must be considered against the user and code official safety benefits derived from the proposed changes, as well as additional effort needed to demonstrate or determine compliance.

F60-24

IFC: SECTION 202 (New), 322.8 (New), 322.8.1 (New), 322.8.1.1 (New), 322.8.1.2 (New), 322.8.1.3 (New), 322.8.1.4 (New), 322.9 (New), UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Add new definition as follows:

MICROMOBILITY CHARGING EQUIPMENT.
An electrical device intended for recharging batteries utilized in *battery-powered micromobility devices*. This equipment is intended to charge multiple *battery-powered micromobility devices* simultaneously.

Add new text as follows:

322.8 Battery-powered micromobility device batteries and chargers. The batteries and chargers used with *battery-powered micromobility devices* shall comply with this section.

322.8.1 Batteries and battery chargers. Batteries and battery chargers shall be in accordance with 322.8.1.1 through 322.8.1.4 as applicable.

322.8.1.1 Original equipment manufacturer's devices. Batteries and battery chargers shall be provided as part of the *listed battery-powered micromobility device*. This includes both non-removable and removable batteries.

322.8.1.2 Replacement batteries. Batteries not provided as part of the *listed battery-powered micromobility device* shall be compatible with the *listed battery-powered micromobility device* in accordance with the *battery-powered micromobility device* manufacturer's instructions.

322.8.1.3 Replacement battery chargers. Single unit battery changers notprovided as part of the *listed battery-powered micromobility device* shall be compatible with the *listed battery-powered micromobility device* in accordance with the *battery-powered micromobility device* manufacturer's instructions.

322.8.1.4 Aftermarket devices. The use of batteries and battery chargers that do not comply with 322.8.1.2 and 322.8.1.3 shall be prohibited.

322.9 Micromobility charging equipment. *Battery-powered micromobility device charging equipment that* are multi-unit and do not comply with 322.8.1 shall be *listed* and *labeled* in accordance with UL 4900 and installed and operated in accordance with its listing and the manufacturer's instructions. *Micromobility charging equipment* shall only be used to charge the *battery-powered micromobility devices* identified in the instructions. The installation location shall be *approved* by the *fire code official.*

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

4900-2023 Outline of Investigation for Micromobility Charging Equipment

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Outline of Investigation for Micromobility Charging Equipment (UL 4900-2023)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: An important safety aspect associated with battery powered micromobility device safety is the use of batteries and charging equipment that have been evaluated as part of the product listing standard. This proposal introduces requirements that effectively prohibit the use of unlisted (aftermarket) batteries and battery chargers. It also requires batteries and chargers to be compatible with the micromobility devices with which they are being used.

The UL 4900 Outline of Investigation for Micromobility Charging Equipment addresses the safety of micromobility charging equipment intended to only be used with micromobility systems, subassemblies, and/or components listed in accordance with UL 2849, UL 2272, or UL 2271.

This outline has not been evaluated for charging micromobility devices that are not listed in accordance with these standards. UL 4900 evaluates for Micromobility Charging Equipment for both indoor and outdoor use and requires the equipment to be labeled for the intended environment. Equipment is typically installed in outdoor or approved indoor spaces and/or public environments.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0 or as explained below.

Part 1 - The battery powered micromobility devices are currently required to be listed. This proposal adds requirements to ensure the battery and battery charger are compatible and evaluated as part of the powered micromobility device listing. Any replacement chargers or batteries must also be evaluated as part of the listing of the original micromobility device and compatible as required by the manufacturers instructions.

Part 2 - The multi-unit charging equipment charging equipment isn't part of the device listing, but does provide another option for charging these devices. The addition of UL 4900 is a new technical/safety requirement and the cost for obtaining listed battery powered micromobility devices may or may not represent an increase over obtaining non-listed battery powered micromobility devices that has not been independently investigated to applicable product safety standards. Data is not available to accurately estimate the exact cost impact of the proposal, but the factors identified below can be considered in determining cost differentials.

Estimated Immediate Cost Impact Justification (methodology and variables):

Obtaining and maintaining a listing for battery powered micromobility devices involves both product investigation costs and costs for periodic inspection of production, as required by the definition of "listed". These costs are often insignificant compared to the overall production, distribution, marketing and installation costs associated with the product. However, the impact of any potential cost increase must be considered against the user and code official safety benefits derived from the proposed changes, as well as additional effort needed to demonstrate or determine compliance.

F60-24

F61-24

IFC: SECTION 202 (New), SECTION 323 (New), 323.1 (New), NFPA Chapter 80 (New)

Proponents: Kevin Duerr-Clark, NYS DOS, NYS DOS (kevin.duerr-clark@dos.ny.gov); Chad Sievers, NYS, NYS DOS (chad.sievers@dos.ny.gov); Daniel Carroll, New York State Department of State, Department of State (daniel.carroll@dos.ny.gov); John R Addario - NYS Department of State, NEW YORK STATE CODES DIVISION, New York State Department of State Division of Building Standards and Codes (john.addario@dos.ny.gov); Brian Tollisen, NYS Department of State, NYS Department of State (brian.tollisen@dos.ny.gov); Jeanne Rice, NYSDOS (jeanne.rice@dos.ny.gov); China Clarke, New York State Dept of State, Manager Technical Support Unit (china.clarke@dos.ny.gov)

2024 International Fire Code

Add new definition as follows:

LIVE FIRE TRAINING BUILDING. A building in which live fire training evolutions are conducted on a repetitive basis.This shall include, but not be limited to, containerized training structures, live fire training structures, and training towers.

Add new text as follows:

SECTION 323
LIVE FIRE TRAINING BUILDINGS

323.1 Live fire training buildings. Live fire training buildings and any appurtenances connected or attached to such buildings or structures shall be designed, constructed and maintained in accordance with the applicable provisions of NFPA 1402, this code and the *International Building Code*.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

1402-2019 Standard on Facilities for Fire Training and Associated Props

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Standard on Facilities for Fire Training and Associated Props (NFPA 1402-2019)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: Live fire training facilities contain unique types of buildings/structures that are in some instances, purposely designed to not meet building codes and/or simulate potentially hazardous conditions. NFPA 1402, when combined with the building codes of the jurisdiction, provides for the necessary design and construction provisions of these types of buildings and gives the code enforcement community the tools necessary to properly regulate them. The scope of the standard acknowledges that building codes and gas codes do not address the unique and specific requirements for these specialized types of facilities. It is not the intent of this proposal to capture buildings that are designed, constructed, and maintained to the International Building Code and International Fire Code already, such as a B or A occupancy where instruction on fire practices takes place, rather, to capture those buildings not clearly covered by the Codes that would typically require variances or modifications of code language to be compliant.

From the previous cycle, based on committee comments, the definition of “Live Fire Training Building” was modified to ensure only buildings where live fire training exercises are conducted are captured. The “associated systems, appliances and props” was also removed from the definition and the term “appurtenances” was added to the section to ensure the intent is not to capture stand-alone props that may be co-located at the same facility such as a gas-fired car prop but to capture gas-fired props used to simulate fire in or on the structure. Furthermore the requirement that the building still had to be constructed following the applicable provisions of the IBC was added.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is not intended to add any new provisions on buildings. The use of NFPA1402 to design and construct these types of buildings is already a standard of practice in the industry. This proposal is simply codifying the requirement, giving the code enforcement community a means to properly implement the provisions of NFPA 1402, and squarely placing the building into a specific use group for consistency.

F61-24

F62-24

IFC: SECTION 202 (New), SECTION 323 (New), 323.1 (New), 323.2 (New), 323.3 (New), 323.4 (New), 323.5 (New), 323.5.1 (New), 323.6 (New), 323.7 (New), 323.8 (New), 323.9 (New), 323.9.1 (New), 323.9.2 (New), 323.9.3 (New), UL Chapter 80 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new definition as follows:

MODULAR ROOM.
A prefabricated structure intended for indoor use to provide privacy that has walls, a ceiling, with or without an integrated floor, and that can include integral electrical wiring, ventilation, and furniture.

Add new text as follows:

SECTION 323
MODULAR ROOMS

323.1 General. *Modular rooms* shall comply with this section.

323.2 Permits. A construction permit shall be required for the installation of *modular rooms*.

323.3 Listing. *Modular rooms* shall be *listed* and *labeled* in accordance with UL 962.

Exception: Precast concrete construction in accordance with Chapter 17 and 19 of the *International Building Code* shall not be required to be listed.

323.4 Location. *Modular rooms* shall not obstruct the means of egress and shall be installed in approved locations.

323.5 Installation. *Modular rooms* shall be installed in accordance with the listing and manufacturer's installation instructions.

323.5.1 Stacking. Modular rooms shall not be stacked.

323.6 Floor Area. The aggregate area of *modular rooms* shall not exceed 10 percent of the fire area.

323.7 Occupant Notification system. Where modular rooms are installed in areas equipped with an occupant notification system, the audible and visual signals shall provide notification to the occupants within the *modular room* in accordance with Section 907.5.

323.8 Automatic sprinkler system. Where modular rooms exceeding 24 ft2 (2.2 m2) are installed in areas protected by an automatic sprinkler system, the automatic sprinkler system shall provide protection within the *modular room* in accordance with Section 903.3.

323.9 Modular rooms used for sleeping. *Modular rooms* used for sleeping shall also comply with Sections 323.9.1 through 323.9.3.

323.9.1 Location. *Modular rooms* shall not be permitted in Group F,H,S, or U occupancy groups.

323.9.2 Number of Modular rooms used for sleeping. The *fire code officia*l is authorized to limit the number of *modular rooms* installed in a single fire area.

323.9.3 Smoke detection. In buildings equipped with a fire alarm system, the *modular room* shall be equipped with smoke detectors. In other buildings, the *modular room* shall be equipped with a smoke alarm in accordance with Section 907.2.11.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

962-2022 Household and Commercial Furnishings

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Household and Commercial Furnishings (UL 962-2022)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: Modular rooms are becoming increasingly popular and are showing up in a variety of different occupancies. This proposal provides a means for code officials to approve these installations and allow the use of these prefabricated furnishings. The locations where these are found include airports, convention centers, business and government buildings. These are factory-built products, rather than rooms being constructed as a part of the structure in accordance with the local building code.

Requiring the modular room to be listed to UL 962 provides the code official with verification that the modular structure met testing requirements for applicable fire and electrical shock safety for occupants.

The UL 962 listing standards covers the fabrication and safety of the modular room. UL 962 includes requirements for insulation, finish materials, internal wiring, lighting, ventilation, and other construction features. UL 962 requires that modular rooms be tested for flame spread, with minimum passing results equivalent to a UL 723 FSI of 200. UL 962 additionally contains furniture flammability requirements for upholstered seating and mattresses that may be incorporated into the modular room.

Proposed section 322.5 limits the size of a modular room to not exceed 100 ft^2 to reflect that these modular rooms are factory-built products and not conventional construction.This proposal treats modular rooms as products that can be installed in a building, and not as building construction, while not losing applicable code requirements.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

Though there is cost increases with the need to comply with UL 962 and potentially adjustment to automatic sprinkers and fire alarm devices these are treated primarily as a product being placed in a building and are not associated with building construction. The cost of compliance with UL 962 will vary based upon the product being listed to this standard and how it will affect systems being used in the building.

F62-24

F63-24

IFC: SECTION 202 (New), SECTION 323 (New), 323.1 (New), 323.2 (New), 323.3 (New), 323.4 (New), 323.5 (New), 323.6 (New)

Proponents: Mark Chubb, ManitouNW LLC, ManitouNW LLC (mark.chubb@manitounw.com)

2024 International Fire Code

Add new definition as follows:

AUTOMATED PARKING SYSTEM (APS)

. A mechanical system designed to facilitate the efficient storage of motor vehicles by stacking vehicles vertically or arranging vehicles horizontally in any fashion that reduces clearances between adjacent vehicles or between vehicles and building elements; also known as automated parking facility (APF) and automated vehicle storage and retrieval system (AVSRS).

Add new text as follows:

SECTION 323
AUTOMATED PARKING SYSTEMS

323.1 General.. New *automated parking systems* in new or existing buildings shall comply with the provisions of Sections 323.2 through 323.6

323.2 Open parking garages. New *automated parking systems* shall only be installed and located on floor levels that comply with the requirements of Section 406 of the International Building Code for open parking garages.

323.3 Above grade. All portions of an *automated parking system* shall be located at or above a level of fire department vehicle access but no more than 4-stories or 30-ft (10-m) above the lowest level of fire department vehicle access.

323.4 Fire department vehicle access. All portions of an *automated parking system* shall be located within 150-ft of an approved fire department vehicle access roadway.

323.5 Fire protection. *Automated parking systems* shall be protected by automatic sprinkler systems designed and installed in accordance with the provisions of Section 903.3.1.1.

323.6 Electric vehicle charging. Electric vehicle charging in *automated parking systems* shall be prohibited.

Reason: The introduction of automated parking systems to increase the density of automobile storage has become common in urban areas with high land values. Recent fire experience with parking structures suggests changes in the combustibility of vehicle components has affected the scale and severity of fires involving high-density vehicle storage. At the same time, efforts to develop automatic sprinkler system design criteria for automated storage and retrieval systems (ASRS) have failed to produce definitive guidance that can be applied under Section 903. The convergence of these issues — high density vehicle storage and ASRS — warrants a precautionary approach until definitive guidance on the protection of these systems emerges. The proposed code text seeks to address the design and construction of new automated parking systems by limiting their installation to aboveground structures easily accessible to firefighters for manual fire suppression. Notwithstanding the hazards associated with previously approved automated parking structures, this proposed change does not seek to render these illegal, otherwise require the discontinuation of their use, or require additional protection for their continued operation. These matters are left to the discretion of the code officials in the jurisdictions that have already approved these installations.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The most immediate impact involves limitations on sites where automatic parking systems can be constructed. By prohibiting the installation of these systems in enclosed parking structures and building levels below grade level, building owners wishing to employ these systems will need to dedicate space aboveground to these installations and utilize design strategies that satisfy requirements for open parking structures.

Estimated Immediate Cost Impact Justification (methodology and variables):

In the absence of definitive guidance regarding the protection of these installations, it must be assumed fire service intervention and manual firefighting will be required to suppress and extinguish fires involving automated parking systems. Fighting fires involving densely spaced automobiles containing thermoplastics, flammable or combustible liquids, and lithium-ion battery systems poses an unreasonable risk of firefighter injuries or deaths were these systems to be installed in full enclosed buildings or below-grade. As such, the safety of fire department personnel required to suppress or extinguish these fires justifies limitations on the location and construction of these systems.

Estimated Life Cycle Cost Impact:

The proposal contains no requirements likely to increase lifecycle costs beyond those associated with similar buildings based on construction type and use.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

No additional lifecycle costs are anticipated.

F63-24

F64-24

IFC: SECTION 324 (New), 324.1 (New), 324.2 (New), 324.2.1 (New), 324.3 (New), 324.4 (New), 324.5 (New), 324.6 (New), 324.7 (New), 324.8 (New), 324.9 (New), 324.10 (New), 324.11 (New), 903.2.4; IBC: [F] 903.2.4

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new text as follows:

SECTION 324
LITHIUM-ION AND LITHIUM METAL BATTERY RESEARCH, TESTING, MANUFACTURING, OR RECYCLING

324.1 General.
The research, testing, manufacturing, or recycling of lithium-ion and lithium metal batteries shall comply with this Section.

324.2 Scope. Any occupancy where one or more of the following operations involving lithium-ion or lithium metal battery components are conducted shall comply with Sections 324.3 through 324.11.

1. Where batteries or cells are tested, modified, or subjected to load testing, cycling, thermal tests, short circuit, impact, penetration, crushing, overcharge, shock, vibration, or similar conditions.
2. Where battery components are researched, tested, or developed.
3. Where batteries are manufactured.
4. Where batteries are recycled, dismantled, repaired, or refurbished.

324.2.1 Collection and collating facilities. Facilities where batteries are only collected and collated for offsite recycling processing or disposal are not regulated by this section. Such facilities shall comply with Section 320.

324.3 Permits.. An operational permit in accordance with Section 105.5.29 shall be required.

324.4 Fire Safety Plan. A fire safety plan shall be provided in accordance with Section 403.10.6.

324.5 Technical opinion and report.. A technical opinion and report complying with Section 104.2.2 shall be prepared to evaluate the fire and explosion risks associated with research, testing, manufacturing, and recycling and to make recommendations including the necessary mitigation measures for all identified risks and for the fire and explosion protection design basis. The report shall be submitted to the fire code official for approval. The technical opinion and report shall specifically evaluate the following:

1. Compliance with Section 320.
2. Hazardous materials storage, use, and handling, including Group H Occupancy requirements, where applicable.
3. Combustible dust hazards, including cathode and anode powders; notching and cutting equipment; and other processes that involve or generate combustible dusts or powders, as applicable.
4. Storage, distribution, and dispensing of flammable liquids or gases, including electrolytes as applicable.
5. Protection of areas and equipment where formation, aging, and testing of batteries or cells occurs, including fire suppression, fire or gas detection, thermal runaway prevention, ventilation, and emergency response to runaway cells.
6. Storage of batteries or cells, including high piled storage requirements where storage exceeds 6 feet (1.82 m) in height.

7. Firefighting access and water supply.
8. Hazards involving flying debris during fire incidents igniting adjacent storage areas, buildings, or other exposure hazards.
9. The basis of design for an automatic sprinkler system or other approved fire suppression system. Such design basis shall reference relevant full-scale fire testing or another approved method of demonstrating sufficiency of the recommended design.
10. An evaluation of the suitability of the equipment used.
11. Handling, storage, and monitoring of damaged, defective, recalled, and out-of-specification batteries and cells.
12. Other items as required by the fire code official.

324.6 Storage.. Lithium metal and lithium-ion batteries shall be stored in accordance with Section 320.

324.7 Equipment.
Equipment used in research, testing, recycling, and manufacturing of lithium-ion and lithium metal batteries shall be designed for the intended use and evaluated in the technical report.

324.8 Fire protection.. An approved automatic sprinkler system complying with Section 903 shall be provided in buildings where lithium ion or lithium metal batteries are researched, tested, manufactured, or recycled.

324.9 Fire detection.. An approved automatic fire detection and alarm system complying with Section 907 shall be provided in buildings where lithium ion or lithium metal batteries are researched, tested, manufactured, or recycled.

324.10 Fire resistant separation. Indoor rooms or areas where any of the following operations are conducted shall be separated from other portions of the building by 2-hour fire-resistance-rated fire barriers and horizontal assemblies. Fire barriers shall be constructed in accordance with Section 707 of the International Building Code, and horizontal assemblies shall be constructed in accordance with Section 711 of the International Building Code.

1. Research or manufacturing areas where more than 2kWh of lithium ion or lithium metal batteries are charged, tested, or undergo processes such as formation and aging.
2. Where any quantity of batteries or cells undergo destructive testing such as thermal, short circuit, impact, nail penetration, crushing, overcharge, or similar testing that can reasonably be expected to result in failure of the battery or cell.
3. Where any quantity of lithium ion or lithium metal batteries undergo recycling processes including dismantling, repair, refurbishing, incineration, or similar processes.

324.11 Hazardous materials.. Hazardous materials stored, used, handled, and generated in lithium ion and lithium metal battery manufacturing, research, testing, or recycling shall be in accordance with Chapters 50 through 67, and the *International Building Code.*

Revise as follows:

903.2.4 Group F-1.
An *automatic sprinkler system* shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group F-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group F-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).

4. A Group F-1 occupancy is used to manufacture or recycle lithium-ion or lithium metal batteries.
5. A Group F-1 occupancy is used to manufacture vehicles, energy storage systems or equipment containing lithium-ion or lithium metal batteries where the batteries are installed as part of the manufacturing process.

2024 International Building Code

Revise as follows:

[F] 903.2.4 Group F-1.
An *automatic sprinkler system* shall be provided throughout all *buildings* containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group F-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group F-1 *fire areas* on all floors, including any *mezzanines*, exceeds 24,000 square feet (2230 m^2).
4. A Group F-1 occupancy is used to manufacture or recycle lithium-ion or lithium metal batteries.
5. A Group F-1 occupancy is used to manufacture vehicles, energy storage systems or equipment containing lithium-ion or lithium metal batteries where the batteries are installed as part of the manufacturing process.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

This new article is intended to provide guidance for the safe design, construction, and operation of these operations involving lithium-ion or lithium metal batteries.

Unfortunately, there is no guidance on how to comprehensively identify and apply the requirements which will have variations operation to operation. This proposal identifies the application of the requirements, that a technical report be provided that documents how the hazards will be addressed in relationship to the code requirements.

Triggers for automatic fire sprinkler systems, fire detection, and fire safety and evacuation plans and battery storage were all added to the 2024 edition of the IFC and IBC. Pointers are included here to assist in applying the code. For clarification purposes "recycle" has been added to Section 903.2.4 Group F-1, Item 4.

Addition of this section will provide clear guidance for designers, builders, and code officials when applying the code to facilities containing these hazards.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

The core requirements are contained within the current codes. This new section provides guidance to provide for efficient and effective application of the code requirements. This will help eliminate unnecessary construction requirements developed by designers or, more importantly, demanded by local code officials. The proposal builds on requirements added to the 2024 codes for suppression, detection, emergency action plans, and assignment of group classifications.

Providing a road map to the necessary requirements for complying with the codes reduces the demand for improvements that do not provide any increase in safety. This reduces the cost of construction.

F64-24

F65-24

IFC: 401.4

Proponents: William Freer, NYS OFPC, NYS OFPC (wfreer@dhses.ny.gov); Heather Roth, NYS, OFPC (heather.roth@dhses.ny.gov)

2024 International Fire Code

Revise as follows:

401.4 Required plan implementation. In the event an unwanted fire is detected in a building or a fire alarm activates, the ~~emergency plan~~ fire safety and evacuation plans shall be implemented.

Reason: The current code requires that the emergency plan be implemented but there is no definition in the code for emergency plan nor an outline of what the emergency pan should include, making enforcement difficult. Both fire safety and evacuation plan are well outlined in Section 404.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no cost impact associated with this proposal as it is simply a change in terminology. See reason statement.

F65-24

F66-24

IFC: 401.4.1 (New)

Proponents: William Freer, NYS OFPC, NYS OFPC (wfreer@dhses.ny.gov); Heather Roth, NYS, OFPC (heather.roth@dhses.ny.gov)

2024 International Fire Code

Add new text as follows:

401.4.1 **Evacuation.** Unless otherwise specified in an approved fire safety and evacuation plan, all occupants shall evacuate the building.

Reason: Section 403.1 specifies what occupancies are required to have fire safety and evacuation plans. Not all occupancies are required to have a plan and therefore no code path is provided for a fire code official to enforce the evacuation of a building during an unwanted fire or fire alarm activation.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code proposal is operational and does not impact the cost of construction.

F66-24

F67-24

IFC: 403.7.3.1, 403.7.3.2, 403.7.3.3

Proponents: Chad Sievers, NYS, NYS DOS (chad.sievers@dos.ny.gov); Jeanne Rice, NYS DOS, NYS DOS (jeanne.rice@dos.ny.gov); Kevin Duerr-Clark, NYS DOS, NYS DOS (kevin.duerr-clark@dos.ny.gov); China Clarke, New York State Dept of State, Manager Technical Support Unit (china.clarke@dos.ny.gov); John R Addario - NYS Department of State, NEW YORK STATE CODES DIVISION, New York State Department of State Division of Building Standards and Codes (john.addario@dos.ny.gov)

2024 International Fire Code

403.7.3.1 Fire safety and evacuation plans.
The fire safety and evacuation plans required by Section 404 shall include a description of special staff actions. Plans shall include all of the following in addition to the requirements of Section 404:

1. Procedures for evacuation of detainees with needs for containment or restraint and post-evacuation containment, where present.
2. Procedures for a *defend-in-place* strategy.
3. Procedures for a full-floor or building evacuation, where necessary.

Revise as follows:

403.7.3.2 Fire safety plan.
A copy of the fire safety plan shall be maintained at the facility at all times. The plan shall include both of the following in addition to the requirements of Section 404.2.2:

1. Location and number of cells.
2. Location of special locking arrangements.
3. <u>Keys that operate doors installed in the means of egress shall be identified in the fire safety and evacuation plan.</u>

403.7.3.3 Staff training. Staff shall be periodically instructed and kept informed of their duties and responsibilities under the plan. Records of instruction shall be maintained. Such instruction shall be reviewed by staff at intervals not exceeding 3 months. Training of new staff shall be provided promptly upon entrance to duty.

1. Staff shall be instructed in the proper use of portable fire extinguishers and other manual fire suppression equipment.
2. <u>Staff shall be trained on the identification and use of keys that are necessary for unlocking doors that are installed in the means of egress.</u>

Reason: Locked doors which require a key to operate are often found in the means of egress in I3 occupancies. The proposed change adds requirements for documentation of all such locked doors to be added to fire safety plans, ensuring that such information is easily accessible. The proposed change also adds requirements for staff training on identification and use of keys for locked doors in the means of egress, which will ensure that such doors can be opened by staff in the event of an emergency. Without proper training, staff may be unaware of the location of the keys and/or how to utilize the keys to unlock the doors, which could lead to means of egress being blocked in an emergency.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The proposed change will increase the required staff fire safety training time. We estimate a cost of roughly $10 per employee for training on operating key-locked doors in the means of egress.

Estimated Immediate Cost Impact Justification (methodology and variables):

According to a study conducted by Training Magazine (https://pubs.royle.com/publication/?m=20617&i=678873&p=24&ver=html5), companies in 2020 spent an average of $1,111 for safety training per employee, providing an average of 55.4 hours of training per employee. This provides an average cost of $20.05/hour per employee for safety training. Adding training for key-locked doors in means of egress will likely add not more than 1/2 hour of safety training per employee.

F67-24

F68-24

IFC: 403.10.6, 403.10.6.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

Revise as follows:

403.10.6 Lithium-ion and lithium metal batteries .
An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for occupancies that involve activities for the research and development, testing, manufacturing, recycling, handling or storage of lithium-ion batteries or lithium metal batteries, or the repair or servicing of vehicles powered by lithium-ion batteries or lithium metal batteries.

Exceptions: A fire safety and evacuation plan is not required for the storage or merchandizing of any of the following:

1. New or refurbished batteries installed for use in the equipment or vehicles they are designed to power.
2. New or refurbished batteries packed for use with the equipment or vehicles they are designed to power for merchandizing purposes.
3. New or refurbished lithium-ion batteries rated at not more than 300 watt-hours and lithium metal batteries containing not more than 25 grams of lithium metal in their original retail packaging.
4. The storage, repair and charging activities in detached one- and two-family *dwellings* and townhouses, provided that such devices are for personal use.
5. The storage, repair and charging activities associated with personal use in *sleeping units* and *dwelling units* of Group R-1 and R-2 occupancies.

403.10.6.1 Mitigation planning .
The *approved* fire safety and evacuation plan shall include thermal runaway event mitigation measures. These measures shall include activities undertaken to prevent thermal runaway, early detection of a thermal runaway event , reporting of unplanned thermal runaway events to the fire official, and mitigation measures to be undertaken to limit the size and impact of the event on occupants and the facility.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

This proposal modifies Section 403.10.6 to add "recycling" as a clarification. Routine users of the code would understand that the battery recycling operation would be addressed as we do a manufacturing operation. A reverse manufacturing in concept. This clarification highlights that that recycling activities are included in the requirement for a fire safety and evacuation plan when dealing with these types of batteries.

Section 403.10.6.1 is updated to ensure reporting of unplanned thermal runaway events are reported to the fire code official. If such events occur, ensuring that mitigation measures were successful, and that proper cause analysis occurs to prevent such occasions are important activities. The reporting of unplanned events is consistent with Section 401.2.1.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

This is an additional aspect that must be address for fire safety and evacuation planning, however this is purely operational and somewhat a clarification of intent.

F68-24

F69-24

IFC: SECTION 202 (New), 403.10.7 (New), NFPA Chapter 80 (New)

Proponents: Joe Scibetta, BuildingReports, Self (jscibetta@buildingreports.com)

2024 International Fire Code

Add new text as follows:

ANIMAL HOUSING FACILITIES. Area of a building or structure, including interior and adjacent exterior spaces, where animals, other than those in agricultural buildings, are fed, rested, worked, exercised, treated, exhibited, or used for production.

403.10.7 Animal Housing Facilities.. Animal housing facilities shall develop a disaster/emergency management plan in accordance with NFPA 150. The disaster/emergency management plans shall comply with the maintenance and availability provisions in Sections 404.3 and 404.4.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

150-22 Fire and Life Safety in Animal Housing Facilities Code

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Fire and Life Safety in Animal Housing Facilities Code (NFPA 150-22)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: Currently, the IFC addresses animals housed in agricultural buildings only (livestock and poultry). Facilities that house animals (and, at times, human handlers) other than in agricultural buildings, are not addressed. This proposal would incorporate animal housing facilities into the IFC as separate and distinct from agricultural buildings and would ensure that a disaster/emergency plan is implemented for them.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

No cost impact with this proposal. This provides recognition and clarification that animal housing facilities exist and should be considered separate and distinct from agricultural buildings.

F69-24

F70-24

IFC: 404.2.3.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

404.2.3.1 Lockdown plan contents. Lockdown plans shall include the following:

1. Identification of individuals authorized to issue a lockdown order.
2. Security measures used during normal operations, when the building is occupied, that could adversely affect egress or fire department operations.
3. A description of identified emergency and security threats addressed by the plan, including specific lockdown procedures to be implemented for each threat condition.
4. Means and methods of initiating a lockdown plan for each threat, including:
   4.1. Occupant notification shall be based on a mass notification risk analysis conducted in accordance with NFPA 72, and the notification signal for a lockdown event ~~The means of notifying occupants of a lockdown event, which~~ shall be distinct from the fire alarm signal.
   4.2. Identification of each door or other access point that will be secured.
   4.3. A description of the means or methods used to secure doors and other access points.
   4.4. A description of how locking means and methods are in compliance with the requirements of this code for egress and accessibility.
5. Procedures for reporting to the fire department any lockdown condition affecting egress or fire department operations.
6. Procedures for determining and reporting the presence or absence of occupants to emergency response agencies during a lockdown.
7. Means for providing two-way communication between a central location and each area subject to being secured during a lockdown.
8. Identification of the prearranged signal for terminating the lockdown.
9. Identification of individuals authorized to issue a lockdown termination order.
10. Procedures for unlocking doors and verifying that the *means of egress* has been returned to normal operations upon termination of the lockdown.
11. Training procedures and frequency of lockdown plan drills.

Reason: This is the second of two proposals relating to notifying occupants during a lockdown. This proposal seeks to amend the means of notifying occupants during a lockdown by requiring a mass notification risk analysis to be performed. The proposal is needed because Chapter 4 the 2021 code requires a notification method distinct from the fire alarm system notification signal but provides no guidance as to the expectation for what kind of system.

A key aspect of a lockdown plan is to identify the organizational structure in charge of making decisions during a lockdown. It is critical to understand who is authorized to initiate and lift a lockdown order. There is often a need for different lockdown plans to address differing threats. Therefore, different types of messaging are required to notify occupants of different threats. For example, the correct procedure during a chemical release incident will be different from the correct procedure during an active shooter incident.

Mass notification often utilizes one or several communication technologies and is intended to communicate information about emergencies including but not limited to fire, human caused events (accidental and intentional), other dangerous situations, accidents, and natural disasters. A lockdown situation often requires a subsequent evacuation depending on the threat, and therefore is a reasonable trigger to perform a mass notification risk analysis.

This proposal **does not automatically** mandate the installation of any mass notification systems. Rather, it only requires a risk analysis be conducted for a building that chooses to utilize lockdown plans as detailed in section 404.

Requiring a risk analysis will result in a more comprehensive emergency response plan that is customized for the specific hazards and risks associated with the building. The risk analysis and emergency response plan can be as elaborate or as basic as the fire code official and building owner determines it needs to be. This proposal only emphasizes the need to document how communicating with the occupants of the building and possibly occupants that are outside the building will be accomplished.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

There is no increase in construction cost because this proposal is not associated with construction, nor is this proposal requiring any new occupant notification system.

There will be some additional costs to conduct the risk analysis, which will be based on the complexity of the facility. For the purposes of this requirement, the scope of the risk analysis is limited to the scope of the emergency response plan being considered for a lockdown event. In extreme cases, the risk analysis may cost thousands of dollars to produce an expansive report of risks, and strategies to mitigate those risks.

F70-24

F71-24

IFC: SECTION 405, 405.2

Proponents: Mark Chubb, ManitouNW LLC, ManitouNW LLC (mark.chubb@manitounw.com)

2024 International Fire Code

SECTION 405
EMERGENCY EVACUATION DRILLS

Revise as follows:

405.2 Occupant participation.
Emergency fire and evacuation drills shall involve the actual evacuation of occupants to a selected assembly point and shall provide occupants with experience in exiting through required *exits*. <u>The use of virtual reality simulators or synthetic environments for training purposes is not a suitable substitute for required participation in drills or exercises required by this section.</u>

Exceptions:

1. In ambulatory care facilities and Group I-2, the movement of care recipients to a safe area or to the exterior of the building is not required.
2. In Group I-1, Condition 2, the assembly point for residents is permitted to be within an adjacent *smoke compartment*.
3. In Group R-4, actual exiting from emergency escape and rescue openings shall not be required. Opening the emergency escape and rescue openings and signaling for help shall be an acceptable alternative.
4. In Group I-3, Conditions 2 through 5 where a *defend-in-place* response is permitted, the assembly point for detainees is permitted to be within an adjacent *smoke compartment*.
5. In Group I-3, Conditions 2 through 5, movement of detainees is not required to an assembly point where there are security concerns.

Reason: The development and use of virtual reality and augmented reality has advanced considerably in recent years. Virtual reality simulators are now routinely used for research purposes to study occupants' evacuation behaviors under varying conditions. The use of virtual or augmented reality in staff training has value but should not be considered a substitute for the physical performance of evacuation drills and exercises in buildings. Occupants performing evacuation drills in the actual physical environment provide many advantages over virtual or synthetic environments, even when these environments are constructed to resemble the actual occupancy in question. The experience of physical space under actual conditions of use often reveals features and conditions simulations cannot replicate or present to users in the same manner they are experienced in the physical world.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The added material reinforces the existing language while specifically addressing the introduction of new technologies not previously considered in the application of the code. This results in no added or changed costs for users.

F71-24

F72-24

IFC: 503.2.2, 503.2.1.1 (New), 503.2.1.2 (New), 503.2.1.2.1 (New), Table 503.2.1.2.1 (New), 503.2.1.2.2 (New), TABLE 503.2.1.2.2 (New), 503.2.1.2.3 (New), TABLE 503.2.1.2.3 (New), 503.4.1 (New), TABLE 503.4.1 (New), 503.4.2 (New), SECTION D102 (New), D102.1 (New), SECTION 202 (New), SECTION D103, D103.1, FIGURE D103.1, D103.1.1 (New), D103.2, D103.3, D103.4 (New), TABLE D103.4, D103.5, D103.6, D103.6.1, D103.6.2, D105.1, D105.2, D105.2.1 (New), D105.2.1.1 (New), D105.2.2 (New), D105.2.2.1 (New), D105.2.2.2 (New), D105.2.2.3 (New), D105.2.2.4 (New), D105.2.2.5 (New), D105.2.2.6 (New), FIGURE D105.2.2.6 (New)

Proponents: Scott Brody, Self (sbrody96@gmail.com)

2024 International Fire Code

Revise as follows:

503.2.2 Authority. The *fire code official* shall have the authority to require or permit modifications to the required access widths where they are inadequate for fire or rescue operations or where necessary to meet the public safety, <u>health, environmental, historic preservation, or other </u>objectives of the jurisdiction.

Add new text as follows:

<u>**503.2.1.1**</u> <u>**Single Lane Fire Apparatus Access Roads.**</u> <u>Single lane fire apparatus access roads shall be not less than 12 ft (3658 mm) wide, and shall comply with all of the following:</u>

1. <u>The road shall be one-way, a one-way lane channel of a divided two-way road, or closed to ordinary motor vehicle traffic.</u>

   <u>**Exception:** In exclusively residential areas, a single bi-directional driving lane shall be permitted where designed in accordance 503.2.1.2.</u>

2. <u>The route from the Fire Station to the dwelling shall require traveling no more than 600 ft (182.88 m) until the nearest turnoff to another road, and there shall be no more than 1200 ft (365.76 m) of one lane road segments for each emergency service trip, unless approved otherwise.</u>
3. <u>A minimum 75 foot long (22.86 m) × 21 ft (6401 mm) wide passing space shall be installed not less than every 600 ft (182.88 m).</u>

   <u>3.1 Where parking is naturally prohibited in the vicinity of hydrants, active driveways, intersections, or other approved locations, these spaces shall be permitted to be counted toward the passing bay requirements.</u>

   <u>3.2 Where there are turnoffs to other roads not less than every 400 ft (121.92 m), passing bays are allowed to be omitted.</u>

4. <u>The road width at curves shall be increased where necessary to accommodate the swept path of all emergency vehicles.</u>
5. <u>The road shall not terminate in a dead end.</u>
6. <u>The route from the Fire Station to all buildings shall not be overly circuitous. The fire code official is authorized to modify the location and level of interconnection between fire apparatus access roads where their design is insufficient.</u>
7. <u>All parallel parking spaces shall be a minimum of 7 ft (2134 mm) wide.</u>
8. <u>Angle parking, and reverse angle parking, shall only be permitted where designed in accordance with approved dimensions.</u>
9. <u>All parking spaces shall be marked for the entire extent of the space with lines indicating the border between the outer edge of the parking space, and the fire apparatus travel lane. The fire code official is authorized to require the placement of enhanced signage and road markings indicating that the central lane must be kept clear at all times.</u>
10. <u>The fire code official is authorized to require a sufficient number of locations be provided for deliveries, maintenance vehicles, passenger drop-off/pickup, snow storage, or any other extenuating circumstance that results in excessive blockage of the road. The width of such spaces shall be determined based on the types of vehicles which are likely to require use of the space, and shall be approved.</u>

11. Where a narrower street could impede apparatus access, or pose a risk that arriving pumpers would need to get too close to the building in order to establish a connection to the automatic sprinkler system and standpipe system, the fire code official is authorized to require installation of approved remote or interconnected fire department connections, or a fire pump system.
12. Buildings shall be equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3.
13. Where the travel distance on single lane roads exceeds 600 ft (182.88 m), and buildings sited along single lane road(s) have a combined occupant load of 350 persons or more, Automated External Defibrillators (AED) shall be made available and maintained within 450 ft (137.16 m) of all locations.
14. Except for one and two-family dwellings, and other *approved* low risk occupancies, construction type shall be IA, IB, IIA, IIIA, IV (A,B, or C), or V-A.
15. Buildings over 3 stores or 30 ft (9144 mm) above grade plane shall be provided with approved aerial apparatus access.

503.2.1.2 Traffic Demand-based Street Widths. Where a fire apparatus access road is assigned a functional classification of local road or minor collector, or is similarly described per another classification scheme, and the road's average daily traffic volume does not routinely exceed 2000 vehicles per day, the street widths in Section 503.2.1.2.1 and Section 503.2.1.2.2 shall be permitted. Parking ratios shall comply with Section 503.2.1.2.3.

503.2.1.2.1 Two way streets parking one-side. For two-way streets where parking is permitted on one side only, and the parking spaces are unmarked, the width of fire apparatus access roads shall comply with Table 503.2.1.2.1.

Table 503.2.1.2.1 FIRE APPARATUS ACCESS ROAD WIDTH - PARKING ON ONE SIDE

Dwelling units, Sleeping units and Mixed Use			
Per Gross Acre	**Minimum Width (ft)**	**Per Gross Hectare**	**Minimum Width (mm)**
≤ 2.0	18	≤ .8	5486
> 2 to 6	24	> .8 to 2.4	7315
> 6 to 10.0	28	>2.4 to 4.0	8534
Mixed use and > 10	32	Mixed use and > 4.0	9754

503.2.1.2.2 Two-way streets, parking both sides. For two way streets where parking is permitted on both sides, and the parking spaces are unmarked, the width of fire apparatus access roads shall comply with Table 503.2.1.2.2.

TABLE 503.2.1.2.2 FIRE APPARATUS ACCESS ROAD WIDTH - PARKING BOTH SIDES

Dwelling Units, Sleeping units and Mixed Use			
Per Gross Acre	Minimum Width (ft)	Per Gross Hectare	Minimum Width (mm)
≤2.0	20	≤.8	6096
> 2 to 6.0	26	>.8 to 2.4	7925
> 6 to 10	30	> 2.4 to 4.0	9144
Mixed use and > 10	34	Mixed use and >4.0	10360

503.2.1.2.3 Parking ratios residential. In residential districts, the parking ratios shall comply with Table 503.2.1.2.3 or the widths shall comply with high density (6.1 to 10.0 DU/ac or 2.5 to 4.0 DU/ha).

TABLE 503.2.1.2.3 PARKING RATIOS

Dwelling Unit or Sleeping Unit Charactertistics	Minimum number of off-street spaces
≤ 1 bedroom	1.75
2 bedrooms	2.0
Detached housing with ≥ 3 bedrooms	2.5

Revise as follows:

503.4.1 Traffic calming. ~~Traffic calming shall be prohibited unless approved by the fire code official.~~ Traffic calming shall comply with the requirements of Table 503.4.1. Treatments shall be approved by the fire code official based on ability to accommodate the width and turning movements of fire apparatus.

Add new text as follows:

TABLE 503.4.1 TRAFFIC CALMING

Roadway Type/Location	Design to Achieve 85 percentile space mean speed not less than		Maximum Distance[a]	
	mph	km/h	ft	m
Parking lot drive aisles	10	16.09	1000	304.8
Fire Lanes closed to civilian vehicle traffic and woonerfs[b]	10	16.09	1000	304.8
Midblock pedestrian and bicycle crossings (all roadway functional classifications)	10	16.09	Immediate vicinity of crossing only	
Turning movements near urban crosswalks and bicycle path crossings (all roadway functional classifications)	5	8.05	Immediate vicinity of turn only	
Local Roads	18.6	30.00	2000	609.6
Minor collector roads	18.6	30.00	2000	609.6
Major collector, Minor arterial roads, other principle arterial freeways and expressways	Prohibited unless approved by the fire code official			
Other roads	As approved			

a. Fire services shall be provided an approved route to access all structures which does not require traveling more than 2000 ft (609.6 m) on traffic calmed local and minor collector streets. Streets themselves shall be permitted to contain more than 2000 ft (609.6 m) of traffic calming, provided that emergency services do not have to travel beyond 2000 ft (609.6 m) as part of their route.

b. Woonerfs shall be permitted to follow the 10 mph (16.09 km/h) design speed even if assigned a different formal functional classification.

503.4.2 Special Hazards. Fire apparatus access roads shall be permitted to be split into segments not less than 12 ft (3658 mm) wide, where necessary to address the following hazards:

1. To prevent vehicle operators from entering opposing travel lane(s) to bypass railroad or drawbridge gates.
2. To prevent vehicle operators from swerving around others stopped for pedestrians, bicyclists, or similar hazards at a crosswalk.

Exemption: The minimum width of a roadway divided in accordance with 503.4.2 shall be 10 ft (3048 mm), where the elements that divide the roadway are traversable by fire apparatus.

SECTION D102
DEFINITIONS

D102.1 DEFINITIONS. For the purpose of this appendix, certain terms are defined as follows:

Add new definition as follows:

DRIVING LANE. The portion of a fire apparatus access road which is permanently available for driving vehicles.

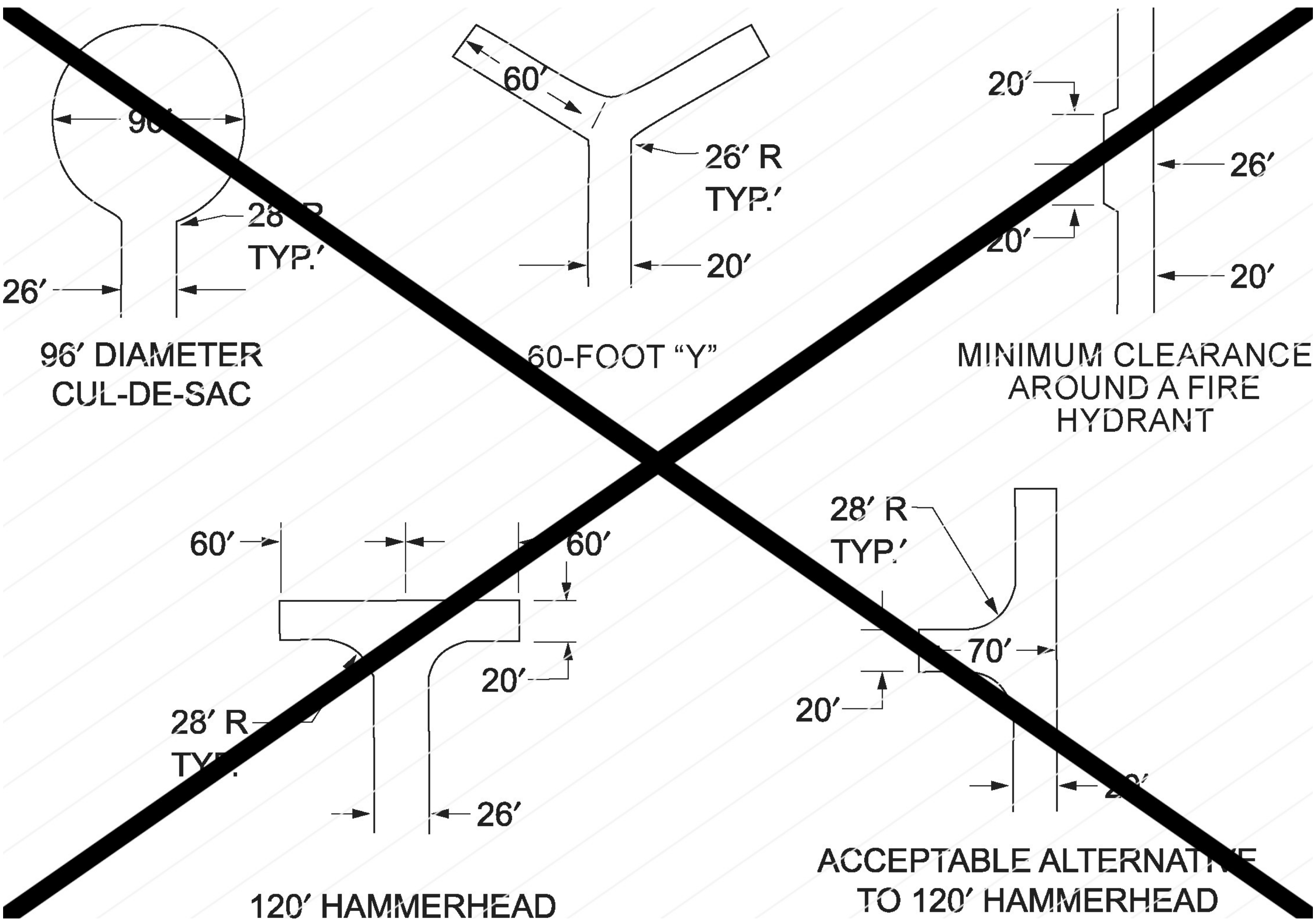
WORKING AREA. A designated area beside the fire apparatus access road, which is available for the placement of outriggers, hose lines, and other staging activates. This could be sidewalk, grass, or another surface, provided there are not excessive obstructions which would impede staging.

SECTION D103 MINIMUM SPECIFICATIONS

Revise as follows:

D103.1 Access road width with a hydrant.
Where a fire hydrant is located on a fire apparatus access road, the minimum road width shall be 26 feet (7925 mm), exclusive of shoulders ~~(see Figure D103.1)~~.

Delete without substitution:



~~For SI: 1 foot = 304.8 mm.~~

~~**FIGURE D103.1 DEAD-END FIRE APPARATUS ACCESS ROAD TURNAROUND**~~

Add new text as follows:

<u>**D103.1.1**</u> <u>**Hydrant access width reductions.**</u> <u>The minimum width of fire apparatus access roads in the vicinity of hydrants shall be reduced to 21 ft (6401 mm) for two-lane roads, or 12 ft (3658 mm) for divided roads, where hydrants are placed not less than 7 ft (2134 mm) back from the nearest roadway edge.</u>

D103.2 Grade. Fire apparatus access roads shall not exceed 10 percent in grade.

Exception: Grades steeper than 10 percent as *approved* by the *fire code official*.

D103.3 Turning radius. The minimum turning radius shall be determined by the *fire code official*.

Revise as follows:

D103.4 Dead Ends. Dead end fire apparatus access roads in excess of 150 feet (45 720 mm) shall be provided with turnaround provisions in accordance with ~~Table D103.4.~~ <u>*A Policy on Geometric Design of Highways and Streets, by the American Association of State Highway and Transportation Officials.*</u>

Delete without substitution:

~~**TABLE D103.4 REQUIREMENTS FOR DEAD-END FIRE APPARATUS ACCESS ROADS**~~

LENGTH (feet)	WIDTH (feet)	TURNAROUNDS REQUIRED
0–150	20	None required
151–500	20	120-foot Hammerhead, 60-foot "Y" or 96-foot diameter cul-de-sac in accordance with Figure D103.1
501–750	26	120-foot Hammerhead, 60-foot "Y" or 96-foot diameter cul-de-sac in accordance with Figure D103.1
Over 750	Special approval required	

~~For SI: 1 foot = 304.8 mm.~~

D103.5 Fire apparatus access road gates.

Gates securing the fire apparatus access roads shall comply with all of the following criteria:

1. Where a single gate is provided, the gate width shall be not less than 20 feet (6096 mm). Where a fire apparatus road consists of a divided roadway, the gate width shall be not less than 12 feet (3658 mm).
2. Gates shall be of the horizontal swing, horizontal slide, vertical lift or vertical pivot type.
3. Construction of gates shall be of materials that allow manual operation by one person.
4. Gate components shall be maintained in an operative condition at all times and replaced or repaired when defective.
5. Electric gates shall be equipped with a means of opening the gate by fire department personnel for emergency access. Emergency opening devices shall be *approved* by the *fire code official*.
6. Methods of locking shall be submitted for approval by the *fire code official*.
7. Electric gate operators, where provided, shall be *listed* in accordance with UL 325.
8. Gates intended for automatic operation shall be designed, constructed and installed to comply with the requirements of ASTM F2200.

D103.6 Signs.

Where required by the *fire code official*, fire apparatus access roads shall be marked with permanent "NO PARKING—FIRE LANE" signs complying with Figure D103.6. Signs shall have a minimum dimension of 12 inches (305 mm) wide by 18 inches (457 mm) high and have red letters on a white reflective background. Signs shall be posted on one or both sides of the fire apparatus road as required by Section D103.6.1 or D103.6.2.

D103.6.1 Roads 20 to 26 feet in width.
Fire lane signs as specified in Section D103.6 shall be posted on both sides of fire apparatus access roads that are 20 to 26 feet wide (6096 to 7925 mm).

D103.6.2 Roads more than 26 feet in width.
Fire lane signs as specified in Section D103.6 shall be posted on one side of fire apparatus access roads more than 26 feet wide (7925 mm) and less than 32 feet wide (9754 mm).

Revise as follows:

D105.1 Where required.
Where the vertical distance between the *grade plane* and the highest roof surface exceeds 30 feet (9144 mm), *approved* aerial fire apparatus access roads shall be provided. For purposes of this section, the highest roof surface shall be determined by measurement to the eave of a pitched roof, the intersection of the roof to the *exterior wall*, or the top of parapet walls, whichever is greater.

> **Exception:** Where *approved* by the *fire code official*, buildings of Type IA, Type IB or Type IIA construction equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and having firefighter access through an enclosed *stairway* with a Class I standpipe from the lowest level of fire department vehicle access to all roof surfaces.

D105.2 Width. Aerial fire apparatus access roads shall have a minimum unobstructed width of 26 feet (7925 mm), exclusive of shoulders, in the immediate vicinity of the building or portion thereof.

Add new text as follows:

D105.2.1 Reductions in Width Permitted with Enhanced Fire Service Equipment. Aerial apparatus access roads shall be permitted to be narrowed on account of the fire service having specialized equipment, in sufficient quantity, to negate the need for wider roadways. All solutions, or combinations thereof, shall be approved by the fire code official and the fire chief. For the purposes of this code, alternative systems shall include but not be limited to:

1. Ladder trucks with specialized capabilities, including but not limited to the following:
   - 1.1 Narrower truck bodies and/or narrower or zero spread outriggers.
   - 1.2 Aerial equipment which does not require outriggers for safe deployment.
   - 1.3 Outriggers which can fit under adjacent parked vehicles, where an adjacent parking lane is provided
   - 1.4 Outriggers which are sized to fit between parallel parked vehicles, where an adjacent parking lane is provided.
   - 1.5 Outriggers with short-jacking capabilities.
2. Vehicle dolly jacks, or other parked vehicle relocation systems, carried by responding emergency service units.
   - 2.1 Manual vehicle relocation systems shall have the capability to move a typical parked passenger vehicle in 90 seconds or less when operated by a single individual, and 60 seconds or less when operated by two individuals.
   - 2.2 Vehicle relocation robots shall have the capability to move a typical parked passenger vehicle in 60 seconds or less.
   - 2.3 Vehicle relocation systems shall not be proposed along slopes or other conditions for which the system is not safely rated.
   - 2.4 Where curbing could interfere with vehicle relocation, the fire code official is authorized to require installation of alternative roadway edge delineation.
3. Push bars mounted to emergency vehicles, for relocating disabled vehicles from the path of aerial apparatus.
   - 3.1 Design strategies which would require moving lawfully parked vehicles with push bars, shall be prohibited unless approved by the fire code official.
4. Outrigger pads with enhanced strength to deploy on non-paved surfaces.
5. Taller ground ladders, or other climbing systems.

6. Light weight or telescopic ladders, where the distance between the aerial apparatus and fire is longer.
7. Fire service aircraft, including drones.
    7.1 Where aircraft are proposed, the adjacent airspace shall be sufficiently clear of obstructions to facilitate their use.

D105.2.1.1 Procedures for Furnishing Equipment. Where the fire department does not have the necessary equipment for operating on narrower streets, the *fire code official* is authorized to require payment for new equipment, and associated expenses, as a condition of approval D105.2.1.

D105.2.2 Aerial apparatus access working areas.. Aerial apparatus access routes shall be permitted to consist of a combination of driving lanes and working areas, where *approved* by the fire code official.

D105.2.2.1 Working Area Materials. Working areas shall consist of sidewalks, geo-cell reinforced grass, or any other system which has been *approved* to provide adequate support for placement of aerial apparatus stabilizers. The system shall also provide support for emergency services to walk upon and use for other staging activities.

D105.2.2.2 Total Width. The sum of the widths for the driving lane(s) and working area shall be not less than 26 ft (7925 mm).

D105.2.2.3 Driving Lane Width. Roads open to bi-directional vehicle traffic shall contain a minimum of 21 ft (6401 mm) of driving lanes. Driving lane width for one-way roads and halves of divided roads shall a minimum of 12 ft (3658 mm). Roads with less than 21 ft (6401 mm) of driving lanes shall install passing bays at the intervals specified in 503.2.1.1, or at locations deemed necessary by the fire code official.

D105.2.2.4 Working Area Placement. Working areas shall be placed directly beside driving lanes.

D105.2.2.5 Separation Between Working Area and Driving Lane. The working area and driving lane shall be permitted to be separated by a combination of any of the following, provided the design is *approved*:

1. Tactile warning surfaces for the blind.
2. Curb with a sufficiently low slope that it will not cause damage to fire apparatus traversing it.
3. Where passing is not required, full height curb.
4. Bollards, boxed plants, or other obstructions placed at sufficiently infrequent spacing so as to provide room for aerial apparatus to deploy around them.
5. Bollards with the ability to be retracted with fire department keys, or another approved retracting system.
6. Bollards that provide the ability to be run over without causing damage to the fire apparatus.

D105.2.2.6 Signage. The fire code official shall be authorized to require the posting of signage including but not limited to the maximum load capacity of the surface, the limits of the area, instructions how to operate any systems, and notices to keep the area clear of unauthorized items.

FIGURE D105.2.2.6 EXAMPLES OF SIGNS AND GROUND TILES FOR MARKING WORKING AREAS

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Neighborhood Street Design Guidelines Table 3–1 (Institute of Transportation Engineers (ITE))***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Attached Files

- **IFC Fire Access Proposal Narrative.pdf**
  https://www.cdpaccess.com/proposal/9078/30852/files/download/4858/

Reason: The US currently has a traffic crash fatality rate several times many peer nations. IFC® Section 503 and Appendix D is likely responsible for 5-10% of US traffic deaths. Every year, roughly 4,000 Americans lose their lives on non-rural neighborhood streets. That's more than the average number of people killed in all fires in a typical year. If the US adopted traffic calming and narrower streets like most of the world, data suggests over half these deaths, at least 2,000 fatalities could be prevented on local streets alone. The benefits simply outweigh the risk.

Lack of exercise causes hugely more deaths than fires. The ban on scale streets leads to neighborhoods which are less attractive for non-motorized transportation. Narrower streets could also reduce road noise and air pollution, both of which kill more persons than fires. The US has an impervious surface the size of Ohio. Wider streets have been shown to cause more ecosystem depletion, drainage problems, and vehicle-wildlife collisions.

My cost analysis analyzed 41.5 miles (66.8 km) of streets fronting nearly 5,000 dwelling units. Calculations show wider streets typically raise the cost of new housing by several thousand dollars. Wider streets further cost the economy through maintenance expenditures and diminished land productivity.IFC® Section 503 and Appendix D were made with the intention of saving lives from fire and other emergencies. However, in the years since, countless places have leapfrogged the United States in fire safety and emergency medical response, despite not having as wide roads. Wide and non-traffic calmed streets are two of the most ineffective investments for improving response time. Other measures like interconnected streets and sprinklers are more effective and proposed as an alternative pathway for compliance. There are also many tactics which can be used, and my proposed language would help fire departments deploy them. Certain fire access passages appear to have been preempted by US Federal Regulations, international treaties, UN Resolutions, and the ICC's own requirements to write standards in a fashion as internationally applicable as possible. This proposal aims to resolve conflicts between the IFC® Fire Access sections, and other laws in a fair and balanced manner.This proposal specifically allows narrower streets if they are more interconnected. For one lane roads, homes are to be sprinklered. For commercial, must provide 1-hr fire resistant construction and AEDs for large developments. This should ensure fire safety is achieved without compromising road safety.

IFC Fire Access Proposal Narrative.pdf

https://www.cdpaccess.com/proposal/9078/30852/files/download/4858/
See PowerPoint slides I prepared for your organization: https://www.cdpaccess.com/proposal/9078/30852/files/download/4433/See full video I prepared for your organization:

Statement to the IFC FCAC 12 06 2023 https://www.youtube.com/watch?v=nTHcZ1v3DP0

Bibliography: The values found in tables referenced in Section 503.2.1.2 were adapted and used with permission from Institute of Transportation Engineers (ITE), based on Neighborhood Street Design Guidelines Table 3 – 1. ISBN: 10: 1-933452-49-8. ISBN 13: 978-1-933452-48-71627. Institute of Transportation Engineers, I Street, NW, Suite 550, Washington, DC, 20006, USA.See reason statement PDF and PowerPoint for additional in-text citations.

Cost impact (key sources):

US Department of Transportation. Highway Investment Analysis Methodology 2015 Status of the Nation's Highways, Bridges, and Transit: Conditions & Performance. [Online] 2015. https://www.fhwa.dot.gov/policy/2015cpr/appendixa.cfm.

DiClerico, Dan. True Cost Guide: Install Asphalt Paving. HomeAdvisor - Powered by Angi. [Online] August 14, 2021. Used price data collected in 2020 and kept on website through late 2021. https://web.archive.org/web/20210814132509/https://www.homeadvisor.com/cost/outdoor25 living/install-asphalt-paving/.

National Fire Protection Association & Newport Partners. Home Fire Sprinkler Cost Assessment. [Online] 2013. https://www.nfpa.org/-/media/Files/News-and-Research/Fire-statistics34 and-reports/Suppression/HomeFireSprinklerCostAssessment2013.ashx.

Note many other sources were considered in my cost model, which can be shared with the committee of requested. I am not including it publicly because planning to publish in a journal and exact values could be adjusted.

Cost Impact: Decrease

- **Study Locations.pdf**
  https://www.cdpaccess.com/proposal/9078/30852/documentation/148268/attachments/download/4813/
- **Cost study sample calc.pdf**
  https://www.cdpaccess.com/proposal/9078/30852/documentation/148268/attachments/download/4812/
- **Statistical Calculations.pdf**
  https://www.cdpaccess.com/proposal/9078/30852/documentation/148268/attachments/download/4811/
- **Results by neighborhood class.PNG**
  https://www.cdpaccess.com/proposal/9078/30852/documentation/148268/attachments/download/4810/

Estimated Immediate Cost Impact:

Context sensitive, traffic-demand based, standards yielded savings in 20 of 25 neighborhoods sampled. Compared with the as-built scenario, reflexive of what is typically built in the US including some exemptions from fire code officials and legacy codes, AASHTO/ITE standards which I am proposing reduced average road surface by 18.9 m2 (204 SF) per dwelling. (IQR: 17.1 –23.3 m2). This is estimated to reduce new home cost by $5,731. Compared with a strict adherence scenario, savings is $6,839 per new home.

For single lane roads, it is estimated cost savings would be 103k$/100 meters, typical of the length of an apartment building.

Cost of sprinklers estimated at 3,501$/home for an NFPA 13R system, per NFPA data. I assume the cost of building construction upgrade to 1 hour fire resistant would be rather low, and could be to a degree offset if it is also better at providing insulation over the life cycle. Exact costs for this vary by building type.

Estimated Immediate Cost Impact Justification (methodology and variables):

To understand resource consumption differs, 66.8 km (41.5 mi) of road spread over 210 local 13 streets in 25 neighborhoods were analyzed. Sample streets fronted 4,985 dwelling units. By recording characteristics of each neighborhood, it was possible to ascertain current roadway characteristics, and how much surface would be required if the same community were built using different standards.

I used average cost per lane mile of construction per US Department of Transportation Highway Economics Requirements System, and the rate private sector pays to build roads per Home Advisor. Also counted land and utility costs. The average of these resulted in a unit price of 261.96 $/m2 (24.34$/ft2) for building a new paved surface, and 3.14 $/m2/year ($0.2918$/ft2/year) in repair costs. This is $1.12 M/lane-km or $1.80 M/lane-mile.

Considering average rates of utility service subscription (ie, what percentage subscribe to gas, electric, cable TV/fiber, public water, and sewer), each ft of road was associated with 955.49 $/m (291.23$/ft) in total utility new build costs and 14.58 $/m/yr (4.44$/ft/yr) in average repair costs.

For roads built to AASHTO/ITE context sensitive widths vs existing codes, costs per dwelling unit are shown below by density. Note immediate cost impact is shown as New Construction Sav. (paving + utilities) whereas lifecycle costs are show as annual repair.

Estimated Life Cycle Cost Impact:

Life cycle cost savings from less road repair is $72.26 per DU per year vs typical scenario, and $85.01 per DU per year comparing context sensitive streets scenario vs strict compliance with existing codes.

I am planning to publish my research on a peer reviewed journal. I can share further mythology/research with the committee outside the public meeting.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Same as above except did not use average of public and private costs, assumed roads generally turned over to government, so only used USDOT HERS repair cost rates for the repaving.

F72-24

F73-24

IFC: 507.1

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

507.1 Required water supply. An *approved* water supply capable of supplying the required fire flow for fire protection shall be provided to premises on which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction. <u>Reclaimed water or recycled water shall be analyzed to evaluate any health hazard and to determine whether any materials, chemicals or contaminants in the water will be detrimental to the components of the fire water supply or fire-extinguishing systems and a report shall be submitted to the fire code official for approval prior to acceptance as fulfilling the requirement for water supply.</u>

Reason: In recent years there has been a increased desire to utilize recycled or reclaimed water for fire fighting purposes. The long-term goal of water conservation is important to improve sustainability, but the quality of recycled or reclaimed water used for fire fighting must meet considered.

There are two aspects of concern: 1) does the water contain any contaminants that will be detrimental to the fire protection equipment and appliances used in fighting the fire, and 2) does the water present any health hazard as fire fighters are doused with water during the firefighting operations.

NFPA 13, the standard for fire sprinkler system design allows the use of recycled or reclaimed water, provided the water quality is tested and evaluated. 2022 NFPA 13 reads:
5.2.1 Water supplies for sprinkler systems shall be one of the following or any combination:

1. A connection to an approved public or private waterworks system in accordance with 5.2.2
2. A connection including a fire pump in accordance with 5.2.3
3. A connection to a water storage tank at grade or below grade installed in accordance with NFPA 22 and filled from an approved source
4. A connection to a pressure tank in accordance with 5.2.4 and filled from an approved source
5. A connection to a gravity tank in accordance with 5.2.5 and filled from an approved source
6. A penstock, flume, river, lake, pond, or reservoir in accordance with 5.2.6
7. ***** A source of recycled or reclaimed water where the building owner (or their agent) has analyzed the source of the water and the treatment process (if any) that the water undergoes before being made available to the sprinkler system and determined that any materials, chemicals, or contaminants in the water will not be detrimental to the components of the sprinkler system it comes in contact with

Annex A in NFPA 13 contains some additional guidance to Item 7 above, and states "…Recycled or reclaimed water should never be used in a sprinkler system until an analysis of what contaminants might be in the water has determined that nothing will be detrimental to sprinkler system performance or the expected reasonable life of the sprinkler system."

Fire fighters routinely splashed or drenched with water from fire sprinklers, fire hoses, and other fire fighting appliances. The firefighters should be wearing their structural fire-fighting personal protective equipment, but that equipment is not designed to keep water off their body, and to limit skin contact with fire fighting water.

The quality of the water must be evaluated for health reasons and for the efficacy of the fire fighting equipment. It would be foolish to install expensive automatic fire fighting systems and then run water through it that will corrode it internally, or plug the orifices of sprinklers. This proposal allows recycled water or reclaimed water to be utilized, but the quality of the water must be analyzed for provide adequate protection from health risks to fire fighters and for the longevity and reliability of the fire fighting appliances.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The requirement to analyze the water already exists, but as the desire increases to use recycled water this proposal places the requirement in the code so it is not missed.

F73-24

F74-24

IFC: 507.2, B103.3

Proponents: Chad Sievers, NYS, NYS DOS (chad.sievers@dos.ny.gov); Jeanne Rice, NYSDOS (jeanne.rice@dos.ny.gov); Kevin Duerr-Clark, NYS DOS, NYS DOS (kevin.duerr-clark@dos.ny.gov); China Clarke, New York State Dept of State, Manager Technical Support Unit (china.clarke@dos.ny.gov); John R Addario - NYS Department of State, NEW YORK STATE CODES DIVISION, New York State Department of State Division of Building Standards and Codes (john.addario@dos.ny.gov)

2024 International Fire Code

Revise as follows:

507.2 Type of water supply. A water supply shall consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow.

Exception: In rural and suburban areas in which adequate and reliable water supply systems do not exist, the *fire code official* is authorized to approve the use of NFPA 1142 or the *International Wildland-Urban Interface Code* where it is adopted.

B103.3 Areas without water supply systems.
For information regarding water supplies for firefighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the *fire code official* is authorized to utilize NFPA 1142 or the *International Wildland-Urban Interface Code*.

Reason: Because of the rural character of many regions of the majority of states, strict compliance with 507.2 is not always feasible. NFPA 1142 and IWUIC accommodate some alternatives. NFPA 1142 and IWUIC are allowed in the IFC code under Appendix B, but adding the exception allows NFPA 1142 or IWUIC to be used without adopting all of Appendix B.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Total cost savings: **$14,272** for a single-family home with an attached garage, as the building would not need to include on-site water storage.

This code change would be cost savings because it gives the code users another option to provide water to extinguish a fire. This option allows water to be supplied by the fire department instead of being kept on-site. This is common in rural areas where there's not a municipal water distribution network. Many factors will come into play in developing a water supply for fire flow. To simplify this estimate we looked at a single-family home with an attached garage and using plastic water tanks to store the water.

This cost estimate does not include any necessary maintenance of fire department equipment, nor the cost of acquiring the water (via pumping or other acquisition method).

Estimated Immediate Cost Impact Justification (methodology and variables):

NFPA 1142 states (as an acceptable method to calculate fire flow)

Eq 4.3.1
WS_{min}=VStot/OHC * CC * 1.5

WS_{min}= min Water Supply

VS_{tot}= Total volume of structure (ft^3)

OHC=Occupancy hazard Classification number

CC= Construction Classification number

For example a single-family home 2 stories with an attached garage

V_{garage} = 24’ x 24’ x 10’=5760

V_{house} = 2 stories x 8’H stories x 40’x 30’19200

V_{tot} = 19200+5760 = 24,960 ft^3

OHC = 7 (per NFPA 1142 5.2.5.2 dwellings)

CC = 1.5 (per NFPA 1142 Table 6.2.1 Type V)

WS_{min}= VS_{tot}/OHC * CC * 1.5=24,960 ft^3 / 7 x1.5 x1.5 = 8023 gallons

Use two 5,000 gallon tanks @ $5,136 each https://www.ntotank.com/5000gallon-norwesco-black-vertical-water-tank-x1750809

Shipping cost estimate $1,000

plumbing cost estimated $1,000

Site work estimate

$2,000

Total cost savings $14,272

F74-24

F75-24

IFC: 509.1.1

Proponents: William Johnson, Town of Mount Pleasant, EDS (wjohnson@tompsc.com)

2024 International Fire Code

Revise as follows:

509.1.1 Utility identification. Where required by the *fire code official*, gas shutoff valves, electric meters, service switches, including stand by generator transfer switches and other utility equipment shall be clearly and legibly marked to identify the unit or space that it serves. Identification shall be made in an *approved* manner, readily visible and shall be maintained.

Reason: Where standby generators are installed on services without service disconnects, the ATS (automatic transfer switch) may not be located at the meter base. During a fire event, simply pulling the meter may not disable the service potentially putting first responders at risk of injury or death. When considering the cost/ benefit analysis, requiring a decal at the service meter would minimally impact the cost of the overall project. Currently, we require decals on solar arrays for rapid shut down, this does not seem too unreasonable to implement without an increased burden to home and business owners.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Approximately $20.00.

Estimated Immediate Cost Impact Justification (methodology and variables):

This would minimally increase the overall cost of the installation of the standby generator system, essentially the only increase would be the price of the decal. A brief review of similar labels online.

F75-24

F76-24

IFC: SECTION 510

Proponents: Alan Perdue, Safer Buildings Coalition, Safer Buildings Coalition (alan.perdue@saferbuildings.org); Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

SECTION 510
EMERGENCY RESPONDER COMMUNICATIONS COVERAGE ~~ENHANCEMENT SYSTEMS~~

510.1 Emergency responder communications ~~enhancement systems~~ coverage in new buildings.
Approved in-building emergency responder communications coverage ~~enhancement system (ERCES)~~ for emergency responders shall be provided in all new buildings. ~~In-building~~ ERCES within the building shall be based on the existing coverage levels of the public safety communications systems utilized by the jurisdiction, measured at the exterior of the building. The ERCES, where required, shall be of a type determined by the *fire code official* and the *frequency license holder(s)*. This section shall not require improvement of the existing public safety communications systems.

Exceptions:

1. Where *approved* by the building official and the *fire code official*, a wired communications system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained instead of an *approved* communications coverage system.
2. Where it is determined by the *fire code official* and the frequency license holder that the communications coverage system is not needed based on existing in-building signal strength, quality and coverage from the public safety communications system(s)
3. In facilities where emergency responder communications coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the *fire code official* shall have the authority to accept an automatically activated emergency responder communications coverage system.
4. One-story buildings not exceeding 12,000 square feet (1115 m^2) with no below-ground area(s).

510.2 Emergency responder communications ~~enhancement system~~ coverage in existing buildings.
Existing buildings shall be provided with *approved* in-building emergency responder communications ~~enhancement system~~ coverage for emergency responders as required in Chapter 11.

510.3 Permits.
Permits for in-building emergency responder communications enhancement systems shall be in accordance with Sections 510.3.1 and 510.3.2.

510.3.1 Permit required.
A construction permit for the installation of or modification to in-building emergency responder communications enhancement systems and related equipment is required as specified in Section 105.6.5. Maintenance performed in accordance with this code is not considered a modification and does not require a permit.

510.3.2 Operational permit.
Where required by the fire code official, an operational permit shall be issued for the operation of an in-building emergency responder communications enhancement system.

510.4 Technical and design requirements.

The in-building emergency responder communications enhancement system shall be designed in accordance with this code and NFPA 1225.~~Equipment required to provide in-building emergency responder communications enhancement shall be *listed* in accordance with UL 2524. Systems, components and equipment required to provide the in-building emergency responder communications enhancement system shall comply with Sections 510.4.1 through 510.4.2.8.~~

510.4.1 ~~Emergency responder communications enhancement system signal strength~~ Listing.

~~The building shall be considered to have an acceptable in-building emergency responder communications enhancementsystem where signal strength measurements in 95 percent of all areas and 99 percent of areas designated as *critical areas* by the *fire code official* on each floor of the building meet the signal strength requirements in Sections 510.4.1.1 through 510.4.1.3.~~Equipment required to provide in-building emergency responder communications enhancement shall be listed in accordance with UL 2524.

~~510.4.1.1~~ 510.4.2.1 Minimum signal strength into the building.

The minimum *downlink* signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the *fire code official*. The *downlink* signal level shall be sufficient to provide not less than a Delivered Audio Quality (DAQ) of 3.0 throughout the coverage area using either narrowband analog, digital or wideband LTE signals or an equivalent bit error rate (BER), or signal-to-interference-plus-noise ratio (SINR) applicable to the technology for either analog or digital signals.

~~510.4.1.2~~ 510.4.2.2 Minimum signal strength out of the building. The minimum *uplink* signal strength shall be sufficient to provide usable voice communications throughout the coverage area as specified by the *fire code official*. The *uplink* signal level shall be sufficient to provide not less than a delivered audio quality (DAQ) of 3.0 using either narrowband analog, digital or wideband LTE digital signals or an equivalent bit error rate (BER), or an equivalent SINR applicable to the technology for either analog or digital signals.

Delete without substitution:

~~510.4.2 System design~~.

~~The in-building emergency responder communications enhancement system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.8 and NFPA 1225.~~

Revise as follows:

~~510.4.1.3~~ 510.4.2 ~~System performance~~ Signal Strength & Quality.

Signal strength shall be sufficient to meet the requirements of the frequencies, applications and other modulation technologies being utilized by public safety for emergency operations through the coverage area as specified by the *fire code official* in Section 510.4.2.2.

Delete without substitution:

~~510.4.2.1 Amplification systems and components~~.

~~Buildings and structures that cannot support the required level of in-building emergency responder communications enhancement system shall be equipped with systems and components to enhance the radio signals and achieve the required level of in-building emergency responder communications enhancement system specified in Sections 510.4.1 through 510.4.1.3. In-building emergency responder communications enhancement systems utilizing radio-frequency-emitting devices and cabling shall be *approved* by the *fire code official*. Prior to installation, all RF-emitting devices shall have the certification of the radio licensing authority and be suitable for public safety use.~~

~~510.4.2.2 Technical criteria~~.

~~The *fire code official* shall maintain a document providing the specific technical information and requirements for the in-building emergency responder communications enhancement system. This document shall contain, but not be limited to, the various frequencies required, the location of radio sites, the effective radiated power of radio sites, the maximum propagation delay in microseconds, the applications being used and other supporting technical information necessary for system design.~~

~~**510.4.2.3 Standby power.**~~

~~In-building emergency responder communications enhancement systems shall be provided with dedicated standby batteries or provided with 2-hour standby batteries and connected to the facility generator power system in accordance with Section 1203. The standby power supply shall be capable of operating the in-building emergency responder communications enhancement system at 100-percent system capacity for a duration of not less than 12 hours.~~

~~**510.4.2.4 Signal booster requirements.**~~

~~If used, signal boosters shall meet the following requirements:~~

1. ~~All signal booster components shall be contained in a NEMA Type 4 cabinet.~~
2. ~~Battery systems used for the emergency power source shall be contained in a NEMA 3R or higher-rated cabinet.~~
3. ~~Equipment shall have FCC or other radio licensing authority certification and be suitable for public safety use prior to installation.~~
4. ~~Where a donor antenna exists, isolation shall be maintained between the donor antenna and all inside antennas to not less than 20dB greater than the system gain under all operating conditions.~~
5. ~~Active RF-emitting devices used for in-building emergency responder communications enhancement systems shall have built-in oscillation detection and control circuitry to reduce gain and maintain operation. When a signal booster detects oscillation, a supervisory signal shall be transmitted. In the event of uncorrectable oscillation, the system shall be permitted to shut down.~~
6. ~~The installation of amplification systems or systems that operate on or provide the means to cause interference on any in-building emergency responder communications enhancement network shall be coordinated and *approved* by the *fire code official* and the *frequency license holder(s)* .~~

~~**510.4.2.5 System monitoring.**~~

~~The in-building emergency responder communications enhancement system shall be monitored by a *listed fire alarm control unit*, or where *approved* by the *fire code official*, shall sound an audible signal at a constantly attended on-site location. Automatic supervisory signals shall include the following:~~

1. ~~Loss of normal AC power supply.~~
2. ~~System battery charger(s) failure.~~
3. ~~Signal source malfunction.~~
4. ~~Failure of active RF-emitting device(s).~~
5. ~~Low-battery capacity at 70 percent of the 12-hour operating capacity has been depleted.~~
6. ~~Failure of critical system components.~~
7. ~~The communications link between the *fire alarm system* and the in-building emergency responder communications enhancement system.~~
8. ~~Oscillation of active RF-emitting device(s).~~

Revise as follows:

~~510.4.2.5.1~~ 510.4.3 Single supervisory input.

Where *approved*, a single supervisory input to the *fire alarm system* to monitor all system supervisory signals shall be permitted.

~~510.4.2.6~~ 510.4.4 Additional frequencies and change of frequencies.

The in-building emergency responder communications enhancement system shall be capable of modification or expansion in the event *frequency* changes are required by the FCC or other frequencylicensing authorities, or additional frequencies are made available by the FCC or other frequency licensing authorities.

~~510.4.2.7~~ <u>510.4.5</u> Design documents.
The *fire code official* shall have the authority to require "as-built" design documents and specifications for in-building emergency responder communications enhancement systems. The documents shall be in a format acceptable to the *fire code official*.

Delete without substitution:

~~510.4.2.8 Near-far effect.~~
~~Where a signal booster is required by the RF system designer, the dynamic range of the in-building emergency responder communications enhancement system shall be designed to minimize the effects of strong signal automatic gain control on weak signal *uplink* performance.~~

Revise as follows:

~~510.4.2.9~~ <u>510.4.6</u> Noise interference.
Where a signal booster is used, signal booster type(s) and the *uplink* signal and noise levels shall be coordinated with and *approved* by all *frequency license holder(s)* that may be adversely impacted by any transmitted noise resulting from the in-building emergency responder communications enhancement system. Systems shall be in compliance with all *frequency licensing authority* requirements.

510.5 Installation requirements.
The installation of the in-building emergency responder communications enhancement system shall be in accordance with <u>NFPA 1225</u> and Sections 510.5.2 through 510.5.5.

~~510.5.1 Mounting of the donor antenna(s).~~
~~To maintain proper alignment with the system designed donor site, donor antennas shall be permanently affixed on the building or where *approved*, mounted on a movable sled with a clearly visible sign stating "MOVEMENT OR REPOSITIONING OF THIS ANTENNA IS PROHIBITED WITHOUT APPROVAL FROM THE FIRE CODE OFFICIAL." The antenna installation shall be in accordance with the applicable requirements in the *International Building Code* for weather protection of the building envelope.~~

510.5.2 Approval prior to installation.
<u>Communications enhancement</u> systems capable of operating on frequencies licensed to any public safety *agency* by the FCC or other *<u>frequency</u> licensing authority* shall not be installed without prior coordination and approval of the *fire code official* <u>and *frequency license holder*</u> .

Delete without substitution:

~~510.5.2.1 Active RF-emitting devices.~~
~~Active RF-emitting devices shall meet the following requirements in addition to any other requirements determined by the *fire code official* or the *frequency license holder(s)*:~~

1. ~~Active RF-emitting devices that have a transmitted power output sufficient to require certification of the *frequency licensing authority* shall have the certification of the radio *frequency licensing authority* prior to installation.~~
2. ~~All active RF-emitting devices shall be simultaneously compatible for their intended use, as required by the *frequency licensing authority*, the *frequency license holder(s)* and the *fire code official* , at the time of installation.~~
3. ~~Written authorization shall be obtained from the *frequency license holder(s)* prior to the initial activation of any RF-emitting devices required to be certified by the *frequency licensing authority*.~~

Revise as follows:

510.5.3 Minimum qualifications of personnel. The minimum qualifications <u>for technical competency</u> of the system designer<u>,</u> ~~and~~ lead installation, maintenance and testing personnel shall include ~~both of~~ the following:

~~1. A valid FCC-issued general radio operators license.~~

~~2~~1. Certification or licensing of in-building system training issued by an *approved* organization ~~or *approved* school, or a~~

2. A certificate issued by the manufacturer of the equipment being installed.

~~These qualifications shall not be required where demonstration of adequate skills and experience satisfactory to the *fire code official* is provided.~~

Delete without substitution:

~~**510.5.4 Acceptance test procedure.**~~

~~Where an in-building emergency responder communications enhancement system is required, and upon completion of installation, the building *owner* shall have the radio system tested to verify that two-way coverage on each floor of the building is not less than 95 percent. The test procedure shall be conducted as follows or by a method *approved* by the *fire code official* :~~

~~1. Each floor of the building shall be divided into a grid of 20 approximately equal test areas.~~

~~2. The test shall be conducted using a calibrated portable radio of the latest brand and model used by the *agency* talking through the *agency*'s radio communications system or equipment *approved* by the *fire code official*.~~

~~3. Failure of more than one test area shall result in failure of the test.~~

~~4. In the event that two of the test areas fail the test, in order to be more statistically accurate, the floor shall be permitted to be divided into 40 equal test areas. Failure of not more than two nonadjacent test areas shall not result in failure of the test. If the system fails the 40-area test, the system shall be altered to meet the 95-percent coverage requirement.~~

~~5. A test location approximately in the center of each test area shall be selected for the test, with the radio enabled to verify two-way communications to and from the outside of the building through the public *agency*'s radio communications system. Once the test location has been selected, that location shall represent the entire test area. Failure in the selected test location shall be considered to be a failure of that test area. Additional test locations shall not be permitted.~~

~~6. The gain values of all amplifiers shall be measured and the test measurement results shall be kept on file with the building *owner* so that the measurements can be verified during annual tests. In the event that the measurement results become lost, the building *owner* shall be required to rerun the acceptance test to reestablish the gain values.~~

~~7. As part of the installation, a spectrum analyzer or other suitable test equipment shall be utilized to ensure spurious oscillations are not being generated by the subject signal booster. This test shall be conducted at the time of installation and at subsequent annual inspections.~~

~~8. Systems shall be tested using two portable radios simultaneously conducting subjective voice quality checks. One portable radio shall be positioned not greater than 10 feet (3048 mm) from the indoor antenna. The second portable radio shall be positioned at a distance that represents the farthest distance from any indoor antenna. With both portable radios simultaneously keyed up on different frequencies within the same band, subjective audio testing shall be conducted and comply with DAQ levels as specified in Sections 510.4.1.1 and 510.4.1.2.~~

~~**510.5.5 FCC compliance**~~**.**

~~The in-building emergency responder communications enhancement system installation and components shall comply with all applicable federal regulations including, but not limited to, FCC 47 CFR Part 90.219.~~

Revise as follows:

510.6 Testing and Maintenance.

The in-building emergency responder communications enhancement system shall be maintained operational at all times in accordance with this code and~~Sections 510.6.1 through 510.6.4~~NFPA 1225.

510.6.1 System Testing ~~and proof of compliance~~.

The testing of the in-building, emergency responder communication enhancement system shall be in accordance with NFPA 1225.~~*owner* of the building or *owner's* authorized agent shall have the in-building emergency responder communications~~ enhancement ~~system inspected and tested annually or where structural changes occur, including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:~~

1. ~~In-building coverage test as described in Section 510.5.4.~~
2. ~~Signal boosters shall be tested to verify that the gain is the same as it was upon initial installation and acceptance or set to optimize the performance of the system.~~
3. ~~Backup batteries and power supplies shall be tested under load of a period of 1 hour to verify that they will properly operate during an actual power outage. If within the 1-hour test period the battery exhibits symptoms of failure, the test shall be extended for additional 1-hour periods until the integrity of the battery can be determined.~~
4. ~~All active components shall be checked to verify operation within the manufacturer's specifications.~~

~~At the conclusion of the testing, a report, which shall verify compliance with Section 510.5.4, shall be submitted to the *fire code official* .~~

510.6.2 Additional frequencies.

The building *owner* shall modify or expand the in-building emergency responder communications enhancement system at their expense in the event *frequency* changes are required by the FCC or other radio licensing authority, or additional frequencies are made available by the FCC or other radio licensing authority. Prior approval of an in-building emergency responder communications enhancement system on previous frequencies does not exempt this section.

Delete without substitution:

~~510.6.3 Nonpublic safety system~~.

~~Where other nonpublic safety amplification systems installed in buildings reduce the performance or cause interference with the in-building emergency responder communications~~ enhancement ~~system, the nonpublic safety amplification system shall be corrected or removed.~~

Revise as follows:

~~510.6.4~~ 510.6.3 Field testing. *Agency* personnel shall have the right to enter onto the property at any reasonable time to conduct field testing to verify the required level of radio coverage.

Reason: This proposal is editorial. NFPA 1225, Standard for Emergency Services Communications (Chapter 18 In-Building Emergency Responder Communications Enhancement Systems and Chapter 20 Testing) has been revised and updated to include the appropriate design, installation, inspection, testing and maintenance requirements pertaining to ERCES. With the reference to NFPA 1225, the duplicative technical requirements are no longer needed in the IFC. By referencing NFPA 1225, ERCES will be designed and installed in accordance with the most up to date technical requirements of NFPA 1225. This simple reference to comply with NFPA 1225 eliminates future correlation issues between the IFC and NFPA 1225.

Note: NFPA 1225 (previously NFPA 1221) is a consolidation of several standards. The technical requirements for ERCES are now in Chapter 18 of NFPA 1225.

The requirements that are retained in this Section of the IFC pertain to administrative issues or areas not addressed in NFPA 1225.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The 2022 edition of NFPA 1225 is already referenced for system design and installation. The only new application will be for maintenance. The provisions of NFPA 1225 and Section 510 are very similar so this will only simplify enforcement.

F76-24

F77-24

IFC: 510.1

Proponents: Scott Plumer, Arvada Fire Protection District, Arvada Fire Protection District

2024 International Fire Code

Revise as follows:

510.1 Emergency responder communications enhancement systems in new buildings.
Approved in-building emergency responder communications enhancement system (ERCES) for emergency responders shall be provided in all new buildings. In-building ERCES within the building shall be based on the existing coverage levels of the public safety communications systems utilized by the jurisdiction, measured at the exterior of the building. The ERCES, where required, shall be of a type determined by the *fire code official* and the *frequency license holder(s).* This section shall not require improvement of the existing public safety communications systems.

Exceptions:

1. Where *approved* by the building official and the *fire code official*, a wired communications system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained instead of an *approved* communications coverage system.
2. Where it is determined by the *fire code official* that the communications coverage system is not needed.
3. In facilities where emergency responder communications coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the *fire code official* shall have the authority to accept an automatically activated emergency responder communications coverage system.
4. ~~One-story buildings not exceeding 12,000 square feet (1115 m^2) with no below-ground area(s).~~

Reason: This proposal is to remove exception 4 for one story buildings less than 12,000 square feet with no below ground areas from this section. Buildings less than 12,000 square feet can arguably be more dangerous to emergency responders than larger buildings due to the lack of automatic sprinkler systems. The 12,000 square foot size typically triggers the requirement for an automatic sprinkler system in multiple occupancy types (A-1, A-3, A-4, E, F-1, M, S-1, and S-2). However, the existing code language excepts these smaller, potentially non-sprinklered, buildings from requiring a two-way emergency responder communication system. Depending upon the building construction type/method, building location within the jurisdiction, special occupancy hazards present, and emergency responder staffing/resources, there may be a very legitimate need to have one of these systems in a building that is less than 12,000 square feet. If the fire code official determines that the previously mentioned factors or any unmentioned factors do not apply or will not have an adverse affect on emergency operations, then they are well within their authority to not require a system based on exception 2.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is to remove an exception to a section and does not inherently increase or decrease the cost of construction.

F77-24

F78-24

IFC: SECTION 510, 510.1, 510.1.1 (New), SECTION 202 (New)

Proponents: Alan Perdue, Safer Buildings Coalition, Safer Buildings Coalition (alan.perdue@saferbuildings.org)

2024 International Fire Code

Revise as follows:

SECTION 510 EMERGENCY RESPONDER COMMUNICATIONS COVERAGE~~ENHANCEMENT SYSTEMS~~

510.1 Emergency responder communications ~~enhancement systems~~ coverage in new buildings.
Approved in-building emergency responder communications ~~enhancement system (ERCES)~~ coverage for emergency responders shall be provided in all new buildings. In-building emergency responder coverage ~~ERCES~~ within the building shall be based on the existing coverage levels of the public safety communications systems utilized by the jurisdiction, measured at the exterior of the building. The ERCES, where required, shall be of a type determined by the *fire code official* and the *frequency license holder(s)*. This section shall not require improvement of the existing public safety communications systems.

Exceptions:

1. Where *approved* by the building official and the *fire code official*, a wired communications system in accordance with Section 907.2.13.2 shall be permitted to be installed or maintained instead of an *approved* communications coverage system.
2. Where it is determined by the *fire code official* and the frequency license holder that the communications coverage system is not needed based on existing in-building signal strength, quality, and coverage from the public safety communications system(s) as determined by an approved radio frequency (RF) evaluation..
3. In facilities where emergency responder communications coverage is required and such systems, components or equipment required could have a negative impact on the normal operations of that facility, the *fire code official* shall have the authority to accept an automatically activated emergency responder communications coverage system.
4. One-story buildings not exceeding 12,000 square feet (1115 m^2) with no below-ground area(s).

Add new text as follows:

510.1.1 Radio frequency (RF) evaluation. A radio frequency (RF) evaluation shall be performed to determine if existing (RF) coverage by the *public safety communications system(s)* utilized by the jurisdiction exists within the building to meet the signal coverage, strength and quality requirements of NFPA 1225 prior to requiring the installation and operation of an emergency responder communications enhancement system.

Add new definition as follows:

PUBLIC SAFETY COMMUNICATIONS SYSTEM.
A system that provides communications coverage for use by emergency responders within the jurisdictional area.

Reason: During the 2024 code development cycle the term two-way radio communications coverage system was changed to align with standard industry terminology identify systems that enhance radio frequency (RF) coverage inside buildings as Emergency Responder Communications Enhancement Systems in F32-21. As a result of this global change taking place within Section 510 it inadvertently modified the scope of the section's title and section 510.1 by eliminating the word "coverage" in certain locations. This proposed language for the section title and section 510.1 reinserts the word "coverage" where it is needed to clarify the intent of the issue of when and if an enhancement system is required. It is important to identify and understand that there is RF coverage naturally from the public safety communications system in many buildings as well as buildings where the RF signal is blocked. It is imperative that in-building RF solutions only be installed where they are actually needed. This is a requirement from many frequency licensing authorities due to potential noise and interference to the public safety communications system.

The proposed language within exception #2 is intended to clarify the baseline requirements to be utilized to determine if an emergency responder enhancement system is actually needed or not.

The proposed language within 510.1.1 is intended to address a significant need that has been overlooked during previous code development cycles. As currently written, both the IFC and NFPA ERCES related codes and standards only address the installation of an Emergency Responder Communications Enhancement System (ERCES) and do not provide the necessary direction and requirements to determine if a system is actually needed through a radio frequency (RF) evaluation.

An essential part of determining the need for an emergency responder communications enhancement system (ERCES) is the initial in-building coverage evaluation often referred to as a (RF) survey. The purpose of conducting an initial evaluation is to determine if (RF) from the public safety communication system(s)s utilized by the jurisdiction(s) can penetrate the building to provide sufficient signal strength and quality in addition to the coverage requirements for both general and critical areas without the need for an emergency responder communications enhancement system.

Earlier editions of the standard for ERCES focused on the testing of signal strength only using a measurement of -95DBm. Based on experience, lessons learned and the need for signal quality in addition to signal strength, the testing requirements have evolved. During the evaluation process, it is imperative that signal coverage, strength and signal quality be evaluated for both uplink and downlink communications capabilities. This will include but is not limited to measurements such as delivered audio quality (DAQ), bit error rate (BER) and signal to interference noise ratio (SINR) which provide the quality measurement of the signal.

In many areas, the frequency licensing authority (the Federal Communications Commission in the United States) requires that signal boosters be used in weak signal areas only. In other words, you shall not install and operate an ERCES where it is not actually needed. Therefore, the initial evaluation should be utilized to determine if a building has sufficient signal naturally may need complete or partial enhancement where (RF) is not sufficient to meet the required levels.

It is vital to understand that if there is an insufficient signal level from the public safety communications system outside the building, there is no requirement to install an ERCES within the building. Additionally, there may be multiple public safety communications systems in use by the jurisdiction. To ensure coverage for all emergency responders such as fire, law enforcement, EMS and others, all systems in use by emergency responders should be properly evaluated to ensure adequate signal coverage, strength and quality exist.

Requiring unnecessary ERCES installations will contribute to noise and interference that can impact the health of the entire public safety communications system to the point where it can completely fail leaving emergency responders with no communications within their jurisdiction not just inside the building.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Although the IFC and referenced NFPA 1225 2022 edition are silent on how to conduct an RF evaluation they are already being conducted. This proposal simply clarifies the benchmarks that need to be accomplished to properly determine if an ERCES is actually needed. Performing the evaluation correctly will eliminate the need for some of the ERCES that are currently being required throughout the industry.

F78-24

F79-24

IFC: 502.1, SECTION 202 (New), 105.5.28 (New), 105.6.16 (New), SECTION 511 (New), 511.1 (New), 511.2 (New), 511.3 (New), 511.4 (New), 511.5 (New), 511.6 (New), 511.7 (New)

Proponents: Joseph Kelsey, SAFE HAVEN BABY BOXES INC, self (joe@safehavenbabyboxes.com)

2024 International Fire Code

Revise as follows:

502.1 Definitions. The following terms are defined in Chapter 2:
AGENCY.

FIRE APPARATUS ACCESS ROAD.

FIRE COMMAND CENTER.

FIRE DEPARTMENT MASTER KEY.

FIRE LANE.

INFANT DROP-OFF BOX.

KEY BOX.

TRAFFIC CALMING DEVICES.

Add new definition as follows:

INFANT DROP-OFF BOX. A newborn safety device provided under a jurisdiction’s Safe Haven Law allowing a mother in crisis, that is unable to provide infant care may safely, securely, and anonymously surrender their child at an approved location designated as an infant drop-off site.

Add new text as follows:

105.5.28 Infant drop-off box. An operational permit is required for an infant drop-off box regulated by Section 511.

105.6.16 Infant drop-off box. A construction permit is required for the installation of an infant drop-off box. Maintenance performed in accordance with this code is not considered to be a modification and does not require a construction permit

SECTION 511
INFANT DROP-OFF BOXES

511.1 General.. Where installed in new or existing buildings, the *infant drop-off box* shall comply with Sections 511.2 through 511.4

511.2 Permits.. Permits shall be required as set forth in Sections 105.5 and 105.6.

511.3 Installation. Installation shall be approved and in accordance with the manufacturers instructions.

511.4 Location.. The installation location shall be *approved* by the *fire code official*.

511.5 Monitoring. The infant drop-off box shall be continuously monitored. Signals shall be transmitted to an *approved* supervising station or, where *approved* by the *fire code official*, shall sound an audible signal at a monitored device. Fire and EMS Stations shall be able to respond within 5 minutes after being notified by dispatch that a signal has been received.
Monitoring signals shall include the following:

1. Two seconds after the outside door is opened.
2. Sixty seconds after baby is placed inside the infant drop-off box
3. Where power is lost to the infant drop-off box.

511.6 Inspection, testing and maintenance.. The *infant drop-off box* shall be inspected, tested and maintained in accordance with the manufacturer's instructions.

511.7 Climate control. The infant drop-off box shall be climate controlled.

Reason: Many states have enacted "Safe Haven laws" where parents can anonymously and safely leave an infant, they are unable or unwilling to care for, at locations such as fire stations, police stations or hospitals. Infant drop-off boxes (commonly known as baby boxes) are designed to provide a secure and anonymous option for parents in need, ensuring the well-being of infants and adhering to proper procedures. This proposal provides reasonable safety and performance requirements where an infant drop-off box is being installed in new or existing construction. There is no requirement mandating buildings be outfitted with these boxes. That decision remains with the building owner.

As of 2023, there are illegally abandoned infants found in the United States approximately every 3-5 days. These numbers are decreasing in states that have baby boxes. Indiana for example, installed the country's first baby box in 2016. Since then, Indiana has had 0 deadly abandonments with a prior record of 1-3 per year. Out of all 50 states that have their own versions of the Safe Haven Law, 20 have added baby boxes and several more currently have legislation pending.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Immediate/initial cost impact: Installation is not required, but where installed, the cost for the equipment, related building modifications and connection to the electric service and monitoring is estimated to cost between $15,000-$20,000.

Estimated Immediate Cost Impact Justification (methodology and variables):

Immediate/initial cost impact: Depending on the location, the construction & installation along with the potential need for an additional alarm monitoring service the cost can vary. However, due to the public service nature of infant drop-off boxes, there is a possibility that many of these costs can be donated by individuals or local community organizations.

Estimated Life Cycle Cost Impact:

Annual maintenance cost is estimated to not exceed $500/yr.

F79-24

F80-24

IFC: SECTION 603, 603.1, 603.1.1, 603.1.2

Proponents: Jeff O'Neil, Chair, Committee on Healthcare (ahc@iccsafe.org)

2024 International Fire Code

Revise as follows:

SECTION 603
ELECTRICAL EQUIPMENT, WIRING AND HAZARDS

603.1 General.
Electrical equipment, wiring and systems required by this code or the International Building Code shall be installed, used and maintained in accordance with NFPA 70 and Sections 603.2 through 603.9.

603.1.1 Equipment and wiring.
All electrical equipment, wiring, devices and appliances shall be tested; *listed* and *labeled;* and installed, used and maintained in accordance with NFPA 70 and all instructions included as part of such listing.

Revise as follows:

603.1.2 Healthcare facilities.
In Group I-2 facilities, ambulatory care facilities and outpatient clinics, the electrical systems and equipment shall be installed, maintained and tested in accordance with NFPA 99.

Reason: In order to meet federal conditions of participation health care facilities must comply with system and equipment according to the requirements listed in NFPA 99, Health Care Facilities Code (K912). NFPA 99 is a risk-based approach to system design and maintenance of key building systems. It is based upon risk to patients, visitors, or staff in the healthcare facility regardless of occupancy classification. It does cover items such as routine testing of both normal and emergency power, installation directions of circuits in areas as critical areas, testing of electrical systems, defining surgery operating rooms as wet locations unless approved risk assessment determines otherwise. Cover plates on life safety and critical branch receptacles are a distinct color. Requiring tamperproof receptacles in designated pediatric locations. These practices improve safety and reliability of electrical systems in locations at risk.

This proposal is submitted by the ICC Committee on Healthcare (CHC). The CHC was established by the ICC Board to evaluate and assess contemporary code issues relating to healthcare facilities. This is a joint effort between ICC and the American Society for Healthcare Engineering (ASHE), a subsidiary of the American Hospital Association, to eliminate duplication and conflicts in healthcare regulation.

This change is a part of a series of changes that assure the IFC, IBC and IEBC align with the requirements of CMS facilities regulations.

Adding reference to NFPA 99 reinforces to local design teams and code officials the need for healthcare facilities electrical systems to conform with both NFPA 99 and NFPA 70. The patients and staff are depending upon a reliable electric system to support delivery of care and their lives may depend upon this. Without having designers, code officials and owners aligned on this expectation, facilities may face compliance challenges from Center for Medicare and Medicaid during inspection.

This proposal is submitted by the ICC Committee for Healthcare (CHC).
The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is already a requirement for healthcare facilities in the United States, so end result will be no change to construction costs.

F80-24

F81-24

IFC: 603.5.1.1, UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Revise as follows:

603.5.1.1 Listing in Group I-2 occupancies and ambulatory care facilities.
In Group I-2 occupancies and ambulatory care facilities, relocatable power taps shall be *listed* and *labeled* in accordance with UL 1363 except under the following conditions:

1. In Group I-2, Condition 2 occupancies, relocatable power taps providing power to patient care-related electrical equipment in the patient care vicinity, as defined by NFPA 99, shall be *listed* and *labeled* in accordance with ~~UL 1363A~~ UL 2930 or be integral to equipment listed and labeled to ~~or~~ UL 60601-1.
2. In Group I-2, Condition 1 facilities, in care recipient rooms using line-operated patient care-related electrical equipment, relocatable power taps in the patient care vicinity, as defined by NFPA 99, shall be *listed* and *labeled* in accordance with ~~UL 1363A~~ UL 2930 or be integral to equipment listed and labeled to ~~or~~ UL 60601-1.
3. In ambulatory care facilities, relocatable power taps providing power to patient care-related electrical equipment in the patient care vicinity, as defined by NFPA 99, shall be *listed* and *labeled* in accordance with~~UL 1363A~~ UL 2930 or be integral to equipment listed and labeled to ~~or~~ UL 60601-1.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

2930-2023 Cord-and-Plug-Connected Health Care Facility Outlet Assemblies

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Cord-and-Plug-Connected Health Care Facility Outlet Assemblies (UL 2930-2023)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: UL 2930 was published in August 2023 and is the appropriate listing standard for Relocatable Power Taps (RPT)s for use in I-2 and ambulatory care facilities. UL 60601-1 does not apply to stand-alone RPTs, but rather complete medical electrical equipment which may incorporate integral power taps. The existing code references UL 1363A which is a component standard for use within listed complete medical electrical equipment. However, UL1363A is not used for listing, and there are not listed and labeled products on the market in accordance with this standard. The product requirements in UL 2930 align with those in these existing reference standards, but are appropriate for listing of stand-alone RPTs for these uses. At least four manufacturers have listing to these requirements.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Clarification to point to correct listing standard. Substantive requirements have not changed from existing references.

F81-24

F82-24

IFC: 604.3.4

Proponents: Kevin Brinkman, NEI, NEII (klbrinkman@neii.org)

2024 International Fire Code

Revise as follows:

604.3.4 Temperature Control. Where standby power is connected to elevators <u>and a temperature control means is provided in accordance with Section 3005.2 of the *International Building Code*, the temperature control means</u> ~~the machine room ventilation or air conditioning~~ shall be connected to the standby power source.

Reason: To correlate the title and requirements with IBC Section 3005.2. The current titles and language are misleading because the real purpose is to provide standby power for the means to control the temperature for proper operation of the elevator equipment. This public comment to modify the proposal correlates with the public comment and proposal for 3003.1.4.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no change in the requirement for standby power, only a clarification to better align with another section in the IBC.

F82-24

F83-24

IFC: 607.6 (New), 607.6, 607.7, 607.6.2 (New), UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Add new text as follows:

607.6 Electrically operated cooking oil equipment. Electrically operated equipment for heating, storing, and filtering cooking oil shall be installed in accordance with NFPA 70, the manufacturer's installation instructions, and 607.6.1 and 607.6.2.

Revise as follows:

607.6.1 Electrical cooking oil heating equipment ~~Heating of cooking oil~~.
Electrical equipment used for heating cooking oil in cooking oil storage systems shall be *listed* ~~to~~ and *labeled* in accordance with UL 499 ~~and shall comply with NFPA 70~~. Use of electrical immersion heaters shall be prohibited in nonmetallic tanks.

Delete without substitution:

~~**607.7 Electrical equipment.**~~
~~Electrical equipment used for the operation of cooking oil storage systems shall comply with NFPA 70.~~

Add new text as follows:

607.6.2 Electrically operated filter systems for cooking oil. Electrically operated filter systems for cooking oil which are not integral to a cooking appliance shall be *listed* and *labeled* in accordance with UL 1889.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

1889-1996 Commercial Filters for Cooking Oil - with revisions through September 4, 2018

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Commercial Filters for Cooking Oil - with revisions through September 4, 2018 (UL 1889-1996)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: Editorial changes to group related requirements for electrically operated cooking oil equipment. This proposal identifies UL 1889 as the correct standard for listing the electrically operated filter systems for this application and also clarifies requirements for non-integral filter systems as is done for integral filter systems which are part of listed cooking appliances. More than 15 manufacturers have active listings to this standard.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The cost for obtaining listed electrically operated equipment for heating, storing, and filtering cooking oil may or may not represent increased product costs over obtaining non-listed equipment that have not been independently investigated to applicable standards for determining product safety and performance.

Obtaining and maintaining a listing for electrically operated equipment for heating, storing, and filtering cooking oil involves both product investigation costs and costs for periodic inspection of production, as required by the definition of "listed". However, the impact of any potential cost increase can be weighed by the code development committee against the user and code official safety benefits derived from requiring listed equipment, as well as the additional benefit of less effort needed to demonstrate or determine compliance.

F84-24

IFC: 608.18.4 (New), 2311.5 (New), 2311.5, UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Add new text as follows:

608.18.4 Refrigerant recovery and recycling equipment. Electrically operated equipment used for recovery or recycling of refrigerant of Groups A2, A2L, and A3 shall be *listed* and *labeled* in accordance with UL 1963 and be marked as suitable for use with the refrigerant being recovered or recycled.

2311.5 Refrigerant recovery and recycling equipment. Electrically operated equipment used for recovery or recycling of refrigerant of Groups A2, A2L, and A3 shall be *listed* and *labeled* in accordance with UL 1963 and be marked as suitable for use with the refrigerant being recovered or recycled.

Revise as follows:

~~**2311.5**~~ **2311.6 Vehicles powered by liquefied petroleum gas (LP-gas).**
Vehicles powered by LP-gas and the servicing of vehicles powered by LP-gas shall be in compliance with this chapter, Chapter 61 and NFPA 58.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

1963-2011 Refrigerant Recovery/Recycling Equipment - with revisions through March 25, 2021.

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Refrigerant Recovery/Recycling Equipment - with revisions through March 25, 2021 (UL 1963-2011)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: EPA Significant New Alternative Policy Program (SNAP) rules regarding low-GWP refrigerants will essentially require the use of refrigerants with higher flammability safety classifications per ASHRAE 34. The referenced product standard for recovery/recycling equipment has additional requirements to mitigate fire and explosion hazards associated with these refrigerants.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The cost for obtaining listed electrically operated equipment used for recovery or recycling of refrigerant may or may not represent increased product costs over obtaining non-listed products that have not been independently investigated to applicable standards for determining product safety and performance.

Obtaining and maintaining a listing for electrically operated equipment used for recovery or recycling of refrigerant involves both product investigation costs and costs for periodic inspection of production, as required by the definition of “listed”. However, the impact of any potential cost increase can be weighed by the code development committee against the user and code official safety benefits derived from requiring listed equipment, as well as the additional benefit of less effort needed to demonstrate or determine compliance.

F84-24

F85-24

IFC: 609.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

609.1 General.
~~Hyperbaric~~ In all facilities and occupancies, hyperbaric chambers and associated devices shall be installed, inspected, tested and maintained in accordance with NFPA 99.

Reason: This proposal is necessary because there has been an increase in the number of hyperbaric chambers that are being used in occupancies other than Health Care Facilities. This proposal also closes a loophole in the code for those that are using hyperbaric chambers for non-medical uses. With this code change, now the fire code will ensure that all hyperbaric chambers, no matter their location or use, are in compliance with NFPA 99.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

There is no actual cost impact because all hyperbaric chambers were intended to meet the requirements of NFPA 99 though the code was not clear with use of the term facilities and not referring to the hyberbaric chambers themselves. This code change closes a loophole.

F85-24

F86-24

IFC: SECTION 611 (New), 611.1 (New), 611.1.1 (New), 611.2 (New), 611.3 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new text as follows:

SECTION 611
ELECTRIC VEHICLE CHARGING STATIONS

611.1 Disconnects. Locations containing electric vehicle charging stations shall be provided with a clearly identified and readily accessible emergency disconnect installed in an approved location.

611.1.1 Alternative Disconnects. Where approved, a disconnect provided to comply with NFPA 70 can be utilized to meet the disconnect requirement when it is clearly identified, and the location is accessible to the fire department.

611.2 Height. Where provided, the height of the emergency disconnect shall be not less than 42 inches (1067 mm) and not more than 48 inches (1372 mm) measured vertically, from the floor level to the activating device. The disconnect shall be distinctly labeled EMERGENCY ELECTRIC VEHICLE CHARGER DISCONNECT.

611.3 Fire Extinguishers. Approved portable fire extinguishers complying with Section 906 with a minimum rating of 2-A:20-B:C shall be provided and located such that an extinguisher is not more than 75 feet (23 860 mm) from electric vehicle charging stations.

Reason: Electric vehicle charging stations are becoming more prominent as electric vehicles gain popularity. The fire service needs a safe means to disconnect these charging stations from their power supply to be able to safely extinguish a fire involving the charging stations and/or the vehicle being charged. This new code sections provides accessible emergency disconnects to safely shut power off to the charging stations. The new code section allows for alternative disconnect that is in compliance with NFPA 70 plus code language for the height of the disconnect, signage and fire extinguishers.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Research was conducted and the typical immediate cost increase for each installation would be less than $50.

Estimated Immediate Cost Impact Justification (methodology and variables):

The cost impact is very small as most installation already have a means to disconnect the power from the EV Charger. A small increase may be necessary in terms on additional conduit and wire if the disconnect needs to be installed in a location the is accessible for the fire service and away from the charger. Research was conducted and the cost increase for each installation would be less than $50.

F86-24

F87-24

IFC: 701.2

Proponents: Mark S. Graham, National Roofing Contractors Association (NRCA) (mgraham@nrca.net)

2024 International Fire Code

Revise as follows:

701.2 Fire-resistance-rated construction.
The *fire-resistance rating* of the following *fire-resistance-rated* construction shall be maintained:

1. Structural members.
2. *Exterior walls*.
3. Roof coverings
~~3.~~4. *Fire walls , fire barriers , fire partitions*.
~~4.~~5. *Horizontal assemblies*.
~~5.~~6. Shaft enclosures.

Reason: This code change proposal is intended to clarify the code's intent by specifically identifying roof coverings as rated construction who's rating needs be maintained, inventoried and annually visually inspected per Section 701.

It can be interpreted roof coverings are already included in Item 4. *Horizontal assembles,* as this term includes "...roof assembly of materials..." in it's definition. Adding roof covering in Section 701.2 makes it plainly clearly roof coverings, whether low-slope (horizontal) or steep-slope, are required to be maintained in Section 701 as constructed according to IBC Section 1505-Fire Classification and IRC Section-R902-Fire Classification.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change proposal adds clarity to the code and does not increase or decrease the code's stringency. See reason statement.

F87-24

F88-24

IFC: 705.2.4

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

705.2.4 Door operation. Swinging *fire doors* shall close from ~~the full open~~a door-open position of 90 degrees (1.57 rad) and latch automatically.

Reason: There is a conflict in the requirements for swinging fire doors specific to the functionality of the door closing hardware.

- The IBC §716.1 and IFC §705.2 require opening protectives to comply with NFPA 80. This includes fire doors and door-closing devices on fire doors.
- IFC §405.2 requires inspection and testing of fire doors.
- IFC §705.2.4 requires fire doors to close and latch from the **full open** position.
- NFPA 80 §5.3.5.2 states that swinging doors with fire door hardware must close from the **full open** position.
- NFPA 80 §5.3.6.2 states that swinging doors with fire door hardware must close from the **any open** position.
- NFPA 80 Chapter 7, which is specific to swinging doors with fire door hardware requires fire doors to close from **any open** position.

This proposal intends to clarify the actual requirement for initial acceptance and periodic inspection and testing. There are contradictory requirements, and as a result a multitude of interpretations and applications of the requirement.

Even if a door swings to 180 degrees, when an occupant uses that door to exit, they will not routinely open it the full 180-degree swing—more likely a 90-degree swing is what will happen. Chapter 10 requires measurement of the clear width of egress opening at 90 degrees.

Where NFPA 80 states the door must close from any open position, does that mean full open, 90 degrees open, or 1 degree open? I would be surprised to see door closers close and latch from a 1 degree position, but I would expect from 90 degrees or more.

So, if we consider "full open" to be 90 degrees or more, we can the test at 90 degrees as the worst case for that range. Testing fire doors in an existing building from a 90-degree position seems to be the logical solution.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This will not change the cost of construction. This proposal clarifies the method of inspection to ensure proper operation of the door through its life span.

F88-24

F89-24

IFC: SECTION 708, 708.1

Proponents: Bill McHugh, CM Services, National Fireproofing Contractors Association (bill@mc-hugh.us)

2024 International Fire Code

Revise as follows:

SECTION 708
SPRAY FIRE-RESISTIVE ~~FIRE-RESISTANT~~ MATERIALS
AND INTUMESCENT FIRE-RESISTIVE ~~FIRE-RESISTANT~~ MATERIALS

708.1 Maintaining protection.
Where required when the building was originally permitted and constructed, spray ~~fire-resistant~~ fire-resistive materials and intumescent ~~fire-resistant~~ fire-resistive materials shall be visually inspected to verify that the materials do not exhibit exposure to the substrate.

Reason: From the 2021 to the 2024 version of the IBC, the terms were changed to Spray Fire-Resistive Materials and Intumescent Fire-Resistive Materials. To be consistent with the 2024 International Building Code, the terms need to change in the 2027 International Fire Code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Changing titles and terms in this case does not increase or decrease the cost of construction.

F89-24

F90-24

IFC: 708.1, 708.2 (New)

Proponents: Bill McHugh, CM Services, National Fireproofing Contractors Association (bill@mc-hugh.us)

2024 International Fire Code

708.1 Maintaining protection.
Where required when the building was originally permitted and constructed, spray fire-resistant materials and intumescent fire-resistant materials shall be visually inspected to verify that the materials do not exhibit exposure to the substrate.

Add new text as follows:

<u>**708.2**</u> <u>**Repair of Spray Fire-Resistant Materials and Intumescent FIre-Resistant Materials.**</u> <u>Where damaged, materials used to protect columns, beams and horizontal assemblies shall be repaired, replaced or restored in accordance with the listing, the manufacturer's repair instructions and with the same materials and thicknesses used in the *listing*. Where the *listing* is not known, repairs shall be made with the same material type and thickness that exists.</u>

Reason: In the 2024 IFC it is that SFRM and IFRM Fireproofing need to be visually inspected. This proposal completes the action by adding a repair section. Because fireproofing is installed in accordance with a fire-resistance listing and manufacturers instructions, it needs to be repaired with a listed repair system. When the listing is not known, guidance is provided to repair with the same type of material an the same thickness. Too many times we see thick fireproofing repaired with skim coats over fireproofing void and not the same thickness as exists on the rest of the beam, column or assembly. It is critical the repair method have the appropriate material, material type and where possible, match new construction listing to provide continues fire-resistance protection.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The reason this proposal has no impact is that this proposal reflects what actually should happen. Anything less is a fire and life safety risk.

F90-24

F91-24

IFC: SECTION 708, 708.1

Proponents: Bill McHugh, CM Services, National Fireproofing Contractors Association (bill@mc-hugh.us)

2024 International Fire Code

Revise as follows:

SECTION 708 SPRAY FIRE-RESISTANT MATERIALS~~, AND~~ INTUMESCENT FIRE-RESISTANT MATERIALS AND OTHER MATERIALS

708.1 Maintaining protection.
Where required when the building was originally permitted and constructed, spray fire-resistant materials~~, and~~ intumescent fire-resistant materialsand other materials used to provide fire-resistance protection, shall be visually inspected to verify that the materials do not exhibit exposure to the substrate.

Reason: The reason for this proposal is to update 708.1 to be consistent with the types of materials used to provide fire-resistance protection to structural building elements and assemblies. In addition to spray fire-resistive materials and intumescent fire-resistive materials, boards and wraps are used as well. Boards could be mineral wool boards, ceramic fiber boards, gypsum panels, calcium silicate board, metal composite boards, lath and plaster. Wraps are insulation type materials, endothermic wraps, etc.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The International Fire Code requires annual visual inspection of fire-resistance in buildings. This code proposal is to clarify that all types of materials used to provide fire-resistance-rated protection to structural building elements need to have protection maintained during the life cycle of the building.

F91-24

F92-24

IFC: 803.3

Proponents: Marcelo Hirschler, GBH International, GBH International (mmh@gbhint.com)

2024 International Fire Code

Revise as follows:

803.3 Interior finish requirements based on occupancy.
Interior wall and ceiling finish shall have a flame spread index not greater than that specified in Table 803.3 for the group and location designated. Interior wall and ceiling finish materials tested in accordance with NFPA 286, and meeting the acceptance criteria of Section 803.1.1.1, shall be permitted to be used where a Class A, Class B, or Class C classification in accordance with ASTM E84 or UL 723 is required.

Reason: Since a Class A requirement is more severe than a Class B or a Class C requirement, based on testing to ASTM E84, it should be evident that if a material is acceptable as a Class A, it would also automatically be acceptable as a Class B or Class C. However, sometimes aspects that are evident are not accepted if they are not explicitly stated. In this case, the code commentary also states what this proposal recommends, but explicit mention in the code would be useful.

The other change (from "shall be used" to "shall be permitted to be used") is a clarification and makes it consistent with the intent and with the IBC. Clearly the IFC is not mandating that only materials tested to NFPA 286 shall be used but that materials that comply with the criteria based on NFPA 286 are acceptable.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is simply clarification. It is clear that a material that meets a Class A can also meet a Class B or a Class C.

F92-24

F93-24

IFC: 807.4, 807.4.1, 807.4.1.1 (New)

Proponents: Marcelo Hirschler, GBH International, GBH International (mmh@gbhint.com)

2024 International Fire Code

807.4 Artificial decorative vegetation.
Artificial decorative vegetation shall comply with this section and the requirements of Sections 806.2 and 806.3. Natural decorative vegetation shall comply with Section 806.

Exception: Testing of artificial vegetation is not required in Group I-1; Group I-2, Condition 1; Group R-2; Group R-3; or Group R-4 occupancies equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1, where such artificial vegetation complies with the following:

1. Wreaths and other decorative items on doors shall not obstruct the door operation and shall not exceed 50 percent of the surface area of the door.
2. Decorative artificial vegetation shall be limited to not more than 30 percent of the wall area to which it is attached.
3. Decorative artificial vegetation not on doors or walls shall not exceed 3 feet (914 mm) in any dimension.

Revise as follows:

807.4.1 Flammability.
~~Artificial~~ <u>The flammability of artificial</u> decorative vegetation shall <u>be assessed in accordance with one of the following:</u>
~~meet the flame propagation performance criteria of~~

1. <u>Where tested in accordance with NFPA 701 using</u> Test Method 1 or Test Method 2, as appropriate~~, of NFPA 701~~ <u>the artificial decorative vegetation shall meet the flame propagation performance criteria</u>. ~~Meeting such criteria shall be documented and certified by the manufacturer in an approved manner~~
2. ~~Alternatively, the artificial decorative vegetation shall be~~ <u>Where</u> tested in accordance with NFPA 289~~,~~ using the 20 kW ignition source, ~~and~~ <u>the artificial decorative vegetation</u> shall have a maximum heat release rate of 100 kW.

Add new text as follows:

<u>**807.4.1.1 Documentation.** The test report and compliance with acceptance thresholds shall be documented and certified by the manufacturer in an approved manner.</u>

Reason: Editorial rewrite for clarification. No change in requirements.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

No change in requirements.

F93-24

F94-24

IFC: 807.4, 807.4.1

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

807.4 Artificial decorative vegetation.
Artificial decorative vegetation in other than Group U occupancies shall comply with this section and the requirements of Sections 806.2 and 806.3. Natural decorative vegetation shall comply with Section 806.

~~**Exception:** Testing of artificial vegetation is not required in Group I-1; Group I-2, Condition 1; Group R-2; Group R-3; or Group R-4 occupancies equipped throughout with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1, where such artificial vegetation complies with the following:~~

1. ~~Wreaths and other decorative items on doors shall not obstruct the door operation and shall not exceed 50 percent of the surface area of the door.~~
2. ~~Decorative artificial vegetation shall be limited to not more than 30 percent of the wall area to which it is attached.~~
3. ~~Decorative artificial vegetation not on doors or walls shall not exceed 3 feet (914 mm) in any dimension.~~

807.4.1 Flammability.
~~Artificial~~The flammability of artificial decorative vegetation shall be tested and meet one of with the following:

1. ~~the flame propagation performance criteria of~~Where tested in accordance with NFPA 701 using Test Method 1 or Test Method 2, as appropriate, ~~of NFPA 701~~the artificial decorative vegetation shall meet the flame propagation performance criteria. ~~Meeting such criteria shall be documented and certified by the manufacturer in an *approved* manner.~~
2. ~~Alternatively, the artificial decorative vegetation shall be~~Where tested in accordance with NFPA 289~~,~~ using the 20 kW ignition source, ~~and~~the artificial decorative vegetation shall have a maximum heat release rate of 100 kW.

The test report showing compliance with acceptance thresholds shall be documented and certified by the manufacturer.

Exception: In Group I-1; I-2, Condition 1; R-2; R-3; and R-4 occupancies flammability testing is not required in buildings equipped throughout with an approved automatic sprinkler system installed in accordance with Section 903.3.1, where the artificial decorative vegetation complies with the following:

1. Wreaths and other artificial decorative vegetation on doors shall not obstruct the door operation and shall not exceed 50 percent of the surface area of the door.
2. Artificial decorative vegetation shall be limited to not more than 30 percent of the wall area to which it is attached.
3. Artificial decorative vegetation not on doors or walls shall not exceed 3 feet (914 mm) in any dimension.

Reason: Section 807.4 states all decorative vegetation must comply with the requirements. Section 807.4.1 requires flammability testing, but the exception to flammability testing is in Section 807.4. This proposal intends to relocate the exception to flammability testing to the appropriate section and reformat the flammability testing requirements.

This proposal accomplishes the following:

1. Section 807.4 is revised by indicating the provisions do not apply to Group U occupancies, and deleting the exception. The exception is relocated to Section 807.4.1, which is where the flammability testing is required.
2. Section 807.4.1 is reformatted to clarify that either the NFPA 701 test or the NFPA 289 test in providing evidence of acceptability.
3. The allowance for the manufacturer to certify compliance is relocated so that it applies to both testing procedures rather than only NFPA 701.

This proposal reformats the sections and clarifies the application of the exception.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal editorially relocates requirements to a clearer format. The only possible change in construction costs would be for Group U occupancies which would not need to comply.

F94-24

F95-24

IFC: 901.6 (New), 901.6.1, 901.6, 901.6.3 (New), 901.6.2, 901.6.2.1, 901.6.2.2, 901.6.3, 901.6.3.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new text as follows:

901.6 Inspection, testing and maintenance. Fire protection and life-safety systems shall be inspected, tested and maintained in accordance with Sections 901.6.1 through 901.6.5

901.6.1 Standards.
Fire protection systems shall be inspected, tested and maintained in accordance with the referenced standards *listed* in Table 901.6.1.

Revise as follows:

~~901.6~~ 901.6.2 Operative Condition Required ~~Inspection, Testing and Maintenance~~.
Fire protection and *life safety systems* shall be maintained in an operative condition at all times, and shall be replaced or repaired where defective. ~~Nonrequired *fire protection* and *life safety systems* and equipment shall be inspected, tested and maintained or removed in accordance with Section 901.8.~~

Add new text as follows:

901.6.3 Non-required systems.
Nonrequired *fire protection* and *life safety systems* and equipment shall be inspected, tested and maintained or removed in accordance with Section 901.8.

Revise as follows:

~~901.6.2~~ 901.6.4 Integrated testing.
Where two or more *fire protection* or *life safety systems* are interconnected, the intended response of subordinate *fire protection* and *life safety systems* shall be verified when required testing of the initiating system is conducted. In addition, integrated testing shall be performed in accordance with Sections 901.6.4.1 ~~901.6.2.1~~ and 901.6.4.2 ~~901.6.2.2~~.

~~901.6.2.1~~ 901.6.4.1 High-rise buildings.
For high-rise buildings, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.

~~901.6.2.2~~ 901.6.4.2 Smoke control systems.
Where a *fire alarm system* is integrated with a smoke control system as outlined in Section 909, integrated testing shall comply with NFPA 4, with an integrated test performed prior to issuance of the certificate of occupancy and at intervals not exceeding 10 years, unless otherwise specified by an integrated system test plan prepared in accordance with NFPA 4. If an equipment failure is detected during integrated testing, a repeat of the integrated test shall not be required, except as necessary to verify operation of fire protection or life safety functions that are initiated by equipment that was repaired or replaced.

~~901.6.3~~ 901.6.5 Records. Records of all system inspections, tests and maintenance shall be maintained in accordance with Section 110.3.

~~901.6.3.1~~ 901.6.5.1 **Records information.** Initial records shall include the name of the installation contractor, type of components installed, manufacturer of the components, location and number of components installed per floor. Records shall include the manufacturers' operation and maintenance instruction manuals. Such records shall be maintained for the life of the installation.

Reason: Section 901.6 currently lacks a scoping statement, which makes it appear that provisions following the current 901.6.1 only apply to existing systems. The added scoping statement clarifies that each subsection of 901.6 stands on its own vs. the appearance of being constrained to existing systems. The provisions for non-required systems have been split into a separate subsection to increase visibility of this important provision.

Cost Impact: The code change proposal will not increase or decrease the cost of construction
Editorial clarification.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Only adding a scoping section for existing provisions.

F95-24

F96-24

IFC: 901.6.1.1 (New)

Proponents: Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Add new text as follows:

901.6.1.1 Fire sprinklers. Where fire sprinklers have been installed for 80 or more years, the fire sprinklers shall be replaced with new *listed* fire sprinklers appropriate for the occupancy classification. In Group S occupancies, fire sprinklers installed for 80 or more years protecting *high-piled storage areas* shall be replaced with new *listed* fire sprinklers of the same orientation and orifice size. New fire sprinkler installation and modifications shall be in accordance with the standards in Section 903.3.1.

Exceptions:

1. Fire sprinklers in concealed and inaccessible spaces are permitted to remain in service when inspected, tested, and maintained in accordance with 901.6.
2. The fire code official is permitted to extend the schedule of replacement sprinklers in accordance with Section 104.2.4.1.

Reason: This change would remove many fire sprinklers 80 years or older and replace with new sprinklers appropriate for the hazard occupancy or commodity classification.

Modern sprinklers have evolved significantly in the past 80 years. Today, sprinklers have more operating temperature categories, more deflector styles, larger and smaller orifices or K-factors, better water distribution, and different operating elements, such as, fast (quick and residential) response sprinklers. Sprinklers today have evolved and are designed to meet today's fire loading and represent significant improvement to sprinklers installed 80 years ago. Furthermore, today's sprinklers have the manufacturers installation bulletin (cut sheets) available for installation and special rules, whereas this is missing for many older sprinklers. These rules are easily found when the SIN (sprinkler identification number, required on all new sprinklers since Dec. 31, 2000) is entered into a search engine.

The referenced edition (2023) of NFPA 25 (per IFC Section 901.6), *the Standard for Inspection, Testing, and Maintenance of Water-based Fire Protection Systems* (Section 5.3.1.1.1.4) requires sprinklers manufactured after 1920 and in-service for 75 or more years, the option to either replace all sprinklers or send a representative sample (1 % or a minimum of four of each type) and then retest every five years. This proposal would allow sprinklers being installed for 75 years when tested and passed, an additional 5-years. This change would establish 80 years as the maximum age of many installed sprinklers and supersede the NFPA 25 1920 criteria by only allowing one 5-year extension past the 75-year test with an exception to concealed and inaccessible sprinklers. Currently, NFPA 25 does have 1920 as the maximum age before replacement, allowing 104-year-old sprinklers (in 2024) in buildings, however this may change in the current development of the 2026 edition of NFPA 25.

This first sentence provides the existing building the opportunity to update with sprinklers protection to the current occupancy classification. For example, standard response sprinklers have not been allowed in light hazard occupancies since the 1996 edition of NFPA 13. Since 1996 (or earlier, the legacy codes, UBC and SBCCI, first required in 1991 editions), dwelling units and sleeping units (considered light hazard per NFPA 13) are protected with quick response or residential sprinklers with lower or faster activation times that correlate to a measurement called Response Thermal Index or RTI (Section 3.3.215.2 and A.3.3.215.2 in the 2022 edition of NFPA 13) than standard response sprinklers. The RTI of quick response and residential sprinklers have a RTI from 0 – 50 whereas standard response sprinklers have a longer operating time in the RTI range of 80 to 350. The higher the RTI, the longer it takes the thermal element in the sprinkler to operate. Standard response sprinklers manufactured from 1926 to 1948 have a RTI retesting failure rate of 6.3%.

The thermal operating elements in quick response and residential sprinklers operate faster and provide better life safety to the occupants, while protecting the property. The National Fire Sprinkler Association (NFSA) tested several older standard response sprinklers (with bulb and links) removed from existing I and R occupancies that resulted in a RTI range of 186 -276. This RTI range has an average of 223, which passes the test for the current standard response sprinklers, however, they are well above the maximum of 50 for fast response sprinklers installed today in dwelling and sleeping units. To put it differently, the NFPA 13, NFPA 13R, and NFPA 13D standards requires sprinklers in dwelling units to have fast response (quick or residential) sprinklers with an RTI from 0 – 50. When sprinklers in these buildings are at 80 years, then new sprinklers would correlate to the occupancy hazard, meaning, quick response sprinklers for light hazard or residential sprinklers protecting dwelling or sleeping units.

The second sentence addresses Group S (Storage). Sprinkler technology for storage has evolved significantly in the past 30 years. Today, NFPA 13 has high-piled storage protection criteria for Control Mode Density Area (CMDA), Control Mode Specific Application (CMSA) and Early Suppression Fast Response (ESFR) sprinklers. NFPA 13 does not allow k-5.6 or k-8.0 sprinklers for new storage protection and requires a minimum of K-11.2 or larger sprinklers in the design. It is not the intent of this proposal to address changes or evaluate commodity classifications, that is required either by the 2023 NFPA 25 Sections 4.1.6, 4.1.7 or the 2024 IFC Section 3205.1. This proposal would allow the existing aged sprinklers to be replaced with new sprinklers with the same orientation (pendent or sidewall) and equivalent orifice sizes permitting either K-5.6 or k-8.0 to remain.

The first exception permits sprinklers installed in inaccessible and concealed spaces to remain in service. This exception would prevent the removal of walls or ceilings in existing buildings to access sprinklers. NFPA 25 does not require these sprinklers to be inspected or tested either, however, their inaccessibility should be noted in the inspection reports required by IFC 901.6 and NFPA 25.

The second exception would allow the fire code official to permit, on a case-by-case basis, an extension to the 80-year timeframe per IFC Section 104.2.4. This section permits modifications to the fire code for individual cases:

> 104.2.4.1 Individual cases. The fire code official shall have the authority to grant modifications for individual cases, provided that the fire code official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, life and fire safety requirements. The details of action granting modifications shall be recorded and entered in the files of the code compliance agency.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Replacement of fire sprinklers at 80 years:

- One hour, union labor, at a residential rate average of $35/hr.
- Total range of cost of $79 - $106 per replaced sprinkler.
- Estimate range for typical 500 sprinkler replacement of a 112,500 sq ft project: $39,500.00 - $53,000

Testing 75 yr old sprinklers and retesting every five years (per NFPA 25 remove 1% or at least 4 per type of sprinkler, send to test lab)

- Test fees: $55 per sprinkler x at least 4: $220
- Four replacement sprinklers: $48 - $80+
- Labor to remove, replace, send for testing, return to in-service: $1,120.
- Estimate range for four sprinklers removed, tested, and return to service: $1,388-$1,988+

Estimated Immediate Cost Impact Justification (methodology and variables):

Analogous methodology using actual current cost estimates and data from RS Means to create a range of cost. This proposal does increase the cost of an existing building with sprinklers but in the long run it saves on testing and maintenance.

F96-24

F97-24

IFC: 903.2.1.6; IBC: [F] 406.5.8 (New), [F] 903.2.1.6, 3104.5.2

Proponents: Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Revise as follows:

903.2.1.6 Assembly occupancies on roofs.
Where an occupied roof has an assembly occupancy with an *occupant load* exceeding 100 for Group A-2 and 300 for other Group A occupancies, all floors between the occupied roof and the *level of exit discharge* shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.

Exception: Open parking garages of Type I or Type II construction unless required by Section 903.2.10.

2024 International Building Code

Add new text as follows:

[F] 406.5.8 Automatic sprinkler system. An *open parking garage* shall be equipped with an *automatic sprinkler* system as required by Section 903.2.10.

Revise as follows:

[F] 903.2.1.6 Assembly occupancies on roofs.
Where an occupied roof has an assembly occupancy with an *occupant load* exceeding 100 for Group A-2 and 300 for other Group A occupancies, all floors between the occupied roof and the *level of exit discharge* shall be equipped with an *automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.

Exception: *Open parking garages* of Type I or Type II construction, unless required by Section 903.2.10.

3104.5.2 Alternative separation.
The wall separating the *pedestrian walkway* and the *building* shall comply with Section 3104.5.2.1 or 3104.5.2.2 where:

1. The distance between the connected *buildings* is more than 10 feet (3048 mm).
2. The *pedestrian walkway* and connected *buildings* are equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, and the roof of the walkway is not more than 55 feet (16 764 mm) above grade connecting to the fifth, or lower, *story above grade plane*, of each *building*.

Exception: *Open parking garages* need not be equipped with an *automatic sprinkler system*, unless required by Section 903.2.10.

Reason: This proposal applies the current requirements for automatic sprinkler systems for open parking garages in several sections. The 2021 IBC, Section 903.2.10 requires open parking garages over 48,000 sf fire area or over 55 feet (903.2.11.3) in height to have an automatic sprinkler system.

[F] 406.5.8: This subchapter already points to Section 905 for standpipes. This adds a new section to point to the sprinkler requirements in 903.2.10.

[F]903.2.1.6: As currently written, it appears to exempt sprinklers from open parking of Type I or II construction. This change points to the sprinkler threshold in 903.2.10.

3104.5.2: This updates the IBC on pedestrian walkways when connected to open parking, sprinklered or not. It points to 903.2.10 for sprinkler requirements when over the thresholds.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The 2021 IBC, Section 903.2.10 requires open parking garages over 48,000 sf fire area or over 55 feet (903.2.11.3) in height to have an automatic sprinkler system. This change correlates the automatic sprinkler system, when required, to other open parking structures in the IBC and IFC.

F97-24

F98-24

IFC: 903.2.3; IBC: [F] 903.2.3

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

903.2.3 Group E.

An *automatic sprinkler system* shall be provided ~~for~~throughout the fire area containing a Group E ~~occupancies as follows~~occupancy where any of the following conditions exist:

1. ~~Throughout all~~The Group E *fire area~~s~~* is greater than 12,000 square feet (1115 m^2) in area.
2. The Group E *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.

   Exception: In buildings where every classroom has not fewer than one exterior exit door at ground level, an *automatic sprinkler system* is not required in any area below the lowest *level of exit discharge* serving that area.

3. The Group E *fire area* has an *occupant load* of 300 or more.

2024 International Building Code

Revise as follows:

[F] 903.2.3 Group E.

An *automatic sprinkler system* shall be provided ~~for~~throughout the fire area containing a Group E ~~occupancies as follows~~occupancy where any of the following conditions exist:

1. ~~Throughout all~~The Group E *fire ~~areas~~area* is greater than 12,000 square feet (1115 m^2) in area.
2. The Group E *fire area* is located on a floor other than a *level of exit discharge* serving such occupancies.

   Exception: In *buildings* where every classroom has not fewer than one exterior *exit* door at ground level, an *automatic sprinkler system* is not required in any area below the lowest *level of exit discharge* serving that area.

3. The Group E *fire area* has an *occupant load* of 300 or more.

Reason: This proposal is entirely editorial. Section 903.2.3 is written in a different format than the 10 other sections in 903.2 which all require an automatic sprinkler system. This proposal simply formats this section to match the other sections in the code. Without this reformat it leads the code user to look for an underlying reason why it is written differently—and there is no reason.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is editorial and for clarification. See reason statement.

F98-24

F99-24

IFC: 903.2.4, 903.2.4.4 (New), 907.2, 907.2.24 (New); IBC: [F] 903.2.4, [F] 903.2.4.4 (New), [F] 907.2, [F] 907.2.24 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

903.2.4 Group F-1.
An *automatic sprinkler system* shall be provided throughout all buildings containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group F-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group F-1 *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).
4. A Group F-1 occupancy is used to manufacture lithium-ion or lithium metal batteries.
5. A Group F-1 occupancy is used to manufacture vehicles, energy storage systems or equipment containing lithium-ion or lithium metal batteries where the batteries are installed as part of the manufacturing process.

Add new text as follows:

903.2.4.4 Combustible waste sorting and transfer. An automatic sprinkler system shall be provided throughout F-1 occupancy fire areas that contain combustible waste sorting and transfer operations in excess of 5,000 square feet (464.5 m^2) in area.

907.2 Where required—new buildings and structures.
An *approved fire alarm system* installed in accordance with the provisions of this code and NFPA 72 shall be provided in new buildings and structures in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.
Not fewer than one manual fire alarm box shall be provided in an *approved* location to initiate a fire alarm signal for fire alarm systems employing automatic fire detectors or waterflow detection devices. Where other sections of this code allow elimination of fire alarm boxes due to sprinklers, a single fire alarm box shall be installed.

Exceptions:

1. The manual fire alarm box is not required for fire alarm systems dedicated to elevator recall control and supervisory service.
2. The manual fire alarm box is not required for Group R-2 occupancies unless required by the *fire code official* to provide a means for fire watch personnel to initiate an alarm during a sprinkler system impairment event. Where provided, the manual fire alarm box shall not be located in an area that is open to the public.

Add new text as follows:

907.2.24 Combustible waste sorting and transfer. . A radiant-energy fire detection system or a thermal imaging fire detection system shall be provided throughout F-1 occupancy fire areas that contain combustible waste sorting and transfer operations in excess of 5,000 square feet (464.5 m2) in area.

2024 International Building Code

[F] 903.2.4 Group F-1.
An *automatic sprinkler system* shall be provided throughout all *buildings* containing a Group F-1 occupancy where one of the following conditions exists:

1. A Group F-1 *fire area* exceeds 12,000 square feet (1115 m^2).

2. A Group F-1 *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group F-1 *fire areas* on all floors, including any *mezzanines*, exceeds 24,000 square feet (2230 m^2).
4. A Group F-1 occupancy is used to manufacture lithium-ion or lithium metal batteries.
5. A Group F-1 occupancy is used to manufacture vehicles, energy storage systems or equipment containing lithium-ion or lithium metal batteries where the batteries are installed as part of the manufacturing process.

Add new text as follows:

[F] 903.2.4.4 Combustible waste sorting and transfer.. An automatic sprinkler system shall be provided throughout F-1 occupancy fire areas that contain combustible waste sorting and transfer operations in excess of 5,000 square feet (464.5 m^2) in area.

[F] 907.2 Where required—new buildings and structures.
An *approved fire alarm system* installed in accordance with the provisions of this code and NFPA 72 shall be provided in new *buildings* and *structures* in accordance with Sections 907.2.1 through 907.2.23 and provide occupant notification in accordance with Section 907.5, unless other requirements are provided by another section of this code.
Not fewer than one *manual fire alarm box* shall be provided in an *approved* location to initiate a fire *alarm signal* for *fire alarm systems* employing *automatic fire detectors* or waterflow detection devices. Where other sections of this code allow elimination of fire alarm boxes due to sprinklers, a single fire alarm box shall be installed.

Exceptions:
1. The *manual fire alarm box* is not required for *fire alarm systems* dedicated to elevator recall control and *supervisory service*.
2. The *manual fire alarm box* is not required for Group R-2 occupancies unless required by the *fire code official* to provide a means for fire watch personnel to initiate an alarm during a sprinkler system impairment event. Where provided, the *manual fire alarm box* shall not be located in an area that is open to the public.

Add new text as follows:

[F] 907.2.24 Combustible waste sorting and transfer.. A radiant-energy fire detection system or a thermal imaging fire detection system shall be provided throughout F-1 occupancy fire areas that contain combustible waste sorting and transfer operations in excess of 5,000 square feet (464.5 m2) in area.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

A problem Combustible waste sorting and transfer operations have is items in the waste stream that can cause serious fires. Lithium-ion batteries are one of the items that are causing fire events that need to be identified and responded to quickly to protect occupants and the facility. Many facilities are government investments or private investments with government partnerships, these facilities and other private facilities are important to managing the waste stream and effective early detection and mitigation fire protection systems are necessary.

The new requirements can be addressed with an NFPA 13 fire suppression system and an NFPA 72 fire detection system, but there are also some specialty suppression options available that combine early detection with automatic targeted suppression methods.

In determining the square foot threshold, we looked at other suppression thresholds such as woodworking operations and upholstered furniture which are 50% lower, but the hazard and the fuel load is much greater. Theoretically, since this is new construction or occupancy related the threshold could be 0 square feet, new facilities are typically much larger than the 5,000 sq.ft.

Cost Impact: Increase

Estimated Immediate Cost Impact:

This will increase the cost of construction for a small waste transfer and sorting facility, however, because of volume of trash needing sorting the typical facility already crosses the base F-1 12,000 square foot threshold. As a result, that cost impact is minimal if at all in today's waste handling operations world. The real additional cost impact would be the fire detection system, however, this cost is negated by the lifetime savings to the facility by providing for detection early enough to prevent the need for fire suppression system activation.

Estimated Immediate Cost Impact Justification (methodology and variables):

The actual cost of the protection varies from market to market for materials and for labor, there is no way to give a number with any accuracy that applies everywhere the IFC and IBC are adopted. In theory the difference between a 5,000 square foot facility compared to a 12,001 square foot facility would be 60%, however, the smaller facilities would be the rarity, though located in areas that a loss would have a greater impact.

F99-24

F100-24

IFC: 903.2.8, 903.2.8.1, 903.2.8.2, 903.2.8.3, 903.3.1.3; IBC: [F] 903.2.8, [F] 903.2.8.1, [F] 903.2.8.2, [F] 903.2.8.3, [F] 903.3.1.3

Proponents: Jeffrey Shapiro, International Code Consultants, Lake Travis Fire Rescue (jshapiro@LTFR.org)

2024 International Fire Code

Revise as follows:

903.2.8 Group R.
An *automatic sprinkler system* installed in accordance with Section 903.3.1 shall be provided throughout all buildings with a Group R *fire area*.

Delete without substitution:

~~**903.2.8.1 Group R-3.**~~
~~An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in Group R-3 occupancies.~~

~~**903.2.8.2 Group R-4, Condition 1.**~~
~~An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in Group R-4, Condition 1 occupancies.~~

~~**903.2.8.3 Care facilities.**~~
~~An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in care facilities with five or fewer individuals in a single-family *dwelling*.~~

Revise as follows:

903.3.1.3 NFPA 13D sprinkler systems.
Automatic sprinkler systems installed in one- and two-family *dwellings* and *townhouses*; Group R-3; and Group R-4, Condition 1~~; and *townhouses*~~ shall be permitted to be installed throughout in accordance with NFPA 13D.

2024 International Building Code

Revise as follows:

[F] 903.2.8 Group R.
An *automatic sprinkler system* installed in accordance with Section 903.3.1 shall be provided throughout all *buildings* with a Group R *fire area*.

Delete without substitution:

~~**[F] 903.2.8.1 Group R-3.**~~
~~An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in Group R-3 occupancies.~~

~~**[F] 903.2.8.2 Group R-4, Condition 1.**~~
~~An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in Group R-4, Condition 1 occupancies.~~

~~**[F] 903.2.8.3 Care facilities.**~~

~~An *automatic sprinkler system* installed in accordance with Section 903.3.1.3 shall be permitted in care *facilities* with five or fewer individuals in a single-family *dwelling*.~~

Revise as follows:

[F] 903.3.1.3 NFPA 13D sprinkler systems.

Automatic sprinkler systems installed in one- and two-family *dwellings* and *townhouses*; Group R-3; and Group R-4, Condition 1~~; and *townhouses*~~ shall be permitted to be installed throughout in accordance with NFPA 13D.

Reason: Code requirements in Section 903.2.8 and 903.3.1 currently conflict with respect to the types of sprinkler systems permitted for some residential occupancies. Subsections to 903.2.8 specify which sprinkler standards are permissible for some Group R uses, but Section 903.3.1 has different allowances for NFPA 13D to be used, particularly for townhouses which are covered in the scope of NFPA 13D but aren't always classified as Group R3. NFPA 13D as an appropriate standard for townhouse protection is currently recognized in Section 903.3.1.3 but not in Section 903.2.8. Rather than correlating these sections, it makes more sense to have the applicable requirements reside in one location in the code, and Sections 903.3.1 (including 903.3.1.1, 903.3.1.2 and 903.3.1.3) are currently sufficient to entirely support Section 903.2.8. For ease of following what this proposal accomplishes and how the sections will work together if the proposal is approved, relevant extracts from Section 903.3.1 in the 2024 IBC are reproduced below:

[F] 903.3.1 Standards. Automatic sprinkler systems shall be designed and installed in accordance with Section 903.3.1.1 unless otherwise permitted by Sections 903.3.1.2 and 903.3.1.3 and other chapters of this code, as applicable.

[F] 903.3.1.1 NFPA 13 sprinkler systems. Where the provisions of this code require that a building or portion thereof be equipped throughout with an automatic sprinkler system in accordance with this section, sprinklers shall be installed throughout in accordance with NFPA 13 except as provided in Sections 903.3.1.1.1 through 903.3.1.1.3.

[F] 903.3.1.2 NFPA 13R sprinkler systems. Automatic sprinkler systems in Group R occupancies shall be permitted to be installed throughout in accordance with NFPA 13R where the Group R occupancy meets all of the following conditions:

1. Four stories or fewer above grade plane.

2. For other than Group R-2 occupancies, the floor level of the highest story is 30 feet (9144 mm) or less above the lowest level of fire department vehicle access. For Group R-2 occupancies, the roof assembly is less than 45 feet (13 716 mm) above the lowest level of fire department vehicle access. The height of the roof assembly shall be determined by measuring the distance from the lowest required fire vehicle access road surface adjacent to the building to the eave of the highest pitched roof, the intersection of the highest roof to the exterior wall, or the top of the highest parapet, whichever yields the greatest distance.

3. The floor level of the lowest story is 30 feet (9144 mm) or less below the lowest level of fire department vehicle access. The number of stories of Group R occupancies constructed in accordance with Sections 510.2 and 510.4 shall be measured from grade plane.

[F] 903.3.1.3 NFPA 13D sprinkler systems. Automatic sprinkler systems installed in one- and two-family dwellings; Group R-3; Group R-4, Condition 1; and townhouses shall be permitted to be installed throughout in accordance with NFPA 13D.

Although I serve as a consultant to the National Fire Sprinkler Association, this proposal has not been reviewed or endorsed by NFSA, and I am not representing NFSA on this issue.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal eliminates a conflict between code sections and duplication. Technical requirements remain unchanged.

F100-24

F101-24

IFC: 903.2.8.3 (New); IBC: [F] 903.2.8.3 (New)

Proponents: Jeff O'Neil, Chair, Committee on Healthcare (ahc@iccsafe.org)

2024 International Fire Code

Add new text as follows:

903.2.8.3 Group R-4, Condition 2. An automatic sprinkler system installed in accordance with Section 903.3.1.2 shall be permitted in Group R-4, Condition 2 occupancies.

2024 International Building Code

Add new text as follows:

[F] 903.2.8.3 Group R-4, Condition 2. An automatic sprinkler system installed in accordance with Section 903.3.1.2 shall be permitted in Group R-4, Condition 2 occupancies.

Reason: F76-21 gave as it's reason for deletion of Section 903.2.8.3 from the 2021 edition as "Group R4, Division 2 occupancies would default to NFPA 13R systems under Section 903.3.1.2, so there's no need to say that NFPA 13R systems are "permitted" in Section 903.2.8.3.". This is not accurate. The general reference for Group R is to NFPA13, 13R and 13D. There is no 'default' in Section 903.3.1.2 for Group R-4, Condition 2. There is a specific exception for attics in Group R-4, Condition 2 in Section 903.3.1.2.3 Item 4, but that is not an obvious requirement when 903.3.1.2 is generic to Group R. This text should be reinstated for clarity.

This proposal is submitted by the ICC Committee for Healthcare (CHC).
The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Reinstating the text will clarify what the requirements are sprinklers in Group R-4 Condition 2. This should not be a change to what is required.

F101-24

F102-24

IFC: 903.2.8.4 (New); IBC: [F] 903.2.8.4 (New)

Proponents: Ken Brouillette, Seattle Fire Department, Seattle Fire Department (ken.brouillette@seattle.gov)

2024 International Fire Code

Add new text as follows:

903.2.8.4 Group R-3 occupancies less than 60 feet in height. Group R-3 occupancies referenced in Table 504.4 of the *International Building Code* shall be permitted to install an *automatic sprinkler system in accordance with Section 903.3.1.3 when the building height does not exceed 60 feet above grade plane.*

2024 International Building Code

Add new text as follows:

[F] 903.2.8.4 Group R-3 occupancies less than 60 feet in height. Group R-3 occupancies referenced in Table 504.4 shall be permitted to install an *automatic sprinkler system in accordance with Section 903.3.1.3 when the building height does not exceed 60 feet above grade plane.*

Reason: One- and two-family dwellings, manufactured homes, and townhouses are all within the scoping of NFPA 13D. This standard does not restrict the height of these structures. These types of occupancies should not be treated as equivalent to other types of residential type occupancies such as apartments or hotels and therefore should not be required to install an equivalent designed automatic sprinkler system.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0 or less. The design and installation of a NFPA 13D automatic sprinkler system is less than a NFPA 13R or NFPA 13 system.

Estimated Immediate Cost Impact Justification (methodology and variables):

The size and amounts of underground and overhead piping and other materials including labor cost would be less with a NFPA13D system.

F102-24

F103-24

IFC: 903.2.8.5 (New); IBC: [F] 903.2.8.5 (New)

Proponents: Ken Brouillette, Seattle Fire Department, Seattle Fire Department (ken.brouillette@seattle.gov)

2024 International Fire Code

Add new text as follows:

903.2.8.5 Group R-3 occupancies 4 stories or less above grade plane.. Group R-3 occupancies referenced in Table 504.4 of the *International Building Code* shall be permitted to install an *automatic sprinkler system* in accordance with Section 903.3.1.3 when the number of stories above grade plane does not exceed 4.

2024 International Building Code

Add new text as follows:

[F] 903.2.8.5 Group R-3 occupancies 4 stories or less above grade plane.. Group R-3 occupancies referenced in Table 504.4 shall be permitted to install an *automatic sprinkler system* in accordance with Section 903.3.1.3 when the number of stories above grade plane does not exceed 4.

Reason: One- and two-family dwellings, manufactured homes, and townhouses are all within the scoping of NFPA 13D. This standard does not restrict the number of stories of these structures. These types of occupancies should not be treated as equivalent to other types of residential type occupancies such as apartments or hotels and therefore should not be required to install an equivalent designed automatic sprinkler system.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0 or less. The installation of a NFPA 13D system is less expensive than the installation of a NFPA 13 or 13R system.

Estimated Immediate Cost Impact Justification (methodology and variables):

The cost of materials and labor are less for these types of systems.

F103-24

F104-24

IFC: 903.2.9.2; IBC: [F] 903.2.9.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

903.2.9.2 Bulk storage of tires. An automatic sprinkler system shall be equipped throughout buildings ~~Buildings and structures~~ where ~~the area for~~ the aggregate volume of stored ~~storage of~~ tires exceeds 20,000 cubic feet (566 m^3) ~~shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.~~

2024 International Building Code

Revise as follows:

[F] 903.2.9.2 Bulk storage of tires.
An automatic sprinkler system shall be equipped throughout buildings ~~*Buildings* and *structures*~~ where ~~the area for~~ the aggregate volume of stored ~~storage of~~ tires exceeds 20,000 cubic feet (566 m^3) ~~shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1~~.

Reason: While the language implies the area of the tires is measured in volume, there are some jurisdictions that interpret this to mean the floor area of the tires, not the volume. This is to clarify that the intent is the volume of the tires, not the floor area.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Simply a clarification as to what is being measured when triggering the need for an automatic sprinkler system.

F104-24

F105-24

IFC: 903.2.9.2; IBC: [F] 903.2.9.2

Proponents: Eirene Knott, BRR Architecture, Metropolitan Kansas City Chapter of the ICC (eirene.knott@brrarch.com)

2024 International Fire Code

Revise as follows:

903.2.9.2 Bulk storage of tires. Buildings and structures where the area for the storage of tires exceeds 20,000 cubic feet (566 m^3) in volume shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

2024 International Building Code

Revise as follows:

[F] 903.2.9.2 Bulk storage of tires.
Buildings and *structures* where the area for the storage of tires exceeds 20,000 cubic feet (566 m^3) in volume shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.

Reason: The commentary is very clear that the intention with the 20,000 cubic feet is in terms of volume, which would include three dimensions - length, depth and height, in terms of storage area. If the intention here is not volume, then there is an error in the code language as area would not include a height and would not be measured in volume.

Since the intention appears to be related to volume, then inserting the words "in volume" indicates how the area (volume) of tire storage is to be determined, which would also include the height of the storage area, not just the storage area. There have been interpretations that believe this to be an area calculation rather than a volume calculation, thus the attempt to insert "in volume" for clarification purposes. If it was really about area and not volume, then an area of tire storage in excess of 20,000 square feet would already require sprinkler protection since an S-1 occupancy requires protection in excess of 12,000 square feet.

For example, if there is an area of tire storage that measures 45 feet in both length and depth, that would yield an area of 2,025 square feet (45 feet by 45 feet). Since the area is less than 12,000 square feet, it would not trigger sprinkler protection under the S-1 occupancy provisions unless the volume exceeds 20,000 cubic feet. If the tires were stacked 10 feet in height, then the volume of the tire storage would be 20,250 cubic feet (45 feet by 45 feet by 10 feet). At this point this code section would apply.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This could actually reduce construction cost if the calculation is truly in volume, not area. If the volume is less than 20,000 cubic feet and less than 12,000 square feet in area, this code requirement may not apply.

F105-24

F106-24

IFC: 903.2.9.4; IBC: [F] 903.2.9.4

Proponents: Andrew Klein, A S Klein Engineering, PLLC, Self Storage Association (andrew@asklein.com)

2024 International Fire Code

Revise as follows:

903.2.9.4 Group S-1 upholstered furniture and mattresses.
An *automatic sprinkler system* shall be provided throughout a Group S-1 *fire area* where the area used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).

Exception: Self-service storage facilities ~~not greater than one story above *grade plane* where all storage spaces can be accessed directly from the exterior~~.

2024 International Building Code

Revise as follows:

[F] 903.2.9.4 Group S-1 upholstered furniture and mattresses.
An *automatic sprinkler system* shall be provided throughout a Group S-1 *fire area* where the area used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet (232 m^2).

Exception: Self-service storage *facilities* ~~not greater than one *story above grade plane* where all storage spaces can be accessed directly from the exterior~~.

Reason: In the 2012 ICC Code development cycle, an additional trigger (#5) was added to IBC Section 903.2.9 to specify when an automatic sprinkler system shall be required in Group S-1 occupancies: “A Group S-1 occupancy that is used for the storage of upholstered furniture or mattresses exceeds 2,500 square feet.” The provision was added in response to the tragic Charleston Sofa Super Store fire in 2007, however its effects on the self-storage industry were not anticipated. The application of this requirement to self storage facilities was the result of an ICC staff official interpretation. FCAC submitted a proposal in the 2021 Code development cycle to add the exception for only one-story facilities where spaces are accessed directly from the exterior. For such small, low-occupancy buildings, the presence of an interior corridor does not increase the risk to an occupant or first responder in the event of a fire. This code change proposal returns the sprinkler threshold for all self-storage facilities to a 12,000 sf fire area, consistent with the Fire Code prior to 2012.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0 or less. This proposal could decrease the construction costs of self-service storage facilities.

Estimated Immediate Cost Impact Justification (methodology and variables):

This code change proposal returns the sprinkler threshold for all self-storage facilities to a 12,000 sf *fire area*, consistent with the Fire Code prior to 2012, as opposed to the reduced threshold of 2,500 sf *of area used for storage*.

Estimated Life Cycle Cost Impact:

n/a

Estimated Life Cycle Cost Impact Justification (methodology and variables):

n/a

F106-24

F107-24

IFC: 903.2.10; IBC: [F] 903.2.10

Proponents: Steve Skalko, Stephen V. Skalko, P.E. & Associates LLC, Precast/Prestressed Concrete Institute (svskalko@svskalko-pe.com)

2024 International Fire Code

Revise as follows:

903.2.10 Group S-2 parking garages.
An *automatic sprinkler system* shall be provided throughout buildings classified as parking garages where any of the following conditions exist:

1. Where the *fire area* of the enclosed parking garage, in accordance with Section 406.6 of the *International Building Code*, exceeds 12,000 square feet (1115 m^2).
2. Where the enclosed parking garage, in accordance with Section 406.6 of the *International Building Code*, is located beneath other groups.

   Exception: Enclosed parking garages located beneath Group R-3 occupancies.
3. Where the *fire area* of the open parking garage, in accordance with Section 406.5 of the *International Building Code*, exceeds 48,000 square feet (4460 m^2).

   Exception: Open parking garages of Type I construction

2024 International Building Code

Revise as follows:

[F] 903.2.10 Group S-2 parking garages.
An *automatic sprinkler system* shall be provided throughout *buildings* classified as parking garages where any of the following conditions exists:

1. Where the fire area of the enclosed parking garage in accordance with Section 406.6 exceeds 12,000 square feet (1115 m^2).
2. Where the enclosed parking garage in accordance with Section 406.6 is located beneath other groups.

   Exception: Enclosed parking garages located beneath Group R-3 occupancies.
3. Where the *fire area* of the *open parking garage* in accordance with Section 406.5 exceeds 48,000 square feet (4460 m^2).

   Exception: Open parking garages of Type I construction

Reason: Code change F110-18 that modified Section 903.2.10 of the International Fire Code (and International Building Code) to require sprinkler protection in open parking garages was based on a single fire incident that occurred in the UK in January 2018. From a review of the final report by the Merseyside Fire and Rescue Service (MFRS) [Merseyside Fire Rescue Service, *Kings Dock Car Park Fire Protection Report,* April 2018, Merseyside, UK], the parking garage in question, referred to as a car park in the UK, had a reduced fire-resistant design feature that likely contributed to the extensive structural damage to the open car park structure.

The building code requirements in the UK permitted 15-minutes of structural fire resistance of the precast concrete floors for the Kings Dock car park. The fire exposure from the initial vehicle (and subsequent vehicles) damaged the underside of the floor panels above sufficiently enough to damage the floor system and permit the fire to extend upward to vehicles on the next parking level.

Further, data on fire incidences in the United States show that fires in open parking garages are very low. The US Fire Administration statistics show an average of over 1.7 million fires [FA-311, *Fire in the United States 1994-2004,* 14th edition, August 2007] for the period from 1999 to 2002. When compared to the average total parking garage fires (1760 incidents) described in an NFPA study of parking garage fires [M. Ahrens, *Structure and Vehicle Fires in General Vehicle Parking Garages,* NFPA, January 2006] represent less than 0.1% of the fire incidences.

In the US the typical concrete floor systems in open parking garages meet at least a minimum of a 1-hour fire resistance, which increases significantly the ability to maintain structural stability and prevent fire spread between floors from vehicle fires. Based on the low fire incidence record of open parking garages this proposal recognizes the benefit of higher fire resistance in open parking structures of Type I construction by allowing the sprinkler protection to be omitted. In Type I construction the floor systems are required to have at least a 2-hour fire resistance [IBC Table 601]. Using structural fire resistance as an alternative to sprinkler protection is similar to provisions in the IBC where sprinkler protection is permitted to reduce the fire resistance of fire rated assemblies by 1-hour.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Construction costs will decrease because of the savings by using built-in structural fire resistance in lieu of a sprinkler protection system.

Estimated Immediate Cost Impact Justification (methodology and variables):

Actual costs for providing sprinkler protection in open parking garages will vary depending on location. In colder climates subject to freezing temperatures the cost will need to include appropriate measures, such as dry pipe systems with mechanical rooms for air compressors. This may include multiple rooms and air compressors for multi-story open parking garages because of system size on each riser. Estimated cost for automatic sprinkler systems in open parking garage projects in colder climates have ranged from $3.50 to $3.75 per square foot. Meeting fire resistance requirements results in a direct savings.

F107-24

F108-24

IFC: SECTION 903, 903.2, 903.2.10.3 (New); IBC: SECTION 903, [F] 903.2, 903.2.10.3 (New)

Proponents: Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

SECTION 903
AUTOMATIC SPRINKLER SYSTEMS

903.2 Where required.
Approved automatic sprinkler systems in new buildings and structures shall be provided in the locations described in Sections 903.2.1 through 903.2.12.

Exception: Spaces or areas in telecommunications buildings used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries not required to have an *automatic sprinkler system* by Section 1207 for energy storage systems and standby engines, provided that those spaces or areas are equipped throughout with an *automatic smoke detection system* in accordance with Section 907.2 and are separated from the remainder of the building by not less than 1-hour *fire barriers* constructed in accordance with Section 707 of the International Building Code or not less than 2-hour *horizontal assemblies* constructed in accordance with Section 711 of the International Building Code, or both.

Add new text as follows:

903.2.10.3 Lithium-ion or lithium metal powered vehicles.. An *approved automatic sprinkler system* shall be provided throughout fire areas used for the parking or storage of lithium-ion or lithium metal powered vehicles where the fire area exceeds 500 square feet (46.4 m2).

2024 International Building Code

SECTION 903
AUTOMATIC SPRINKLER SYSTEMS

[F] 903.2 Where required.
Approved automatic sprinkler systems in new *buildings* and *structures* shall be provided in the locations described in Sections 903.2.1 through 903.2.12.

Exception: Spaces or areas in telecommunications *buildings* used exclusively for telecommunications equipment, associated electrical power distribution equipment, batteries not required to have an *automatic sprinkler system* by Section 1207 of the *International Fire Code* for energy storage systems and standby engines, provided that those spaces or areas are equipped throughout with an *automatic smoke detection system* in accordance with Section 907.2 and are separated from the remainder of the *building* by not less than 1-hour *fire barriers* constructed in accordance with Section 707 or not less than 2-hour *horizontal assemblies* constructed in accordance with Section 711, or both.

Add new text as follows:

903.2.10.3 Lithium-ion or lithium metal powered vehicles . An *approved automatic sprinkler system* shall be provided throughout fire areas used for the parking or storage of lithium-ion or lithium metal powered vehicles where the fire area exceeds 500 square feet (46.4 m2).

Reason: Last cycle the hazards presented by lithium-ion or lithium metal battery powered vehicle s was addressed by adding the following two sections to the IFC and IBC.

903.2.9 Group S-1.

5. A Group S-1 fire area used for the storage of lithium-ion or lithium metal powered vehicles where the fire area exceeds 500 square feet (46.4 m2).

902.2.9.1 Repair garages.

5. A Group S-1 fire area used for the storage of lithium-ion or lithium metal powered vehicles where the fire area exceeds 500 square feet (46.4 m2).

The hazard addressed is the same when located in a Group S-2 parking garage. This proposal uses the previously approved language to add the protection to S-2 parking garages for consistency.

It should be noted that NFPA 88A: Standard for Parking Structures, 2023, requires all parking garages to be protected by an automatic fire sprinkler system installed in accordance with NFPA 13.

Cost Impact: Increase

Estimated Immediate Cost Impact:

This proposal would require the same protection for S-2 parking garages that is required for S-1 occupancies currently. It will increase new construction costs of S-2 parking garages. The exact cost cannot be estimated.

Estimated Immediate Cost Impact Justification (methodology and variables):

To provide an exact cost a set of detailed plans for the installation of the automatic sprinkler system in a given parking structure is necessary, then the unit costs for all of the parts required including manhours would need to be calculated for a given cost region, then a cost multiplier would need to be added or subtracted for every other cost region where the I-Codes are applied.

F108-24

F109-24

IFC: 903.2.11.4; IBC: [F] 903.2.11.4

Proponents: John Swanson, NFSA, National Fire Sprinkler Association (swanson@nfsa.org); Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Revise as follows:

903.2.11.4 Ducts conveying hazardous exhausts.
Where required by the *International Mechanical Code*, automatic sprinklers shall be provided in ducts conveying hazardous exhaust or flammable or combustible materials.

Exception: Ducts where the largest cross-sectional ~~diameter~~ dimension of the duct is less than 10 inches (254 mm).

2024 International Building Code

Revise as follows:

[F] 903.2.11.4 Ducts conveying hazardous exhausts.
Where required by the *International Mechanical Code* , automatic sprinklers shall be provided in ducts conveying hazardous exhaust or flammable or combustible materials.

Exception: Ducts where the largest cross-sectional ~~diameter~~ dimension of the duct is less than 10 inches (254 mm).

Reason: The term, "diameter" refers to a circular and round ducts. However, ducts used in hazardous exhaust also come in square and rectangular shapes. This change will address the hazard in ducts of all sizes and shapes, not just a circular. Without this change, a literal application of the code would exempt sprinklers all square and rectangular ducts with hazardous exhaust.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Source: Actual estimates

A round duct with a 10 inch diameter is $23/ linear foot and a square duct (8 in. x 8 in.) is $15/linear foot. Estimates do not include cleats, fittings, and labor.

Estimated Immediate Cost Impact Justification (methodology and variables):

Analogous methodology using actual current cost estimates and data from RS Means to create a range of cost. This proposal addresses other shapes that ducts come in. The increase in construction will capture all ducts. However, it can be less expensive to install square or rectangular round ducts.

F109-24

F110-24

IFC: 903.3.1.1.2; IBC: [F] 903.3.1.1.2

Proponents: Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Revise as follows:

903.3.1.1.2 Bathrooms. In Group R occupancies, sprinklers shall not be required in bathrooms that do not exceed 55 square feet (5 m^2) in area and are located within individual *dwelling units* or *sleeping units*, provided that walls~~s~~ and ceilings~~s~~ coverings, including the walls and ceilings behind a shower enclosure or tub, are of noncombustible ~~or limited-combustible~~ materialsin accordance with Section 703.3.1 of the I*nternational Building Code* and providing ~~with~~ a 15-minute thermal barrier rating.

2024 International Building Code

Revise as follows:

[F] 903.3.1.1.2 Bathrooms.
In Group R occupancies sprinklers shall not be required in bathrooms that do not exceed 55 square feet (5 m^2) in area and are located within individual *dwelling units* or *sleeping units*, provided that walls and ceilings, including the walls~~s~~ and ceilings~~s~~ coverings behind a shower enclosure or tub, are of noncombustible ~~or limited-combustible~~ materials in accordance with Section 703.3.1 and providing ~~with~~ a 15-minute thermal barrier rating.

Reason: The current IBC/IFC text is nearly identical to the requirement in found in NFPA 13. This proposal adjusts the intent of the text from NFPA 13 in the IBC/IFC and removes the term limited combustible, as it is not defined in the IBC/IFC (or the family of ICC codes) but is incorporated into IBC Section 703.3.1.

This change is important because the construction type in NFPA 13 is different than the type of construction in the IBC/IFC. NFPA 13 construction type addresses the protected space as the type of construction, for example, as combustible, noncombustible or limited-combustible, whereas the IBC type of construction addresses the structural components of the building as combustible or noncombustible (per 703.3.1). Currently, without this change, a literal read of this section would require the wall and ceiling construction to be entirely noncombustible, i.e., steel studs steel bar joists, concrete plank, etc.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Source: Actual estimates and RS Means.

Noncombustible wall, 3 5/8 in steel stud, 16 in oc, 5/8 in. Type X each side: $4.33 - $4.40 sf

Combustible wall, 3 ½ in. wood stud, 16 in oc, 5/8 in. Type X, each side: $5.34 - $6.25 sf

Estimated Immediate Cost Impact Justification (methodology and variables):

Analogous methodology using actual current cost estimates and data from RS Means to create a range of cost for combustible and noncombustible walls. This proposal does lower the cost of construction as it clarifies the bathroom walls enclosing of the tub/shower unit can match the type of construction, such as Type V, with drywall versus constructing a totally noncombustible wall behind the tub/shower unit.

F110-24

F111-24

IFC: 903.3.1.1.3; IBC: [F] 903.3.1.1.3

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

Revise as follows:

903.3.1.1.3 Lithium-Ion or lithium metal batteries.
Where *automatic sprinkler systems* are required by this code for areas containing lithium-ion or lithium metal batteries, the design of the system shall be based on a series of fire tests. Such tests shall be conducted or witnessed and reported by an approved testing laboratory ~~involving test scenarios~~. A report prepared by a registered design professional with expertise in fire protection engineering shall be provided to the fire code official for review and approval in accordance with Section 104.2.2 and shall that address the range of variables associated with the intended arrangement of the hazards to be protected.

2024 International Building Code

Revise as follows:

[F] 903.3.1.1.3 Lithium-ion or lithium metal batteries.
Where *automatic sprinkler systems* are required by this code for areas containing lithium-ion or lithium metal batteries, the design of the system shall be based on a series of fire tests. Such tests shall be conducted or witnessed and reported by an *approved* testing laboratory ~~involving test scenarios that~~ . A report prepared by a registered design professional with expertise in fire protection engineering shall be provided to the fire code official for review and approval in accordance with Section 104.2.2 and shall address the range of variables associated with the intended arrangement of the hazards to be protected.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

There currently is a lack of full-size testing of battery arrangements in buildings. This leads to difficulties for the designer, builder and code official. There is design guidance from an approved laboratory based upon some large-scale burn testing, Factory Mutual, on sprinkler design and there are lab reports for many cells and/or modules that a designer could utilize in determining the correct level of sprinkler protection. This modification would provide for use of the information available provided a report prepared by a registered design professional with expertise in fire protection engineering is submitted for review and approval.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal may reduce the cost of construction as it allows other ways of justifying performance where no testing data exists.

F111-24

F112-24

IFC: 903.3.1.1.3, TABLE 903.3.1.1.3(1) (New); IBC: [F] 903.3.1.1.3, TABLE 903.3.1.1.3(1) (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

903.3.1.1.3 Lithium-Ion or lithium metal batteries.
Where *automatic sprinkler systems* are required by the sections listed in Table 903.3.1.1.3 (1),~~this code~~ for areas containing lithium-ion or lithium metal batteries, the design of the system shall be based on a series of fire tests. Such tests shall be conducted or witnessed and reported by an approved testing laboratory involving test scenarios that address the range of variables associated with the intended arrangement of the hazards to be protected.

Add new text as follows:

TABLE 903.3.1.1.3(1) AUTOMATIC SPRINKLER SYSTEMS FOR LITHIUM-ION AND LITHIUM-ION BATTERY AREAS

SECTION	AREA REQUIRED
Table 3206.2	High Hazard Commodity
Section 320	Battery Storage
Section 903.2.3	Research and Development Laboratory
Section 903.2.4	Manufacturing
Section 903.2.7.3	Group M Occupancy
Section 1207.6	Energy Storage Systems

2024 International Building Code

Revise as follows:

[F] 903.3.1.1.3 Lithium-ion or lithium metal batteries.
Where *automatic sprinkler systems* are required by the sections listed in Table 903.3.1.1.3 (1), ~~this code~~ for areas containing lithium-ion or lithium metal batteries, the design of the system shall be based on a series of fire tests. Such tests shall be conducted or witnessed and reported by an *approved* testing laboratory involving test scenarios that address the range of variables associated with the intended arrangement of the hazards to be protected.

Add new text as follows:

TABLE 903.3.1.1.3(1) AUTOMATIC SPRINKLER SYSTEMS FOR LITHIUM-ION AND LITHIUM-ION BATTERY AREAS

SECTION	AREA REQUIRED
IFC Table 3206.2	High Hazard Commodity
IFC Section 320	Battery Storage
Section 903.2.3	Research and Development Laboratory
Section 903.2.4	Manufacturing
Section 903.2.7.3	Group M Occupancy
IFC Section 1207.6	Energy Storage System

Reason: The purpose of this code change is to identify the specific code sections within the IFC that already require automatic suppression systems where lithium-ion or lithium-ion batteries may be found in the building or specific occupancies. The problem with the existing language that was adopted last cycle gives the impression that this section would apply to any building and occupancy where a lithium-ion battery may exist must be protected by an automatic suppression system (for example bringing a laptop into a coffee shop would not trigger the required protection).

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is a clarification as to the specific locations where sprinkler protection is required for Lithium-ion and Lithium-ion metal batteries.

F112-24

F113-24

IFC: 903.4.1, 903.3.9, 903.4.3, 913.4; IBC: [F] 903.4.1, [F] 903.3.9, [F] 903.4.3, [F] 913.4

Proponents: Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org); Jason Webb, Potter Electric Signal, Automatic Fire Alarm Association Codes & Standards Committee (jasonw@pottersignal.com); John Swanson, NFSA, National Fire Sprinkler Association (swanson@nfsa.org); Shane Clary, Bay Alarm Company, Automatic Fire Alarm Association (smclary@bayalarm.com)

2024 International Fire Code

Revise as follows:

903.4.1 ~~Electronic~~ Electrical supervision.
Valves controlling the water supply for *automatic sprinkler systems*, pumps, tanks, water levels and temperatures, critical air pressures and waterflow switches on all automatic sprinkler systems shall be electrically supervised by a *listed* fire alarm control unit.

Exceptions:

1. *Automatic sprinkler systems* protecting one- and two-family *dwellings*.
2. Limited area sprinkler systems in accordance with Section 903.3.8, provided that backflow prevention device test valves located in limited area sprinkler system supply piping shall be locked in the open position unless supplying an occupancy required to be equipped with a *fire alarm system*, in which case the backflow preventer valves shall be electrically supervised by a valve supervisory ~~tamper~~ switch installed in accordance with NFPA 72 and separately annunciated.
3. *Automatic sprinkler systems* installed in accordance with NFPA 13R where a common supply main is used to supply both domestic water and the *automatic sprinkler system*, and a separate shutoff valve for the *automatic sprinkler system* is not provided.
4. Jockey pump control valves that are sealed or locked in the open position.
5. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and *deluge sprinkler systems* that are sealed or locked in the open position.
8. Underground key or hub gate valves in roadway boxes.

~~903.3.9~~ 903.4.1.1 High-rise building floor control valves. *Approved* supervised indicating control valves shall be provided at the point of connection to the riser on each floor in high-rise buildings.

903.4.3 Alarms.
An *approved* audible and visual sprinkler waterflow alarm device, located on the exterior of the building in an *approved* location, shall be connected to each *automatic sprinkler system*. Such sprinkler waterflow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Where a waterflow switch is required by Section 903.4.1 to be electrically supervised, such sprinkler waterflow alarm devices shall be monitored ~~powered~~ by a fire alarm control unit or, where provided, a *fire alarm system*. Where a *fire alarm system* is provided, actuation of the *automatic sprinkler system* shall actuate the building *fire alarm system*.

Exception: *Automatic sprinkler systems* protecting one- and two-family *dwellings*.

913.4 Valve supervision.
Fire pump valves located in the water supply for an *automatic sprinkler system* shall be supervised in accordance with Section 903.4.1. ~~Where provided, the~~ Other fire pump suction, discharge and bypass valves, and isolation valves on the backflow prevention device or assembly shall be supervised open by one of the following methods:

1. Central-station, proprietary or remote-station signaling service.
2. Local signaling service that will cause the sounding of an audible signal at a *constantly attended location*.

3. Locking valves open.
4. Sealing of valves and *approved* weekly recorded inspection where valves are located within fenced enclosures under the control of the *owner*.

2024 International Building Code

Revise as follows:

[F] 903.4.1 ~~Electronic~~ Electrical supervision.
Valves controlling the water supply for *automatic sprinkler systems*, pumps, tanks, water levels and temperatures, critical air pressures and waterflow switches on all automatic sprinkler systems shall be electrically supervised by a *listed fire alarm control unit*.

Exceptions:

1. *Automatic sprinkler systems* protecting one- and two-family *dwellings*.
2. Limited area sprinkler systems in accordance with Section 903.3.8 , provided that backflow prevention device test valves located in limited area sprinkler system supply piping shall be locked in the open position unless supplying an occupancy required to be equipped with a *fire alarm system*, in which case the backflow preventer valves shall be electrically supervised by a valve supervisory ~~tamper~~ switch installed in accordance with NFPA 72 and separately annunciated.
3. *Automatic sprinkler systems* installed in accordance with NFPA 13R where a common supply main is used to supply both domestic water and the *automatic sprinkler system*, and a separate shutoff valve for the *automatic sprinkler system* is not provided.
4. Jockey pump control valves that are sealed or locked in the open position.
5. Control valves to commercial kitchen hoods, paint spray booths or dip tanks that are sealed or locked in the open position.
6. Valves controlling the fuel supply to fire pump engines that are sealed or locked in the open position.
7. Trim valves to pressure switches in dry, preaction and deluge sprinkler systems that are sealed or locked in the open position.
8. Underground key or hub gate valves in roadway boxes.

[F] ~~903.3.9~~ 903.4.1.1 High-rise building floorcontrol valves.
Approved supervised indicating control valves shall be provided at the point of connection to the riser on each floor in *high-rise buildings*.

[F] 903.4.3 Alarms.
An *approved* audible and visual sprinkler waterflow alarm device, located on the exterior of the *building* in an *approved* location, shall be connected to each *automatic sprinkler system*. Such sprinkler waterflow alarm devices shall be activated by water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Where a waterflow switch is required by Section 903.4.1 to be electrically supervised, such sprinkler waterflow alarm devices shall be monitored ~~powered~~ by a *fire alarm control unit* or, where provided, a *fire alarm system*. Where a *fire alarm system* is provided, actuation of the *automatic sprinkler system* shall actuate the *building fire alarm system*.

Exception: *Automatic sprinkler systems* protecting one- and two-family *dwellings*.

[F] 913.4 Valve supervision.
~~Where provided,~~Fire pump valves located in the water supply for an automatic sprinkler system shall be supervised in accordance with Section 903.4.1. Other ~~the~~ fire pump suction, discharge and bypass valves, and isolation valves on the backflow prevention device or assembly shall be supervised open by one of the following methods:

1. Central-station, proprietary or remote-station signaling service.
2. Local signaling service that will cause the sounding of an audible signal at a *constantly attended location*.
3. Locking valves open.

4. Sealing of valves and *approved* weekly recorded inspection where valves are located within fenced enclosures under the control of the *owner*.

Reason: 903.4.1: The term "electrical" is more appropriate than "electronic" and correlates better with the referenced standards, i.e., NFPA 13 and NFPA 72. While these terms are often used interchangeably, these devices are listed as electrical versus electronic. Having the code match the standards helps the code official enforce the codes efficiently.

903.4.1.1: The high rise valve supervision is a current requirement and is more appropriate in the supervision section than left alone in another section.

913.4: This change reinforces the water supply valve supervision required by Section 903.4.1 and serves as a pointer from 913 to 903.4 for application consistency.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal updates the text to be consistent throughout the IBC/IFC and the referenced standards.

F113-24

F114-24

IFC: 904.2.1; IBC: [F] 904.2.1

Proponents: Jean-Pierre de Tourtoulon, Marioff, Marioff (jean-pierre.detourtoulon@carrier.com)

2024 International Fire Code

Revise as follows:

904.2.1 Restriction on using automatic sprinkler system exceptions or reductions. *Automatic fire-extinguishing systems* shall not be considered alternatives for the purposes of exceptions or reductions allowed for *automatic sprinkler systems* or by other requirements of this code.

Exception: *Automatic water mist systems* installed in accordance with Section 904.11.

2024 International Building Code

Revise as follows:

[F] 904.2.1 Restriction on using automatic sprinkler system exceptions or reductions.
Automatic fire-extinguishing systems shall not be considered alternatives for the purposes of exceptions or reductions allowed for *automatic sprinkler systems* or by other requirements of this code.

Exception: *Automatic water mist systems* installed in accordance with Section 904.11.

Reason: FM, UL, NFPA, CEN, VDS, and IMO all recognize watermist as being equivalent to sprinkler systems when designed, installed, operated, and maintained according to the

relevant standards and in accordance with their relevant listings.

Proposal is to recognize this equivalence to sprinklers to allow the same exemptions and reductions.

Currently businesses see the benefit of using systems designed based on their performance to aid in resilience, business continuity, space and cost

savings but 9.4.2.1 negates the cost savings and makes the system too expensive to use.

Bibliography: NFPA 13
NFPA 750
UL2167
FM5560
FM Data sheet 4-2
FM Data Sheet 5-32
FM Data Sheet 3-26
CEN14976
VDS3188
IMO

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Current reductions assigned to automatic sprinkler systems not allowed, change in code will have significant impact and make watermist both competitive and a better choice for clients looking for a performance based system

Estimated Immediate Cost Impact Justification (methodology and variables):

Current comparison to sprinklers makes watermist over 100% more expensive due to wording of 9.4.2.1
Changing this will reduce this to 20% but over lifetime of building system will be significantly less expensive.

Small bore stainless pipework helps with coordination, installation and longevity of system. No need to replace every 25 years.

Estimated Life Cycle Cost Impact:

High pressure water mist systems by their design perform equal or better to traditional sprinkler systems, this is the premise of the design and pass fail criteria.

If the system proves it performs better then the damage caused, cleanup cost, impact on business continuity is clearly reduced.

Environmentally speaking 72.5% less water is used to suppress a lithium ion fire so there is 72.5% less water to clean, decontaminate and dispose of to reinstate the business.

High pressure watermist systems with stainless steel pipework outlast all sprinkler systems and with maintenance have no problems with system degradation

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Replacement of sprinkler currently at 20-25 years, not needed with high pressure watermist system

F114-24

F115-24

IFC: 904.2.2, 904.14; IBC: [F] 904.2.2, [F] 904.14

Proponents: Kevin Scott, KH Scott & Associates LLC, KH Scott & Associates LLC (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

904.2.2 Commercial hood and duct systems.
~~Each required~~ An approved automatic fire-extinguishing system shall be installed to protect Type I commercial kitchen exhaust hoods ~~and duct system~~ required by Section 606 ~~to have a Type I hood~~ , cooking appliances equipped with integral down-draft exhaust systems, smoker ovens with integral exhaust systems, and wood-fired ovens *listed* in accordance with UL 2162.~~shall be protected with an *approved*~~The *automatic fire-extinguishing system* shall be installed in accordance with ~~this code~~Sections 904.14 through 904.14.4.1.

Exceptions:

1. Factory-built commercial cooking recirculating systems listed and labeled in accordance with UL 710B, and installed in accordance with Section 304.1 of the *International Mechanical Code*.
2. Electric cooking appliances where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with UL 710B.

904.14 Commercial cooking systems.
The *automatic fire-extinguishing system* for commercial cooking systems shall be of a type recognized for protection of commercial cooking equipment and exhaust systems of the type and arrangement protected. Preengineered automatic dry- and wet-chemical extinguishing systems shall be tested in accordance with UL 300 and *listed* and *labeled* for the intended application. Other types of *automatic fire-extinguishing systems* shall be *listed* and *labeled* for specific use as protection for commercial cooking operations. The system shall be installed in accordance with this code, NFPA 96, its listing and the manufacturer's installation instructions. *Automatic fire-extinguishing systems* of the following types shall be installed in accordance with the referenced standard indicated, as follows:

1. Carbon dioxide extinguishing systems, NFPA 12.
2. *Automatic sprinkler systems*, NFPA 13.
3. Automatic water mist systems, NFPA 750.
4. Foam-water sprinkler system or foam-water spray systems, NFPA 11.
5. Dry-chemical extinguishing systems, NFPA 17.
6. Wet-chemical extinguishing systems, NFPA 17A.

~~**Exception:** Factory-built commercial cooking recirculating systems that are tested in accordance with UL 710B and *listed*, *labeled* and installed in accordance with Section 304.1 of the International Mechanical Code.~~

2024 International Building Code

Revise as follows:

[F] 904.2.2 Commercial hood and duct systems.
~~Each required~~ An approved automatic fire-extinguishing system shall be installed to protect Type I commercial kitchen exhaust hoods ~~and duct system~~ required by Section 606 of the International Fire Code or Chapter 5 of the International Mechanical Code, cooking appliances equipped with integral down-draft exhaust systems, smoker ovens with integral exhaust systems, and wood-fired ovens listed in accordance with UL 2162. ~~to have a Type I hood shall be protected with an *approved*~~ The *automatic fire-extinguishing system* shall be installed in accordance with ~~this code~~ Sections 904.14 through 904.14.4.1.

Exceptions:

1. Factory-built commercial cooking recirculating systems listed and labeled in accordance with UL 710B, and installed in accordance with Section 304.1 of the *International Mechanical Code*.
2. Electric cooking appliances where an approved testing agency provides documentation that the appliance effluent contains 5 mg/m^3 or less of grease when tested at an exhaust flow rate of 500 cfm (0.236 m^3/s) in accordance with UL 710B.

[F] 904.14 Commercial cooking systems.
The *automatic fire-extinguishing system* for commercial cooking systems shall be of a type recognized for protection of commercial cooking equipment and exhaust systems of the type and arrangement protected. Preengineered automatic dry- and *wet-chemical extinguishing systems* shall be tested in accordance with UL 300 and *listed* and *labeled* for the intended application. Other types of *automatic fire-extinguishing systems* shall be *listed* and *labeled* for specific use as protection for commercial cooking operations. The system shall be installed in accordance with this code, NFPA 96, its listing and the manufacturer's installation instructions. *Automatic fire-extinguishing systems* of the following types shall be installed in accordance with the referenced standard indicated, as follows:

1. *Carbon dioxide extinguishing systems*, NFPA 12.
2. *Automatic sprinkler systems*, NFPA 13.
3. Automatic water mist systems, NFPA 750.
4. Foam-water sprinkler system or foam-water spray systems, NFPA 11.
5. Dry-chemical extinguishing systems, NFPA 17.
6. *Wet-chemical extinguishing systems*, NFPA 17A.

~~**Exception:** Factory-built commercial cooking recirculating systems that are tested in accordance with UL 710B and *listed*, *labeled* and installed in accordance with Section 304.1 of the *International Mechanical Code*.~~

Reason: The intent of this proposal is to clarify which cooking appliances require fire protection. The IFC states that only those cooking appliances required to have a Type I hood must be protected with a fire-extinguishing system. When Section 606.2 is evaluated, there are 4 exceptions to the Type I hood requirement. Technically, the code does not require all of the appliances covered in the exceptions to be protected by an fire-extinguishing system, even though all but 2 of the exceptions address cooking operations which produce grease and grease-laden vapors.

Exception 2 is for factory-built commercial cooking recirculating systems. These cooking appliances contain an automatic fire-extinguishing system as part of the listing under UL 710B. The fire-extinguishing system has been tested, and provides suitable protection.

Exception 4 addresses electric cooking appliances that have reduced grease emissions and do not produce enough grease to warrant the need for an automatic fire-extinguishing system.

Exception 3 addresses down-draft exhaust systems. NFPA 96 includes criteria on the protection of down-draft exhaust systems.

Exception 1 only eliminates compliance with certain requirements in the IMC if the exhaust hood is listed and labeled.

The phrasing in Section 904.2.2 unintentionally removes the items covered in Exceptions 1 and 3 from the fire-extinguishing system requirement even though these appliances produce grease-laden vapors.

The revisions in this proposal clarify the type of appliances where a fire-extinguishing system is required. The reference to a "required Type I hood" is retained and correlates with the requirement in the IMC.

The exception in Section 904.14 is deleted because it is misleading and an exception is added to Section 904.2.2. Equipment listed under UL 710B is already required to install a fire-extinguishing system.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal does not add new requirements, although the current requirements can be easily missed. This proposal clarifies which commercial cooking operations need to be provided with an automatic fire-extinguishing system.

F116-24

IFC: 904.3.5; IBC: [F] 904.3.5

Proponents: James Carver, Self, Southern California Fire Prevention Officer's Association

2024 International Fire Code

Revise as follows:

904.3.5 Monitoring.
Where a building *fire alarm system* or a dedicated function fire alarm system is installed, *automatic fire-extinguishing systems* shall be monitored by the building *fire alarm system* or dedicated function fire alarm system in accordance with NFPA 72.

2024 International Building Code

Revise as follows:

[F] 904.3.5 Monitoring.
Where a building *fire alarm system* or a dedicated function fire alarm system is installed, *automatic fire-extinguishing systems* shall be monitored by the building *fire alarm system* or dedicated function fire alarm system in accordance with NFPA 72.

Reason: A proposal to require pre-engineered fire extinguishing systems and other alternative automatic fire-extinguishing systems to be connected to a Dedicated Function fire alarm system when the building does not have a fire alarm system installed. Currently, the IFC only requires automatic fire-extinguishing systems to be monitored by a building fire alarm system.

Some agencies have interpreted that a dedicated function fire alarm system meets the requirement for a building fire alarm system. IFC Section 202 has the following definition for a fire alarm system:

FIRE ALARM SYSTEM.

A system or portion of a combination system consisting of components and circuits arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals.

NFPA 72, 2022 edition has the following definition for a fire alarm system and a building fire alarm system:

3.3.118 Fire Alarm System.

A system or portion of a combination system that consists of components and circuits arranged to monitor and annunciate the status of fire alarm or supervisory signal-initiating devices and to initiate the appropriate response to those signals. (SIG-FUN)

3.3.118.4.1 Building Fire Alarm System.

A protected premises fire alarm system that includes any of the features identified in **23.3.3.1** and that serves the general fire alarm needs of a building or buildings and provides notification. (SIG-PRO)

With NFPA 72 providing a definition for a building fire alarm system, I believe it is the current intent of the IFC to not require a Dedicated Function fire alarm system to monitor a pre-engineered fire extinguishing system, or other alternative automatic fire-extinguishing system. This proposal would clarify the requirement for monitoring of automatic fire extinguishing systems. In most cases, automatic fire extinguishing systems activate prior to activation for the sprinkler system. A pre-engineered fire extinguishing system protecting a commercial kitchen hood activates when the hood system senses fire, prior to, and often without activation of the sprinkler system. When the automatic fire extinguishing system is monitored, there would be earlier notification to the fire department.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The proposal could have an increase in construction cost for installation of a dedicated function fire alarm system. If the automatic fire extinguishing system is located near the fire alarm control unit or the fire alarm system initiating circuit wiring, there would be no significant cost impact. An example of increased cost would be a strip mall, where the automatic fire extinguishing system is located at one end of the strip mall and the fire alarm control unit is located at the other end. In this case, a 5% increase in system cost could be expected.

Estimated Immediate Cost Impact Justification (methodology and variables):

The proposal could have an increased system cost of approximately 5% for the installation of additional fire alarm initiating device circuit wiring to the automatic fire extinguishing system.

Estimated Life Cycle Cost Impact:

There is not estimated additional life cycle cost for this proposal.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

There is not estimated additional life cycle cost for this proposal.

F116-24

F117-24

IFC: 904.7, 904.7.1 (New), 904.7.1, 904.7.3 (New); IBC: [F] 904.7, [F] 904.7.1 (New)

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

904.7 Foam systems.
Foam-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 11 and their listing. Records of inspections and testing shall be maintained.

Add new text as follows:

904.7.1 Foam concentrate type. The foam concentrate type utilized in foam-extinguishing systems shall be in accordance with NFPA 11 and shall not contain intentionally-added polyfluoroalkyl substances or perfluoroalkyl substances (PFAS).

Revise as follows:

~~904.7.1~~ 904.7.2 System test.
Foam-extinguishing systems shall be inspected and tested at intervals in accordance with NFPA 25.

Add new text as follows:

904.7.3 Existing foam systems. Existing supplies of firefighting foam containing PFAS shall be replaced with a foam concentrate type complying with Section 904.7.1 based on the following schedule, whichever occurs first:

1. The tank containing AFFF is due for a hydrostatic test in accordance with Section 11.3.5 of NFPA 25.
2. The foam concentrate fails the annual quality condition test required in Section 11.3.1.1 of NFPA 25. The owner shall notify the fire code official after a failed quality condition test and establish a timeframe for replacement foam concentrate and necessary components that is acceptable to the fire code official.

2024 International Building Code

[F] 904.7 Foam systems.
Foam-extinguishing systems shall be installed, maintained, periodically inspected and tested in accordance with NFPA 11 and their listing. Records of inspections and testing shall be maintained.

Add new text as follows:

[F] 904.7.1 Foam concentrate type. The foam concentrate type utilized in foam-extinguishing systems shall be in accordance with NFPA 11 and shall not contain intentionally-added polyfluoroalkyl substances or perfluoroalkyl substances (PFAS).

Reason: Aqueous film-forming foam concentrates (AFFF) contain PFAS (polyfluoroalkyl substances or perfluoroalkyl substances). PFAS is referred to as a “forever chemical”, and U.S. EPA has determined that exposure to PFAS can have detrimental health effects. To address this situation, this proposal is one of three code changes addressing AFFF in fire-extinguishing systems.

Thousands of existing foam fire-extinguishing systems exist across the country. EPA and some states have already taken actions to remove or reduce materials containing PFAS that could present an exposure. This proposal is designed to replace the current AFFF supplies, and have the foam concentrate supply replaced with a nonfluorinated foam concentrate.

Section 904.7.2 is added to the code to specify that the type of foam concentrate must be in accordance with NFPA 11 and must not contain any intentionally added PFAS. The 2021 edition of NFPA 11 now includes criteria for protection with nonfluorinated foam.

Section 904.7.3 is added to set a trigger replacement of existing AFFF foam concentrate supplies with a nonfluorinated foam supply. Along with the items listed in Section 904.7.2, EPA and states may specify a certain date for replacement. The items listed in Section 904.7.2 represent occurrences in the life of the foam-extinguishing system. When either of these situations occur, it is time to replace the foam concentrate supply. This section refers back to Section 904.7.2 for approval of the type of foam concentrate used as the new supply.

Replacement with the newer nonfluorinated foam concentrates is not a simple swap of tank contents—much or all of the existing system equipment and piping may need to be replaced. Usually, the quantity of foam will increase resulting in the need for a larger supply and tank. Often, the foam-water sprinklers or nozzles need to be replaced for this new concentrate. Nonfluorinated foam concentrates are typically more viscous than AFFF, so a different eductor or foam pump is required. With all of this time, work, supplies of concentrate and equipment needed, it is not possible to replace all of these systems in a short time. It is not uncommon for a single facility to have thousands of gallons of product ready for system activation, and another stock of AFFF for replenishment after system activation.

Item 1 states that when the AFFF bladder tank is due for hydrostatic testing, the foam is to be replaced. The requirement for testing is every ten years. During hydrostatic testing, the foam concentrate is removed from the tank presenting an obvious opportunity to refill the tank with nonfluorinated foam. The date for hydrostatic retesting is known years in advance. This advance notice provides time to determine what other components of the extinguishing system must also be replaced, with the intent to ensure a minimal down time.

Item 2 states that when the foam concentrate fails the annual quality condition testing, it shall be replaced. The real-world practice when the foam concentrate fails the quality condition test is to test it again. Once it is confirmed that the concentrate has failed, the next step is to establish a plan for replacement. At this point, the fire code official is involved in determining the timeframe for replacement. There have been incidents where foam, that has failed the quality condition testing, has successfully controlled and extinguished a fire. The decision on the urgency should be based on whether quality condition tests have been completed annually and what portion of the piping and appurtenances must be replaced at the same time the foam is replaced. This will allow the transition to nonfluorinated foam to occur with the least down time.

Cost Impact: Increase

Estimated Immediate Cost Impact:

This proposal does not increase the cost of construction, but it will increase the cost of maintenance of an existing AFFF system. U.S. EPA has placed a ban on use of AFFF for new installations and many manufacturers are no longer producing AFFF.

Estimated Immediate Cost Impact Justification (methodology and variables):

The estimate for construction costs is for little change in cost. An internet search on January 8, 2023 found the following product costs:

1. Chemguard 3%/6% AR-AFFF 5 gallons at $266.95
2. Chemguard 3%/3% AR-NFFF 5 gallons at $266.48

It is obvious that the cost of the product will have little impact.

The increase on maintenance costs could be significant depending on the size of the system, and whether the existing piping network needs to be replaced. There are too many variables to develop an accurate estimate.

F117-24

F118-24

IFC: 904.15.1.2, UL Chapter 80 (New); IBC: [F] 904.15.1.2, UL Chapter 35 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Revise as follows:

904.15.1.2 Ignition prevention. Electric Cooktops and ranges shall include heating elements ~~burners~~ that have been tested and *listed* in accordance with UL 858 to prevent ignition of cooking oil ~~with burners turned on to their maximum heat settings and allowed to operate for 30 minutes.~~

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

858-2014 Household Electric Ranges - with revisions through August 2023.

2024 International Building Code

Revise as follows:

[F] 904.15.1.2 Ignition prevention.
Electric cooktops ~~Cooktops~~ and ranges shall include heating elements ~~burners~~ that have been tested and *listed* in accordance with UL 858 to prevent ignition of cooking oil ~~with burners turned on to their maximum heat settings and allowed to operate for 30 minutes~~.

Add new standard(s) as follows:

UL

UL LLC
333 Pfingsten Road
Northbrook, IL 60062

858-2014 Household Electric Ranges - with revisions through August 2023.

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Household Electric Ranges - with revisions through August 2023 (UL 858-2014)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: This proposal correlates the appliance requirements in the IFC with the current requirements for electric cooktops and ranges in IRC M1503.2, IRC M1901.2, and IMC 917.1. The IRC and IMC already require the appliance to be listed and labeled to UL 858. The latest edition of UL 858 includes the testing requirement for the heating elements to prevent cooking oil ignition.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no increase to cost of construction as these appliances are already required to be listed and labeled. The proposal merely identifies the appropriate product standard.

F118-24

F119-24

IFC: 905.3.8 (New); IBC: [F] 412.2.7 (New), [F] 905.3.8 (New)

Proponents: William Cooper, Protection Engineers, LLC, FAA Fire Protection Engineering Code Team (wacooper@protengineers.com); David Clark, Protection Engineers, LLC, FAA Fire Protection Engineering Code Team (dwclark@protengineers.com)

2024 International Fire Code

Add new text as follows:

905.3.8 Airport Traffic Control Towers. Class I standpipes in airport traffic control towers shall be permitted to be manual where approved by the fire code official.

2024 International Building Code

Add new text as follows:

[F] 412.2.7 Standpipe System.
An airport traffic control tower shall be equipped with a standpipe as required by Section 905.

[F] 905.3.8 Airport Traffic Control Towers. Class I standpipes in airport traffic control towers shall be permitted to be manual where approved by the fire code official.

Reason: The proposed addition to IBC 412 states the requirement for standpipes in airport traffic control towers, similar to the statement made in IBC 403 for high-rise buildings. The proposed IBC/ IFC Section 905 addition cites a permitted allowance for airport traffic control towers to be served by manual wet standpipe systems where permitted by the authority having jurisdiction.

This new section is needed for clarification because many designers incorrectly regard airport traffic control towers as high-rise buildings (specifically excluded in IBC 403.1 exceptions) where NFPA 14 (cited in IBC 905.2) specifically precludes the use of manual standpipes.

Unnecessarily increasing the size of the fire pump to serve an automatic Class I standpipe demand in lieu of the fire sprinkler demand only can substantively impact the critical electrical systems serving airport traffic control towers. The specific result being an engine generator which is oversized for the necessary electrical demands, even though the fire department may have the capability, equipment, and resources to adequately serve the hydraulic standpipe system demands.

The proposed language also includes “where permitted by the authority having jurisdiction” to assure the responding fire department apparatus and resources are capable of supplying the needed standpipe hydraulic demands where a manual wet system is leveraged.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

The estimated immediate cost impact for this code change is expected to be approximately $50k per installation.

Estimated Immediate Cost Impact Justification (methodology and variables):

Elements included in the immediate cost impact are:

1. Fire pump size reduction.
2. Engine generator size reduction.

Estimated Life Cycle Cost Impact:

The estimated life cycle cost impact for this code change is expected to be limited annually but approximately $50k per installation as infrastructure goes through routine life cycle replacements.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Elements included in the life cycle replacement cost impact are:

1. Fire pump size reduction.
2. Engine generator size reduction.

F119-24

F120-24

IFC: 905.3.8 (New); IBC: [F] 905.3.8 (New)

Proponents: Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Add new text as follows:

905.3.8 High-piled storage. High-piled storage occupancies shall be equipped with Class I standpipes when required by Section 3206.9.

2024 International Building Code

Add new text as follows:

[F] 905.3.8 High-piled storage. High-piled storage occupancies shall be equipped with Class I standpipes when required by Section 3206.9 of the *International Fire Code*.

Reason: Section 905.3 of the IBC/IFC provides pointers to all areas in the code where standpipe systems are required but the current IBC/IFC is missing the pointer to high-piled storage in IFC Chapter 32.

Section 3206.9 requires Class I standpipes in exit passageways, where present in high-piled storage areas.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is already required but may be missed if the user is not familiar with Chapter 32 of the IFC.

F120-24

F121-24

IFC: 905.4; IBC: [F] 905.4

Proponents: Jeffrey Grove, Coffman Engineers, Coffman Engineers (jeff.grove@coffman.com)

2024 International Fire Code

Revise as follows:

905.4 Location of Class I standpipe hose connections.
Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway* or *exterior exit stairway* , a hose connection shall be provided for each story above and below *grade plane*. Hose connections shall be located at the main floor landing unless otherwise *approved* by the *fire code official*.

   Exception: A single hose connection shall be permitted to be installed in the open *corridor* or open breezeway between open *stairs* that are not greater than 75 feet (22 860 mm) apart.

2. On each side of the wall adjacent to the exit opening of a horizontal exit. <u>The hose connections shall be visible from and provided within 20 feet (6096 mm) of each side of the horizontal exit.</u>

   Exception: Where <u>all</u> floor areas ~~adjacent to a horizontal *exit*~~ are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection ~~by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the horizontal *exit*.~~ <u>on the same side of a horizontal exit within 130 feet travel distance, the hose connection on the other side of the horizontal exit shall be permitted to be omitted. Where a building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2, this travel distance may be increased to 200 feet.</u>

3. In every exit *passageway*, at the entrance from the *exit passageway* to other areas of a building.

   Exception: Where <u>all</u> floor areas adjacent to an *exit passageway* are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection ~~by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the *exit passageway* to other areas of the building.~~
   <u>within 130 feet travel distance, the hose connection at the exit passageway shall be permitted to be omitted. Where a building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2, this travel distance may be increased to 200 feet.</u>

4. In covered mall buildings, adjacent to each exterior public entrance to the mall and adjacent to each entrance from an *exit passageway* or *exit corridor* to the mall. In open mall buildings, adjacent to each public entrance to the mall at the perimeter line and adjacent to each entrance from an *exit passageway* or *exit corridor*to the mall.
5. Where the roof has a slope less than 4 units vertical in 12 units horizontal (33.3-percent slope), a hose connection shall be located to serve the roof or at the highest landing of an *interior exit stairway* with access to the roof provided in accordance with Section 1011.12.
6. Where the most remote portion of a nonsprinklered floor or story is more than 150 feet (45 720 mm) from a hose connection or the most remote portion of a sprinklered floor or story is more than 200 feet (60 960 mm) from a hose connection, the *fire code official* is authorized to require that additional hose connections be provided in *approved* locations.

2024 International Building Code

Revise as follows:

[F] 905.4 Location of Class I standpipe hose connections.
Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway* or *exterior exit stairway* , a hose connection shall be provided for each *story* above and below *grade plane*. Hose connections shall be located at the main floor landing unless otherwise *approved* by the fire code official.

   Exception: A single hose connection shall be permitted to be installed in the open corridor or open breezeway between open *stairs* that are not greater than 75 feet (22 860 mm) apart.

2. On each side of the wall adjacent to the exit opening of a *horizontal exit*. The hose connections shall be visible from and provided within 20 feet (6096 mm) of each side of the horizontal exit.

   Exception: Where all floor areas ~~adjacent to a horizontal *exit*~~ are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection ~~by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the horizontal *exit*.~~ on the same side of a horizontal exit within 130 feet travel distance, the hose connection on the other side of the horizontal exit shall be permitted to be omitted. Where a building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2, this travel distance may be increased to 200 feet.

3. In every *exit passageway*, at the entrance from the *exit passageway* to other areas of a *building*.

   Exception: Where all floor areas adjacent to an *exit passageway* are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection ~~by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the *exit passageway* to other areas of the building.~~ within 130 feet travel distance, the hose connection at the exit passageway shall be permitted to be omitted. Where a building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2, this travel distance may be increased to 200 feet.

4. In *covered mall buildings*, adjacent to each exterior public entrance to the *mall* and adjacent to each entrance from an exit *passageway* or exit *corridor* to the *mall*. In *open mall buildings*, adjacent to each public entrance to the *mall* at the perimeter line and adjacent to each entrance from an exit *passageway* or *exit* corridor to the *mall*.
5. Where the roof has a slope less than 4 units vertical in 12 units horizontal (33.3-percent slope), a hose connection shall be located to serve the roof or at the highest landing of an *interior exit stairway* with access to the roof provided in accordance with Section 1011.12.
6. Where the most remote portion of a nonsprinklered floor or *story* is more than 150 feet (45 720 mm) from a hose connection or the most remote portion of a sprinklered floor or *story* is more than 200 feet (60 960 mm) from a hose connection, the fire code official is authorized to require that additional hose connections be provided in *approved* locations.

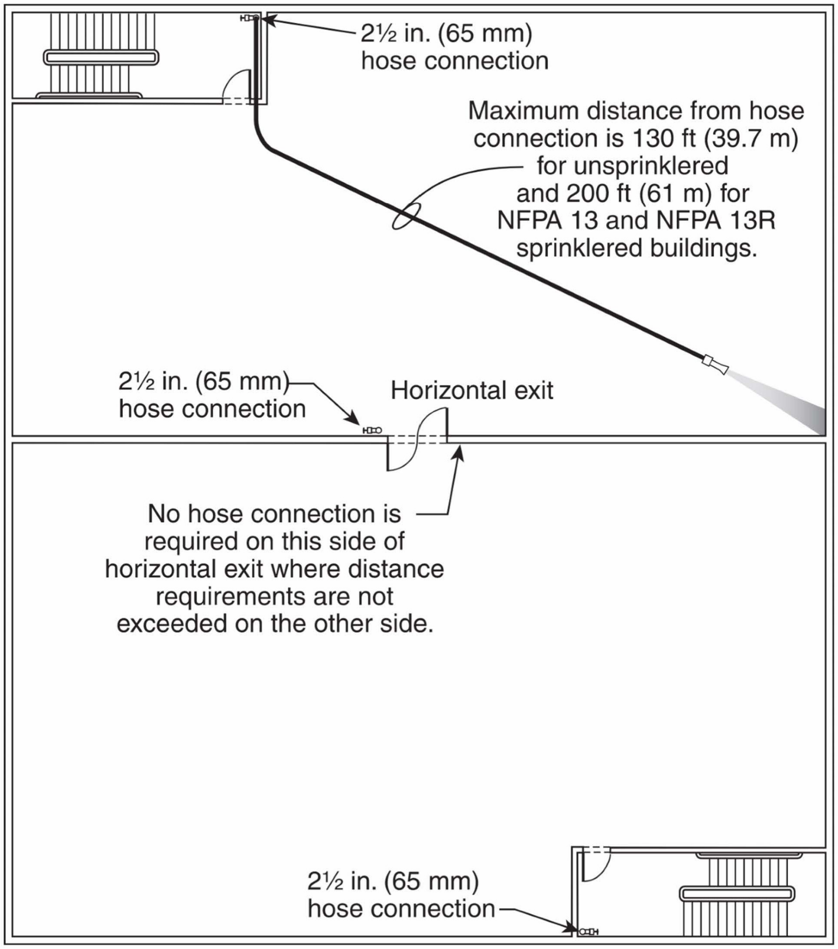
Reason: This change will remove ambiguity from the Exceptions to Item 2 and Item 3 by aligning the code language with NFPA 14, the governing design standard for standpipe systems as prescribed by Section 905.2. These changes, made in an effort to be consistent with NFPA 14, include:

- Provide definitive direction on the required location of hose connections at exit openings in a horizontal exit. 2019 NFPA 14 Section 7.3.2.2 did not contain quantitative requirements for the location of hose connections on each side of a horizontal exit. 2024 NFPA 14 Section 9.5.2.2 has been revised to specify that the hose connections must be, “visible from and provided within 20 feet of each side of horizontal exits.”
- Streamline the distance measurements referenced in the Exceptions to Item 2 and Item 3 to be a standard measure of travel distance rather than a combination of hose pull and hose stream.
- Extend the Exceptions to Item 2 and Item 3 to increase the allowable travel distance for fully sprinklered buildings from 130 feet to 200 feet. Currently, IBC Section 905.4(6) allows an increase in hose connection distance to 200 feet with the following clarification in the Code Commentary: “...the need for prompt manual suppression is reduced by the presence of the sprinkler system.” This change accounts for the increased protection provided by active fire suppression which allows additional time for the responding fire department to attach additional lengths of hose.

NFPA 14 (2024 Edition) Figure A.9.5.2.2.1 from the NFPA 14 annex demonstrates the intended application of this code change proposal. https://link.nfpa.org/free-access/publications/14/2024

Currently, the IBC is more restrictive than NFPA 14. While these changes will make Section 905.4 less restrictive overall, they will also align the IBC with the requirements of the governing design standard, NFPA 14, creating consistency across referenced codes and standards.

This change will also address and resolve comments raised by F80-21 in the previous code change cycle, which was rejected.



Bibliography: NFPA 14, Standard for the Installation of Standpipe and Hose Systems

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Code change proposal intends to coordinate requirements between NFPA 14 and the IFC and does not increase nor decrease the cost of construction.

F121-24

F122-24

IFC: 905.4, 905.5, 905.6; IBC: [F] 905.4, [F] 905.5, [F] 905.6

Proponents: Steve Thomas, Shums Coda Associates, Himself (sthomas@coloradocode.net)

2024 International Fire Code

Revise as follows:

905.4 Location of Class I standpipe hose connections.
Where standpipe systems are provided in accordance with Section 905.3, Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway* or *exterior exit stairway* , a hose connection shall be provided for each story above and below *grade plane*. Hose connections shall be located at the main floor landing unless otherwise *approved* by the *fire code official*.

   Exception: A single hose connection shall be permitted to be installed in the open *corridor* or open breezeway between open *stairs* that are not greater than 75 feet (22 860 mm) apart.

2. On each side of the wall adjacent to the exit opening of a horizontal exit.

   Exception: Where floor areas adjacent to a horizontal *exit* are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the horizontal *exit*.

3. In every exit *passageway*, at the entrance from the *exit passageway* to other areas of a building.

   Exception: Where floor areas adjacent to an *exit passageway* are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the *exit passageway* to other areas of the building.

4. In covered mall buildings, adjacent to each exterior public entrance to the mall and adjacent to each entrance from an *exit passageway* or *exit corridor* to the mall. In open mall buildings, adjacent to each public entrance to the mall at the perimeter line and adjacent to each entrance from an *exit passageway* or *exit corridor*to the mall.
5. Where the roof has a slope less than 4 units vertical in 12 units horizontal (33.3-percent slope), a hose connection shall be located to serve the roof or at the highest landing of an *interior exit stairway* with access to the roof provided in accordance with Section 1011.12.
6. Where the most remote portion of a nonsprinklered floor or story is more than 150 feet (45 720 mm) from a hose connection or the most remote portion of a sprinklered floor or story is more than 200 feet (60 960 mm) from a hose connection, the *fire code official* is authorized to require that additional hose connections be provided in *approved* locations.

905.5 Location of Class II standpipe hose connections. Where standpipe systems are provided in accordance with Section 905.3, Class II standpipe hose connections shall be located so that all portions of the building are within 30 feet (9144 mm) of a nozzle attached to 100 feet (30 480 mm) of hose. Class II standpipe hose connections shall be located where they will have *ready access*.

905.6 Location of Class III standpipe hose connections.
Where standpipe systems are provided in accordance with Section 905.3, Class III standpipe systems shall have hose connections located as required for Class I standpipes in Section 905.4 and shall have Class II hose connections as required in Section 905.5.

2024 International Building Code

Revise as follows:

[F] 905.4 Location of Class I standpipe hose connections. Where standpipe systems are provided in accordance with Section 905.3, Class I standpipe hose connections shall be provided in all of the following locations:

1. In every required *interior exit stairway* or *exterior exit stairway* , a hose connection shall be provided for each *story* above and below *grade plane*. Hose connections shall be located at the main floor landing unless otherwise *approved* by the fire code official.

   Exception: A single hose connection shall be permitted to be installed in the open corridor or open breezeway between open *stairs* that are not greater than 75 feet (22 860 mm) apart.

2. On each side of the wall adjacent to the exit opening of a *horizontal exit*.

   Exception: Where floor areas adjacent to a *horizontal exit* are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the *horizontal exit*.

3. In every *exit passageway*, at the entrance from the *exit passageway* to other areas of a *building*.

   Exception: Where floor areas adjacent to an *exit passageway* are reachable from an *interior exit stairway* or *exterior exit stairway* hose connection by a 30-foot (9144 mm) hose stream from a nozzle attached to 100 feet (30 480 mm) of hose, a hose connection shall not be required at the entrance from the *exit passageway* to other areas of the *building*.

4. In *covered mall buildings*, adjacent to each exterior public entrance to the *mall* and adjacent to each entrance from an exit *passageway* or exit *corridor* to the *mall*. In *open mall buildings*, adjacent to each public entrance to the *mall* at the perimeter line and adjacent to each entrance from an exit *passageway* or *exit* corridor to the *mall*.
5. Where the roof has a slope less than 4 units vertical in 12 units horizontal (33.3-percent slope), a hose connection shall be located to serve the roof or at the highest landing of an *interior exit stairway* with access to the roof provided in accordance with Section 1011.12.
6. Where the most remote portion of a nonsprinklered floor or *story* is more than 150 feet (45 720 mm) from a hose connection or the most remote portion of a sprinklered floor or *story* is more than 200 feet (60 960 mm) from a hose connection, the fire code official is authorized to require that additional hose connections be provided in *approved* locations.

[F] 905.5 Location of Class II standpipe hose connections. Where standpipe systems are provided in accordance with Section 905.3, Class II standpipe hose connections located so that all portions of the *building* are within 30 feet (9144 mm) of a nozzle attached to 100 feet (30 480 mm) of hose. Class II standpipe hose connections shall be located where they will have *ready access*.

[F] 905.6 Location of Class III standpipe hose connections.
Where standpipe systems are provided in accordance with Section 905.3, Class III standpipe systems shall have hose connections located as required for Class I *standpipes* in Section 905.4 and shall have Class II hose connections as required in Section 905.5.

Reason: The language in Section 905 is confusing. Section 905.3 specifies where standpipe system are required. Sections 905.4, 905.5, and 905.6 specify when hose connections are required. The confusion comes when Section 905.3 does not require a standpipe system, but Sections 905.4 requires a hose connection. For example, in Section 905.4, Item 1, hose connections are required in every interior exit stairway. However, standpipes are only required in buildings that meet the provisions of Section 905.3.1. The intent of the section is that when standpipe systems are provided, the hose connections are required. A three story building would not be required to have a standpipe, but Section 905.4, Item 1 would say that you need hose connections in each stairway. The same condition applies when a horizontal exit is provided in a building that does not require standpipe system. The purpose of this proposal is to clarify that when standpipe systems are provided in a building, the various hose connections must be provided. But if there is no standpipe system, the hose connections are not required.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is a clarification of the code requirements. See reason statement.

F122-24

F123-24

IFC: 905.12 (New)

Proponents: Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Add new text as follows:

905.12 **Pressure regulating devices.** Where permitted by the fire code official, pressure regulating devices installed on Class I or Class III standpipe hose valves with a static pressure not exceeding 175 psi. shall be permitted to be replaced with standard hose valves.

Reason: Following the February 23, 1991, Meridian One Plaza fire that claimed the lives of three Philadelphia firefighters, NFPA 14 was amended during the 1990 standards cycle to allow outlet maximum pressures on hose connections to be increased from 100 psi to 175 psi. The substantiation at that time noted that the requirement for limiting outlet pressures to 100 psi may endanger firefighters due to inadequate nozzle pressure. This continues to be an issue for buildings built prior to the 1993 NFPA 14 standard amendment that allows for the higher pressures of 175 psi. This amendment would allow the fire service the option of taking advantage of higher pressures currently allowed in the standard while not exceeding the current 175 psi limitation. This change correlates to the current (2024) and referenced edition of NFPA 14.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Source: Actual estimates and RS Means.

Removing and adding new hose valves:

- Crew: 8-12 hours: $2,000 - 3,000
- Range total cost of $300 – $350 per 2 ½ inch hose valve.
- Estimate for typical seven story high rise with two stair enclosures per floor (14 hose valves), $6,200 - $7,900.

Five-year testing and maintenance of all existing pressure regulating valve (14 PRVs):

- Crew: 12-16 hours: $3,000 - $4,000

Estimated Immediate Cost Impact Justification (methodology and variables):

Analogous methodology using actual current cost estimates and data from RS Means to create a range of cost. This change, where permitted in existing buildings, will add a cost of construction, however, it eliminates the five-year testing and maintenance cost on pressure regulating devices required by the IFC referenced standard, NFPA 25.

F123-24

F124-24

IFC: 906.5 (New); IBC: [F] 906.5 (New)

Proponents: Jacob David, Wiss, Janney, Elstner, Associates, Inc. (WJE), Jesse Corletto, EfireX (jesse@efirex.com) (jdavid@wje.com)

2024 International Fire Code

Add new text as follows:

906.5 Electrical energy storage system (ESS) fires. Fire extinguishers provided for the protection of fire areas within rooms, areas, and walk-in units containing ESS required to comply with Section 1207 shall be of an approved type and shall be selected and placed on the basis of the anticipated Class A hazard.

2024 International Building Code

Add new text as follows:

[F] 906.5 Electrical energy storage system (ESS) fires. Fire extinguishers provided for the protection of fire areas within rooms, areas, and walk-in units containing ESS required to comply with Section 1207 shall be of an approved type and shall be selected and placed on the basis of the anticipated Class A hazard.

Reason: The use of electrical energy storage systems (ESS) is becoming increasingly prevalent in order to meet today's energy and environmental demands. ESS are now allowed to use a variety of battery technologies including new generations of batteries such as lithium-ion and flow batteries. As ESS become more advanced and widely utilized, it is important to require the use of appropriate fire protection to protect building occupants and emergency responders. Currently, the selection and placement of portable fire extinguishers for ESS is based on the classification of the fire hazard as Class A, B, C, or D. However, ESS present unique challenges related to fire protection and can represent multiple fire classes within one entity. Additionally, each individual type of ESS poses specific threats based on the characteristics of the battery being used. The IFC should recognize these differences in ESS and allow for the selection of portable fire extinguishers based on the specific hazards posed by the ESS.

The intent of the proposed amendment is to reinforce the required installation of approved portable fire extinguishers for the protection of ESS hazards based on the appropriate battery technology/chemistry. Since ESS in part represent Class C hazards, the proposed language for the selection and placement of such fire extinguishers was based on the current IFC requirements for the selection and placement of fire extinguishers protecting Class C hazards. It is not the intent of the proposed amendment to remove requirements for portable fire extinguishers in rooms, areas, and walk-in units containing ESS that are not required to comply with Section 1207. Where an ESS is outside the scope of Section 1207, the requirements of Sections 906.1 and 906.2 remain in effect.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposed amendment will have no cost impact since it does not require additional portable fire extinguishers for the protection of ESS. Instead, the amendment is intended to reinforce the need for appropriate portable fire extinguishers for the protection of occupancies containing ESS.

F124-24

F125-24

IFC: 906.5 (New); IBC: [F] 906.5 (New)

Proponents: Jacob David, Wiss, Janney, Elstner Associates, Inc. (WJE), Jesse Corletto, EfireX (jesse@efirex.com) (jdavid@wje.com)

2024 International Fire Code

Add new text as follows:

906.5 Lithium-ion and lithium metal battery storage fires. Fire extinguishers provided for the protection of fire areas used for lithium-ion and lithium metal battery storage required to comply with Section 320 shall be of an approved type and shall be selected and placed on the basis of the anticipated Class A hazard.

2024 International Building Code

Add new text as follows:

[F] 906.5 Lithium-ion and lithium metal battery storage fires. Fire extinguishers provided for the protection of fire areas used for lithium-ion and lithium metal battery storage required to comply with Section 320 shall be of an approved type and shall be selected and placed on the basis of the anticipated Class A hazard.

Reason: Lithium-ion batteries constitute a unique fire hazard due to the inclusion of multiple fire hazard classes (Class A, Class B, Class C, and Class D) within one entity and the possibility of the occurrence of thermal runaway. The intent of the proposed amendment is to reinforce the required installation of approved portable fire extinguishers for the protection of hazards in industrial facilities used for storage of lithium-ion and lithium metal batteries. Since lithium batteries in part represent Class C hazards, the proposed language for the selection and placement of such fire extinguishers was based on the current IFC requirements for the selection and placement of fire extinguishers protecting Class C hazards. It is not the intent of the proposed amendment to remove requirements for portable fire extinguishers in occupancies used for lithium-ion and lithium metal battery storage required to comply with Section 320. Where a storgae occupancy is outside the scope of Section 320, the requirements of Sections 906.1 and 906.2 remain in effect.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposed amendment will have no cost impact since it does not require additional portable fire extinguishers for the protection of occupancies used for lithium-ion and lithium metal battery storage. Instead, the amendment is intended to reinforce the need for appropriate portable fire extinguishers for the protection of these occupancies.

F125-24

F126-24

IFC: 906.9, 906.9.2; IBC: [F] 906.9, [F] 906.9.2

Proponents: JED NEILSEN, Springville City, Colorado Chapter Code Development Committee (j.t.neilsen24@gmail.com)

2024 International Fire Code

Revise as follows:

906.9 Extinguisher installation.
The installation of portable fire extinguishers shall be in accordance with Sections 906.9.1 through 906.9.3. Installation of fire extinguishers within a *means of egress* shall also comply with Section 1003.3.3.

906.9.2 Extinguishers weighing more than 40 pounds. Hand-held portable fire extinguishers having a gross weight exceeding 40 pounds (18 kg) shall be installed so that the tops of the extinguisher is ~~their tops are~~ not more than 42 inches ~~3.5 feet~~(1067mm) above the floor.

2024 International Building Code

Revise as follows:

[F] 906.9 Extinguisher installation.
The installation of portable fire extinguishers shall be in accordance with Sections 906.9.1 through 906.9.3. Installation of fire extinguishers within a *means of egress* shall also comply with Section 1003.3.3.

[F] 906.9.2 Extinguishers weighing more than 40 pounds. Hand-held portable fire extinguishers having a gross weight exceeding 40 pounds (18 kg) shall be installed so that the tops of the extinguisher is ~~their tops are~~ not more than 42 inches ~~3.5 feet~~(1067mm) above the floor.

Reason: Additional wording needed in 906.9 Extinguisher installation to reference horizontal projections being installed within the *circulation path* of the means of egress. This is simply a pointer to help with compliance and does not change code requirements. Also, changes to clarify where measurement is taken to (top of extinguisher, not top of cabinet) and to make units of measurements consistent throughout code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is editorial.

F126-24

F127-24

IFC: SECTION 202 (New), 907.1.4 (New); IBC: SECTION 202 (New), [F] 907.1.4 (New)

Proponents: Maria Marks, Siemens, Siemens (maria.marks@siemens.com); Richard Roberts, Honeywell Building Automation, Honeywell Building Automatation (richard.roberts@systemsensor.com); Jason Webb, Potter Electric Signal, Automatic Fire Alarm Association Codes & Standards Committee (jasonw@pottersignal.com); Scott Lang, Honeywell, Honeywell (scott.lang@honeywell.com)

2024 International Fire Code

Add new definition as follows:

REMOTE SYSTEM ACCESS

. A mechanism for owners, facility managers, fire code officials, and installers to perform remote inspections, testing and system updates. Devices used to access a fire alarm or signaling system remotely included but not limited to laptop computers, cellular handheld devices, cloud-based systems, applications.

Add new text as follows:

907.1.4 Remote System Access. Accessing a fire alarm or signaling system using remote system access for testing, maintenance, diagnostics, software updates and reacceptance testing of software changes shall be in accordance with NFPA 72.

2024 International Building Code

Add new definition as follows:

[F] REMOTE SYSTEM ACCESS. A mechanism for owners, facility managers, fire code officials, and installers to perform remote inspections, testing and system updates. Devices used to access a fire alarm or signaling system remotely included but not limited to laptop computers, cellular handheld devices, cloud-based systems, applications.

Add new text as follows:

[F] 907.1.4 Remote System Access. Accessing a fire alarm or signaling system using remote system access for testing, maintenance, diagnostics, software updates and reacceptance testing of software changes shall be in accordance with NFPA 72.

Reason: This proposal seeks to provide guidance to designers, engineers, installers, users, and fire code officials for applications where remote access may be utilized. These locations may include areas where access to test devices is difficult to reach, or access to systems is restricted. Additionally, by using remote access, a user can verify system status securely and ensure the system is operational. Troubleshooting during maintenance can be streamlined to minimize downtime.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is a feature that is already incorporated into Fire Alarm Control Units (FACU).

F127-24

F128-24

IFC: SECTION 202 (New), 907.1.4 (New); IBC: SECTION 202 (New), [F] 907.1.4 (New)

Proponents: Shane Clary, Bay Alarm Company, Automatic Fire Alarm Association (smclary@bayalarm.com)

2024 International Fire Code

Add new definition as follows:

REMOTE SYSTEM ACCESS. Remote system access is a mechanism for owners, facility managers, fire code officials, and installers to perform remote inspections, testing and system updates.

Add new text as follows:

907.1.4 Remote System Access. Remote system access of a fire alarm or signaling system using laptop computers, cellular handheld devices, cloud-based systems, applications, or software for testing, maintenance, diagnostics, software updates and reacceptance testing of software changes shall be permitted in accordance with NFPA 72.

2024 International Building Code

Add new definition as follows:

[F] REMOTE SYSTEM ACCESS. Remote system access is a mechanism for owners, facility managers, fire code officials, and installers to perform remote inspections, testing and system updates.

Add new text as follows:

[F] 907.1.4 Remote System Access. Remote system access of a fire alarm or signaling system using laptop computers, cellular handheld devices, cloud-based systems, applications, or software for testing, maintenance, diagnostics, software updates and reacceptance testing of software changes shall be permitted in accordance with NFPA 72.

Reason: This proposal seeks to provide guidance to designers, engineers, installers, users, and fire code officials for applications where remote access may be utilized. These locations may include areas where access to test devices is difficult to reach, or access to systems is restricted. Additionally, by using remote access, a user can verify system status securely and ensure the system is operational. Troubleshooting during maintenance can be streamlined to minimize downtime.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal will not increase or decrease the cost of construction. See also the proponent's reason statement.

F128-24

F129-24

IFC: 907.2.9.3; IBC: [F] 907.2.9.3

Proponents: Ronald Clements, Chesterfield County, VA, Chesterfield County, VA (clementsro@chesterfield.gov)

2024 International Fire Code

Revise as follows:

907.2.9.3 Group R-2 college and university buildings. An *automatic smoke detection system* that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R-2 occupancies operated by a college or university for student or staff housing in all of the following locations:

1. Common spaces outside of *dwelling units* and *sleeping units*.
2. Laundry rooms, mechanical equipment rooms and storage rooms.
3. All interior *corridors* serving *sleeping units* or *dwelling units*.

Exception: An *automatic smoke detection system* is not required in buildings that do not have interior *corridors* serving *sleeping units* or *dwelling units* and where each *sleeping unit* or *dwelling unit* either has a *means of egress* door opening directly to an exterior *exit access* that leads directly to an *exit* or a *means of egress* door opening directly to an *exit*.

Required smoke alarms in *dwelling units* and *sleeping units* in Group R-2 occupancies operated by a college or university for student or staff housing shall be interconnected with the *fire alarm system* in accordance with NFPA 72. <u>Activation of a smoke alarm shall initiate a visible and audible supervisory signal at a constantly attended location and report only as a supervisory signal and not as a fire alarm.</u>

2024 International Building Code

Revise as follows:

[F] 907.2.9.3 Group R-2 college and university buildings.
An *automatic smoke detection system* that activates the occupant notification system in accordance with Section 907.5 shall be installed in Group R-2 occupancies operated by a college or university for student or staff housing in all of the following locations:

1. Common spaces outside of *dwelling units* and *sleeping units*.
2. Laundry rooms, mechanical equipment rooms and storage rooms.
3. All interior *corridors* serving *sleeping units* or *dwelling units*.

Exception: An *automatic smoke detection system* is not required in *buildings* that do not have interior *corridors* serving *sleeping units* or *dwelling units* and where each *sleeping unit* or *dwelling unit* either has a *means of egress* door opening directly to an exterior *exit access* that leads directly to an *exit* or a *means of egress* door opening directly to an *exit*.

Required *smoke alarms* in *dwelling units* and *sleeping units* in Group R-2 occupancies operated by a college or university for student or staff housing shall be interconnected with the *fire alarm system* in accordance with NFPA 72. <u>Activation of a smoke alarm shall initiate a visible and audible supervisory signal at a constantly attended location and report only as a supervisory signal and not as a fire alarm.</u>

Reason: The requirement in 907.2.9.3 to interconnect unit smoke alarms with the fire alarm system has been a point of confusion. The base paragraph states that the smoke detection system that activates the occupant notification system shall be provided in the three locations listed in the number list after the colon. The provision provided in the last sentence below the exception does not state what kind of signal or function activation of the unit smoke alarm devices are to produce. The ICC IBC Commentary states:

"This interconnection is only for the purpose of making occupants within each unit aware of the fire alarm activation in the building. The intent is not to activate the building fire alarm system by smoke alarms in each unit."

The Commentary states the intent is not to activate the fire alarm system by the unit smoke alarms, which suggests a supervisory function similar to what is required in 907.2.11 #3. This makes sense as false alarms and fire alarm fatigue are common problems in college dormitories and providing a supervisory function would provide notification that a smoke alarm has activated but without activating the full building fire alarm notification system. This also is similar to the requirement for duct smoke detectors to produce a supervisory signal.

This code change clarifies it is a supervisory signal, consistent with the ICC Commentary explanation, and uses language copied from the duct smoke detector provision in section 907.3.1.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change adds language to make the code provision consistent with what the ICC Commentary states is the intent of the section.

F129-24

F130-24

IFC: 907.2.11, 907.2.11.1, 907.2.11.2; IBC: [F] 907.2.11, [F] 907.2.11.1, [F] 907.2.11.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

907.2.11 Single- and multiple-station smoke alarms.
Listed and *labeled* single- and multiple-station smoke alarms complying with UL 217 shall be installed in accordance with Sections 907.2.11.1 through 907.2.11.7, NFPA 72 and the manufacturer's instructions.

907.2.11.1 Group R-1. Single- or multiple-station smoke alarms shall be installed in all of the following locations in Group R-1:

1. In each room used for sleeping purposes ~~areas~~.
2. In every room in the path of the *means of egress* from the sleeping area to the door leading from the *sleeping unit*.
3. In each story within the *sleeping unit*, including *basements*. For *sleeping units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. In the sleeping loft or within the room to which a sleeping loft is open, in the immediate vicinity of the sleeping loft.

907.2.11.2 Groups R-2, R-3, R-4 and I-1.
Single- or multiple-station smoke alarms shall be installed and maintained in Groups R-2, R-3, R-4 and I-1 regardless of *occupant load* at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of the bedrooms.
2. In each room used for sleeping purposes.
3. In each story within a *dwelling unit*, including *basements* but not including crawl spaces and uninhabitable attics. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a smoke alarm installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full story below the upper level.
4. In the sleeping loft or within the room to which a sleeping loft is open, in the immediate vicinity of the sleeping loft.

2024 International Building Code

Revise as follows:

[F] 907.2.11 Single- and multiple-station smoke alarms.
Listed and *labelled* *single-* and *multiple-station smoke alarms* complying with UL 217 shall be installed in accordance with Sections 907.2.11.1 through 907.2.11.7 , NFPA 72 and the manufacturer's instructions.

[F] 907.2.11.1 Group R-1.
Single- or *multiple-station smoke alarms* shall be installed in all of the following locations in Group R-1:

1. In each room used for sleeping purposes ~~areas~~.
2. In every room in the path of the *means of egress* from the sleeping area to the door leading from the *sleeping unit*.
3. In each *story* within the *sleeping unit*, including *basements*. For *sleeping units* with split levels and without an intervening door between the adjacent levels, a *smoke alarm* installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.
4. In the sleeping loft or within the room to which a sleeping loft is open, in the immediate vicinity of the sleeping loft.

[F] 907.2.11.2 Groups R-2, R-3, R-4 and I-1.

Single- or *multiple-station smoke alarms* shall be installed and maintained in Groups R-2, R-3, R-4 and I-1 regardless of *occupant load* at all of the following locations:

1. On the ceiling or wall outside of each separate sleeping area in the immediate vicinity of bedrooms.
2. In each room used for sleeping purposes.
3. In each *story* within a *dwelling unit*, including *basements* but not including crawl spaces and uninhabitable *attics*. In *dwellings* or *dwelling units* with split levels and without an intervening door between the adjacent levels, a *smoke alarm* installed on the upper level shall suffice for the adjacent lower level provided that the lower level is less than one full *story* below the upper level.
4. In the sleeping loft or within the room to which a sleeping loft is open, in the immediate vicinity of the sleeping loft.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Occupants utilizing a sleeping loft should be protected with a smoke alarm. Smoke alarms are required to be installed within in the sleeping loft or in the “immediate vicinity” of the sleeping loft as a compliance option.

This language correlates with requirements in the 2024 IRC as revised by RB153-22 (AM/AMPC 1, 2 & 3).

The loft requirement is not applicable to R-Occupancies or I-2 Occupancies regulated by the IBC/IFC, as that requirement in the IRC (Section R314.3 Location) is specific to design features for lofts in IRC regulated buildings.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Cost may be increased by the requirement to add one or more smoke alarms where sleeping lofts are provided. Cost estimate would not exceed $100 for the purchase of the new smoke alarm and installation.

Estimated Immediate Cost Impact Justification (methodology and variables):

This cost estimate is based on the average retail price of a smoke alarm.

F130-24

F131-24

IFC: 907.2.22; IBC: [F] 907.2.22

Proponents: William Cooper, Protection Engineers, LLC, FAA Fire Protection Engineering Code Team (wacooper@protengineers.com); David Clark, Protection Engineers, LLC, FAA Fire Protection Engineering Code Team (dwclark@protengineers.com)

2024 International Fire Code

Revise as follows:

907.2.22 Airport traffic control towers.
An *automatic smoke detection system* that activates the occupant notification system in accordance with Section 907.5 shall be provided in airport control towers in accordance with Sections 907.2.22.1 and 907.2.22.2.

> **Exception:** Notification ~~Audible~~ appliances shall be provided and located so as not ~~be installed within the control tower cab~~ to inhibit the conduct of airport traffic control operations.

2024 International Building Code

Revise as follows:

[F] 907.2.22 Airport traffic control towers.
An *automatic smoke detection system* that activates the occupant notification system in accordance with Section 907.5 shall be provided in airport control towers in accordance with Sections 907.2.22.1 and 907.2.22.2.

> **Exception:** Notification ~~Audible~~ appliances shall be provided and located so as not ~~be installed within the control tower cab~~ to inhibit the conduct of airport traffic control operations.

Reason: The physical configuration of airport traffic control tower observation levels is variable as related to its separation from adjacent spaces. The existing language prescribes a solution which does not fully address the following:

- Alarm notification sound bleed from adjacent spaces which may disrupt critical air traffic control operations and endanger the safety of the flying public.
- Use of xenon strobes on the observation level which may impact night vision of air traffic controllers and endanger the safety of the flying public.

The proposed language cues the designer to consider alarm notification impact to critical air traffic control operations and provides greater latitude to leverage various solutions and options of the referenced other sections of Chapter 907 and NFPA 72 (referenced by IBC 907) to provide adequate alarm notification on the observation levels.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal should not substantively alter the cost of fire alarm installations in this facility type because notification applications will be required but the type of device selected by the designer may be different or may be placed differently to limit impact to critical air traffic control operations.

F131-24

F132-24

IFC: 907.2.22, 907.2.22.1, 907.2.22.2; IBC: [F] 907.2.22, [F] 907.2.22.1, [F] 907.2.22.2

Proponents: William Cooper, Protection Engineers, LLC, FAA Fire Protection Engineering Code Team (wacooper@protengineers.com); David Clark, Protection Engineers, LLC, FAA Fire Protection Engineering Code Team (dwclark@protengineers.com)

2024 International Fire Code

Revise as follows:

907.2.22 Airport traffic control towers.
All airport traffic control towers shall be provided with a~~A~~n *automatic smoke detection system* that activates the occupant notification system in accordance with Section 907.5 and shall be provided ~~in airport control towers in accordance with Sections 907.2.22.1 and 907.2.22.2.~~with smoke detectors in all of the following locations:

1. Airport traffic control cab.
2. Electrical, mechanical, terminal radar, and electronic equipment rooms.
3. Airport terminal radar and electronics rooms.
4. All *occupiable spaces* including office and other business use spaces, lounges for employees, and sanitary facilities.
5. *Means of egress.*
6. Utility spaces, storage, and shafts where permitted by other applicable standards.

Exception: Audible appliances shall not be installed within the control tower cab.

Delete without substitution:

~~**907.2.22.1 Airport traffic control towers with multiple exits and automatic sprinklers.**~~
~~Airport traffic control towers with multiple *exits* and equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided with smoke detectors in all of the following locations:~~

1. ~~Airport traffic control cab.~~
2. ~~Electrical and mechanical equipment rooms.~~
3. ~~Airport terminal radar and electronics rooms.~~
4. ~~Outside each opening into *interior exit stairways* .~~
5. ~~Along the single *means of egress* permitted from observation levels.~~
6. ~~Outside each opening into the single *means of egress* permitted from observation levels.~~

~~**907.2.22.2 Other airport traffic control towers.** Airport traffic control towers with a single *exit* or where sprinklers are not installed throughout shall be provided with smoke detectors in all of the following locations:~~

1. ~~Airport traffic control cab.~~
2. ~~Electrical and mechanical equipment rooms.~~
3. ~~Airport terminal radar and electronics rooms.~~
4. ~~Office spaces incidental to the tower operation.~~
5. ~~Lounges for employees, including sanitary facilities.~~
6. ~~*Means of egress.*~~
7. ~~Utility shafts where *access* to smoke detectors can be provided.~~

2024 International Building Code

Revise as follows:

[F] 907.2.22 Airport traffic control towers. All airport traffic control towers shall be provided with a~~A~~n *automatic smoke detection system* that activates the occupant notification system in accordance with Section 907.5 and shall be provided ~~in airport control towers in accordance with Sections 907.2.22.1 and 907.2.22.2.~~with smoke detectors in all of the following locations:

1. Airport traffic control cab.
2. Electrical, mechanical, terminal radar, and electronic equipment rooms.
3. Airport terminal radar and electronics rooms.
4. All *occupiable spaces* including office and other business use spaces, lounges for employees, and sanitary facilities.
5. *Means of egress.*
6. Utility spaces, storage, and shafts where permitted by other applicable standards.

Exception: Audible appliances shall not be installed within the control tower cab.

Delete without substitution:

~~**[F] 907.2.22.1 Airport traffic control towers with multiple exits and automatic sprinklers.**~~
~~Airport traffic control towers with multiple *exits* and equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided with *smoke detectors* in all of the following locations:~~

1. ~~Airport traffic control cab.~~
2. ~~Electrical and mechanical equipment rooms.~~
3. ~~Airport terminal radar and electronics rooms.~~
4. ~~Outside each opening into *interior exit stairways.*~~
5. ~~Along the single *means of egress* permitted from observation levels.~~
6. ~~Outside each opening into the single *means of egress* permitted from observation levels.~~

~~**[F] 907.2.22.2 Other airport traffic control towers.**~~
~~Airport traffic control towers with a single exit or where sprinklers are not installed throughout shall be provided with *smoke detectors* in all of the following locations:~~

1. ~~Airport traffic control cab.~~
2. ~~Electrical and mechanical equipment rooms.~~
3. ~~Airport terminal radar and electronics rooms.~~
4. ~~Office spaces incidental to the tower operation.~~
5. ~~Lounges for employees, including sanitary *facilities.*~~
6. ~~*Means of egress.*~~
7. ~~Utility *shafts* where access to *smoke detectors* can be provided.~~

Reason: Operation of airport traffic control towers includes special air traffic and operational contingency planning and evolutions to assure, in the event of a fire emergency, air traffic is transferred in an orderly and safe manner to another control facility. Such evolutions dictate extended pre-mobilization times for the occupants of the tower cab to prepare for egress, when compared to a typical business occupancy. The intent of this change is to ensure sufficient smoke detection is provided throughout the airport traffic control tower to achieve early warning of a fire event and initiate the air traffic controllers' orderly transfer of traffic, prior to their safe and timely evacuation.

The proposal alters the requirement to provide smoke detection in all usable and occupied spaces in all airport traffic control tower regardless of the sprinkler protection or egress configuration provided. The smoke detection required by the proposal is consistent with the language in the current IBC/ IFC Section 907.2.21.2 with several revisions to align with current standards and technologies, as follows:

(1) Smoke detection required by the current language for offices, employee lounges and sanitary facilities was expanded by using these areas as typical examples of business use spaces in airport traffic control towers, and requiring smoke detection for all *occupiable spaces* as defined by the IBC.

(2) The term "incidental to tower operation," associated with offices in the current code language was deleted as unnecessary to ensure any office in an airport traffic control tower will receive smoke detection.

(3) The term in the current code language "where smoke detection can be provided" as related to shafts is ambiguous and not needed with the advent of small ASSD systems which may be used for elevator shafts and addressed in ASME A17.1 as referenced by the IBC.

(4) The proposal also states shaft detection "where permitted by other standards" recognizes and defers to the specific prohibition for detection in certain elevator shafts by the IBC referenced NFPA 72.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal identifying the requirements of smoke detection reflects the Federal Aviation Administration practice and it's incorporation will harmonize the ICC smoke detection mandates and federal practice.

F132-24

F133-24

IFC: 907.3; IBC: [F] 907.3

Proponents: William Koffel, Koffel Associates, Inc., Semiconductor Industry Association (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

907.3 Fire safety functions.
Automatic fire detectors utilized for the purpose of performing fire safety functions shall be connected to the building's fire alarm control unit where a *fire alarm system* is required by Section 907.2. Detectors shall, upon actuation, perform the intended function and activate the alarm notification appliances or activate a visible and audible supervisory signal at a constantly attended location. In buildings not equipped with a *fire alarm system*, the automatic fire detector shall be powered by normal electrical service and, upon actuation, perform the intended function. The detectors shall be located in accordance with NFPA 72.

<u>**Exception:** In a Group H-5 occupancy, automatic shutdown of the air distribution system shall not be required where an automatic smoke detection system, with remote indication and manual shutdown capability at the emergency control station, is provided.</u>

2024 International Building Code

Revise as follows:

[F] 907.3 Fire safety functions.
Automatic fire detectors utilized for the purpose of performing *fire safety functions* shall be connected to the *building*'s *fire alarm control unit* where a *fire alarm system* is required by Section 907.2. Detectors shall, upon actuation, perform the intended function and activate the *alarm notification appliances* or activate a visible and audible *supervisory signal* at a *constantly attended location*. In *buildings* not equipped with a *fire alarm system*, the *automatic fire detector* shall be powered by normal electrical service and, upon actuation, perform the intended function. The detectors shall be located in accordance with NFPA 72.

<u>**Exception:** In a Group H-5 occupancy, automatic shutdown of the air distribution system shall not be required where an automatic smoke detection system, with remote indication and manual shutdown capability at the emergency control station, is provided.</u>

Reason: The 2024 Edition of the IBC allows an increased travel distance in Group H-5 occupancies based upon computer fire modeling. One of the assumptions in the modeling, and a criteria to increase the travel distance, is that the ventilation system remains operational. The proposal provides the correlation language to allow the HVAC system to continue to operate but a requirement to provide annunciation and manual shutdown capability at the emergency control station has been added. Related proposals have been submitted to Chapter 10 of the IBC and Chapter 6 of the IMC.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal correlates with 2024 changes and a proposed change in Chapter 10 that is based upon the ventilation system continuing to operate.

F133-24

F134-24

IFC: 907.5.2.1, 907.5.2.2; IBC: [F] 907.5.2.1, [F] 907.5.2.2

Proponents: Shane Clary, Bay Alarm Company, Automatic Fire Alarm Association (smclary@bayalarm.com); Maria Marks, Siemens, Siemens (maria.marks@siemens.com); Richard Roberts, Honeywell Building Automation, Honeywell Building Automatation (richard.roberts@systemsensor.com); Jason Webb, Potter Electric Signal, Automatic Fire Alarm Association Codes & Standards Committee (jasonw@pottersignal.com); Scott Lang, Honeywell, Honeywell (scott.lang@honeywell.com)

2024 International Fire Code

Revise as follows:

907.5.2.1 Audible alarms.
Audible alarm notification appliances shall be provided and emit a distinctive soundin accordance with NFPA 72 that is not to be used for any purpose other than that of a fire alarm. Where a roof level or portion thereof is used as an occupiable roof in accordance with 503.1.4 of the *International Building Code*, audible alarm notification appliances shall be provided.

Exceptions:

1. Audible alarm notification appliances are not required in critical care areas of Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
2. A visible alarm notification appliance installed in a nurses' control station or other continuously attended staff location in a Group I-2, Condition 2 suite shall be an acceptable alternative to the installation of audible alarm notification appliances throughout a suite or unit in Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
3. Where provided, audible notification appliances located in each enclosed occupant evacuation elevator lobby in accordance with Section 3008.9.1 of the International Building Code shall be connected to a separate notification zone for manual paging only.

907.5.2.2 Emergency voice/alarm communication systems.
Emergency voice/alarm communication systems required by this code shall be designed and installed in accordance with NFPA 72. Where a roof level or portion thereof is used as an occupiable roof in accordance with 503.1.4 of the *International Building Code*, audible alarm notification appliances shall be provided.
The operation of any automatic fire detector, sprinkler waterflow device or manual fire alarm box shall automatically sound an alert tone followed by voice instructions giving *approved* information and directions for a general or staged evacuation in accordance with the building's fire safety and evacuation plans required by Section 404. In high-rise buildings, the system shall operate on at least the alarming floor, the floor above and the floor below. Speakers shall be provided throughout the building by paging zones. At a minimum, paging zones shall be provided as follows:

1. Elevator groups.
2. *Interior exit stairways*.
3. Each floor.
4. *Areas of refuge* as defined in Chapter 2.

Exception: In Group I-1 and I-2 occupancies, the alarm shall sound in a constantly attended area and a general occupant notification shall be broadcast over the overhead page.

2024 International Building Code

Revise as follows:

[F] 907.5.2.1 Audible alarms. *Audible alarm notification appliances* shall be provided and emit a distinctive soundin accordance with NFPA 72 that is not to be used for any purpose other than that of a fire alarm. Where a roof level or portion thereof is used as an occupiable roof in accordance with 503.1.4, audible alarm notification appliances shall be provided.

Exceptions:

1. *Audible alarm notification appliances* are not required in critical care areas of Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
2. A *visible alarm notification appliance* installed in a nurses' control station or other continuously attended staff location in a Group I-2, Condition 2 suite shall be an acceptable alternative to the installation of *audible alarm notification appliances* throughout a suite or unit in Group I-2, Condition 2 occupancies that are in compliance with Section 907.2.6, Exception 2.
3. Where provided, audible notification appliances located in each enclosed occupant evacuation elevator lobby in accordance with Section 3008.9.1 shall be connected to a separate *notification zone* for manual paging only.

[F] 907.5.2.2 Emergency voice/alarm communication systems. Emergency voice/alarm communication systems required by this code shall be designed and installed in accordance with NFPA 72. Where a roof level or portion thereof is used as an occupiable roof in accordance with 503.1.4, audible alarm notification appliances shall be provided. The operation of any *automatic fire detector*, sprinkler waterflow device or *manual fire alarm box* shall automatically sound an alert tone followed by voice instructions giving *approved* information and directions for a general or staged evacuation in accordance with the *building*'s fire safety and evacuation plans required by Section 404 of the International Fire Code. In *high-rise buildings*, the system shall operate on at least the alarming floor, the floor above and the floor below. Speakers shall be provided throughout the *building* by paging zones. At a minimum, paging zones shall be provided as follows:

1. *Elevator groups*.
2. *Interior exit stairways.*
3. Each floor.
4. *Areas of refuge* as defined in Chapter 2.

Exception: In Group I-1 and I-2 occupancies, the alarm shall sound in a constantly attended area and a general occupant notification shall be broadcast over the overhead page.

Reason: This proposal seeks to add clarity to section 907.5.2.1 and 907.5.2.2 for a fire alarm system to provide audible occupant notification in the areas of occupied roofs and provides a pointer to 503.1.4 of the International Building Code relating to occupiable roofs.

This proposal is not requiring visual notification (strobes) in areas of occupied roofs because outdoor strobes are listed to UL 1638 and they are designed for "private mode" usage only. UL 1638 has no provision for outdoor public mode certification. The reason that strobes are only listed for private mode is that the environment outdoors is not controlled in terms of illumination level. It is not possible to design a device that would be bright enough to alert individuals when the ambient light level is 50,000 lux. In addition, NFPA 72 assumes that strobes will reflect off other surfaces indoors to help alert occupants; this is not possible outdoors. Finally, NFPA 72 has no requirements or provisions for public mode alerting outdoors for the reasons outlined above. The annex explains this in A.18.5.9.9, which says "*The application of visual notification appliances in outdoor areas has not been tested and is not addressed in this Code. Visual notification appliances that are mounted outdoors should be listed for outdoor use (under UL 1638, for example) and should be located for direct viewing because reflected light will usually be greatly reduced*."

Cost Impact: Increase

Estimated Immediate Cost Impact:

There would be an additional notification appliance circuit or circuits, power for said circuits and the notification appliances. There would be the labor for the work. The cost would be less than 1% of the total fire alarm system cost for the building. Labor cost would vary based on the geographic location of the project.

Estimated Immediate Cost Impact Justification (methodology and variables):

This is a percentage based estimate based off of the total cost of the fire alarm and signaling system.

F134-24

F135-24

IFC: SECTION 202 (New), 907.5.2.1.3 (New); IBC: SECTION 202 (New), [F] 907.5.2.1.3 (New)

Proponents: Maria Marks, Siemens, Siemens (maria.marks@siemens.com); Richard Roberts, Honeywell Building Automation, Honeywell Building Automatation (richard.roberts@systemsensor.com); Jason Webb, Potter Electric Signal, Automatic Fire Alarm Association Codes & Standards Committee (jasonw@pottersignal.com); Scott Lang, Honeywell, Honeywell (scott.lang@honeywell.com)

2024 International Fire Code

Add new definition as follows:

RESTRICTED AUDIBLE MODE OPERATION (RAMO) NOTIFICATION.
Restricted audible mode operation (RAMO) is to be used for areas where loud sounds might be detrimental to typical occupants of the notification zones. This could be include early education classrooms or facilities occupied by people with autism spectrum disorder, other neurodiversity's, or other medical conditions that might include sensitivity to noise, light, or other stimuli.

Add new text as follows:

907.5.2.1.3 Restricted Audible Mode Operation (RAMO) Notification . In areas where typical occupants of a notification zone have medical conditions which cause sensitivity to noise, light, or other stimuli. RAMO notification in accordance with NFPA 72 shall be permitted to reduce the sound pressure level within a notification zone below the requirements specified in 907.5.2.1.1 and 907.5.2.1.2.

2024 International Building Code

Add new definition as follows:

[F] RESTRICTED AUDIBLE MODE OPERATION (RAMO) NOTIFICATION. Restricted audible mode operation (RAMO) is to be used for areas where loud sounds might be detrimental to typical occupants of the notification zones. This could be include early education classrooms or facilities occupied by people with autism spectrum disorder, other neurodiversity's, or other medical conditions that might include sensitivity to noise, light, or other stimuli.

Add new text as follows:

[F] 907.5.2.1.3 Restricted Audible Mode Operation (RAMO) Notification. In areas where typical occupants of a notification zone have medical conditions which cause sensitivity to noise, light, or other stimuli. RAMO notification in accordance with NFPA 72 shall be permitted to reduce the sound pressure level within a notification zone below the requirements specified in 907.5.2.1.1 and 907.5.2.1.2.

Reason: This proposal seeks to provide guidance to designers, engineers, users, and fire code officials for applications where the audible sound pressure level within a notification zone needs to be controlled to avoid causing undue health issues for certain occupants who are sensitive to loud sounds. There are instances where the very loud audible notification appliances frighten or cause undo panic of occupants, which can impede the orderly evacuation of the protected space.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is just an adjustment to the sound pressure level of the system. No additional notification appliances, circuits or labor would be required.

F135-24

F136-24

IFC: SECTION 202 (New), 907.5.2.1.3 (New); IBC: SECTION 202 (New), [F] 907.5.2.1.3 (New)

Proponents: Shane Clary, Bay Alarm Company, Automatic Fire Alarm Association (smclary@bayalarm.com)

2024 International Fire Code

Add new definition as follows:

RESTRICTED AUDIBLE MODE OPERATION (RAMO). Restricted audible mode operation (RAMO) is to be used for areas where loud sounds might be detrimental to typical occupants of the notification zones. This could be include early education classrooms or facilities that service people with autism spectrum disorder, other neurodiversity's, or other conditions that might include sensitivity to noise, light, or other stimuli.

Add new text as follows:

907.5.2.1.3 Restricted audible mode operation (RAMO) notification. Where required by relevant laws, ordinances, rules, or regulations as determined by the fire code official the sound pressure level within a notification zone shall be permitted to be reduced below the requirements specified in 907.5.2.1.1 and 907.5.2.1.2 in restricted audible mode operation, and in accordance with NFPA 72.

2024 International Building Code

Add new definition as follows:

[F] RESTRICTED AUDIBLE MODE OPERATION (RAMO). Restricted audible mode operation (RAMO) is to be used for areas where loud sounds might be detrimental to typical occupants of the notification zones. This could be include early education classrooms or facilities that service people with autism spectrum disorder, other neurodiversity's, or other conditions that might include sensitivity to noise, light, or other stimuli.

Add new text as follows:

[F] 907.5.2.1.3 Restricted audible mode operation (RAMO) notification. Where required by relevant laws, ordinances, rules, or regulations as determined by the fire code official the sound pressure level within a notification zone shall be permitted to be reduced below the requirements specified in 907.5.2.1.1 and 907.5.2.1.2 in restricted audible mode operation, and in accordance with NFPA 72.

Reason: This proposal seeks to provide guidance to designers, engineers, users, and fire code officials for applications where the audible sound pressure level within a notification zone needs to be controlled to avoid causing undue health issues for certain occupants who are sensitive to loud sounds. There are instances where the very loud audible notification appliances frighten or cause undo panic of occupants, which can impede the orderly evacuation of the protected space.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal will not increase or decrease the cost of construction. See also the proponent's reason statement.

F136-24

F137-24

IFC: 907.5.2.3.1; IBC: [F] 907.5.2.3.1

Proponents: Crystal Sujeski, CAL FIRE/OSFM, CAL FIRE/Office of the State Fire Marshal (crystal.sujeski@fire.ca.gov)

2024 International Fire Code

Revise as follows:

907.5.2.3.1 Public use areas and common use areas. Visible alarm notification appliances shall be installed in rooms that are normally occupied and used by two or more persons, as well as ~~provided~~ in *public use areas* and *common use areas*. Thisincludes, but is not limited to, the following spaces:

1. Band rooms.
2. Classrooms.
3. Corridors.
4. Gymnasiums.
5. Lobbies.
6. Meeting and conference rooms.
7. Multipurpose rooms.
8. Music practice rooms.
9. Occupational shops.
10. Occupied rooms where ambient noise impairs hearing of the fire alarm.
11. Sanitary facilities including restrooms, bathrooms, and shower rooms.
12. Shared office rooms used by two or more persons.
13. Huddle room, mother's room, phone room, quite-room, wellness-room, etc.
14. Storage room/area.
15. Exam rooms in medical office buildings.

Exception: Where employee work areas have audible alarm coverage, the notification appliance circuits serving the employee work areas shall be initially designed with not less than 20-percent spare capacity to account for the potential of adding visible notification appliances in the future to accommodate hearing-impaired employee(s).

2024 International Building Code

Revise as follows:

[F] 907.5.2.3.1 Public use areas and common use areas. Visible alarm notification appliances shall be installed in rooms that are normally occupied and used by two or more persons, as well as ~~provided~~ in *public use areas* and *common use areas*. Thisincludes, but is not limited to, the following spaces:

1. Band rooms.
2. Classrooms.
3. Corridors.
4. Gymnasiums.
5. Lobbies.
6. Meeting and conference rooms.

7. Multipurpose rooms.
8. Music practice rooms.
9. Occupational shops.
10. Occupied rooms where ambient noise impairs hearing of the fire alarm.
11. Sanitary facilities including restrooms, bathrooms, and shower rooms.
12. Shared office rooms used by two or more persons.
13. Huddle room, mother's room, phone room, quite-room, wellness-room, etc.
14. Storage room/area.
15. Exam rooms in medical office buildings.

Exception: Where *employee work areas* have audible alarm coverage, the notification appliance circuits serving the *employee work areas* shall be initially designed with not less than 20-percent spare capacity to account for the potential of adding visible notification appliances in the future to accommodate hearing-impaired employee(s).

Reason: The proposal adds specific examples where strobes shall be provided.

Conference rooms are specifically intended for meetings purposes. They are intended for common-use by the occupants/employees of the building and/or for public-use by the public, regardless their size. However, since Conference and Huddle rooms are not specifically defined in IBC/IFC as meeting rooms, this proposed change clarifies their use and purpose as rooms intended for meetings.

Shared-office rooms are common-use areas used by the occupants/employees of the building, they are shared by two or more persons, and they are enclosed rooms which are different than open/ non-enclosed shared office-space. This specific item also clarifies that a “Private-Office” used by ONE person only, who is a building occupant/employee, will not require a strobe.

The term “Normally-Occupied” is used in CBC and in NFPA 72. These rooms are not specifically defined by CBC or CFC. They could vary in size, (be very small or very large), they could have different furniture layouts, etc. and they are normally occupied and used by either the building’s occupants/employees and/or by the general public. Therefore, strobe protection is required in these undefined rooms regardless their size and configuration if they are classified and intended by the owner/architect to be used by two or more persons.

The term “Normally-Occupied” is used in CBC and in NFPA 72. Storage rooms could be normally used by the occupants/employees of the building and/or by the general public. If these rooms are normally not-occupied such as a private storage room or closet, they are not required to have strobes in them. However, if they are common or public use areas which are normally occupied and used by the building occupants/employees and/or by the public, they should have strobe protection in them.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

See reason statement.

F137-24

F138-24

IFC: 907.6.6; IBC: [F] 907.6.6

Proponents: Jeffrey Shapiro, International Code Consultants, Lake Travis Fire Rescue (jshapiro@ltfr.org)

2024 International Fire Code

Revise as follows:

907.6.6 Monitoring.
Fire alarm systems required by this code ~~chapter~~ or by the *International Building Code* shall be monitored by an *approved* supervising station in accordance with NFPA 72.

Exception: Monitoring by a supervising station is not required for:

1. Single- and multiple-station smoke alarms required by Section 907.2.11.
2. Smoke detectors in Group I-3 occupancies.
3. *Automatic sprinkler systems* in one- and two-family *dwellings*.

2024 International Building Code

Revise as follows:

[F] 907.6.6 Monitoring.
Fire alarm systems required by this code ~~chapter~~ or by the *International Fire Code* shall be monitored by an *approved supervising station* in accordance with NFPA 72.

Exception: Monitoring by a *supervising station* is not required for:

1. *Single-* and *multiple-station smoke alarms* required by Section 907.2.11.
2. *Smoke detectors* in Group I-3 occupancies.
3. *Automatic sprinkler systems* in one- and two-family *dwellings*.

Reason: This proposal corrects an apparent oversight in coordinating IFC Chapters 9 and 11 and the IBC and IFC. Given that the IFC requires monitoring for systems required by the IBC (in its entirety), and that the IBC requires monitoring for systems required by the IFC (in its entirety), the "this chapter" text is moot. I came across this issue when working on IFC Chapter 11. Technically, the IFC alone would not require fire alarm systems called for by Chapter 11 to be monitored since IFC Section 907.6.6 only requires monitoring of systems "required by this chapter" (Chapter 9, not Chapter 11). However, because IBC Section 907.6.6 requires any IFC required fire alarm system to be monitored, an IFC Chapter 11 required fire alarm system still ends up needing to be monitored. Accordingly, changing 907.6.6 to "required by this code" allows either code to stand on its own and eliminates the misleading "required by this chapter" text.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Clarifies existing code text.

F138-24

F139-24

IFC: 909.12.2; IBC: [F] 909.12.2; IMC®: [F] 512.12.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

909.12.2 Wiring.
In addition to meeting requirements of NFPA 70, all wiring, regardless of voltage used for circuits supplying detection and control functions shall be protected using one of the following methods:~~, shall be fully~~

1. Fully enclosed within continuous raceways.
2. Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196 and shall have a fire-resistance rating of not less than 1 hour.
3. Electrical circuit protective systems shall have a fire-resistance rating of not less than 1 hour. Electrical circuit protective systems shall be installed in accordance with their listing requirements.
4. Construction having a fire-resistance rating of not less than 1 hour.
5. The cable is encased in a minimum of 2 inches (51 mm) of concrete.

2024 International Building Code

Revise as follows:

[F] 909.12.2 Wiring.
In addition to meeting requirements of NFPA 70, all wiring, regardless of voltage used for circuits supplying detection and control functions shall be protected using one of the following methods: ~~shall be fully~~

1. Fully enclosed within continuous raceways.
2. Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196 and shall have a fire-resistance rating of not less than 1 hour.
3. Electrical circuit protective systems shall have a fire-resistance rating of not less than 1 hour. Electrical circuit protective systems shall be installed in accordance with their listing requirements.
4. Construction having a fire-resistance rating of not less than 1 hour.
5. The cable is encased in a minimum of 2 inches (51 mm) of concrete

2024 International Mechanical Code

Revise as follows:

[F] 512.12.2 Wiring. In addition to meeting the requirements of NFPA 70, all wiring, regardless of voltage used for circuits supplying detection and control functions shall be protected using one of the following methods:~~, shall be fully~~

1. Fully enclosed within continuous raceways.
2. Cables used for survivability of required critical circuits shall be listed in accordance with UL 2196 and shall have a fire-resistance rating of not less than 1 hour.
3. Electrical circuit protective systems shall have a fire-resistance rating of not less than 1 hour. Electrical circuit protective systems shall be installed in accordance with their listing requirements.

4. <u>Construction having a fire-resistance rating of not less than 1 hour.</u>
5. <u>The cable is encased in a minimum of 2 inches (51 mm) of concrete.</u>

Reason: The purpose of this proposal is to provide additional options for survivability protection of smoke control system circuits that are applied elsewhere in the code for critical circuits. The language added was from Section 913.2.2.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

This simply provides additional options for compliance beyond continuous raceways. Will likely not change construction cost or possibly reduce.

F139-24

F140-24

IFC: 910.2, TABLE 3206.2; IBC: [F] 910.2

Proponents: Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org); Jeffrey H. Greenwald, Controlled Environment Building Association, Controlled Environment Building Association (jgreenwald@gcca.org)

2024 International Fire Code

Revise as follows:

910.2 Where required.
Smoke and heat vents or a mechanical smoke removal system shall be installed as required by Sections 910.2.1 and 910.2.2.

Exceptions:

1. Refrigerated ~~Frozen~~ food warehouses used solely for storage of Class I, II, and III commodities where protected by an *approved automatic sprinkler system*.
2. Smoke and heat removal shall not be required in areas of Group S buildings equipped with early suppression fast-response (ESFR) sprinklers or control mode special application (CMSA) sprinklers with a response time index (RTI) of 50 (m x s) 1/2 or less that are listed to control a fire in stored commodities with 12 or fewer sprinklers.
3. ~~Smoke and heat removal shall not be required in areas of buildings equipped with control mode special application sprinklers with a response time index of 50(m × s)~~ $\cancel{^{1/2}}$ ~~or less that are *listed* to control a fire in stored commodities with 12 or fewer sprinklers.~~

TABLE 3206.2 GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE AREA[a] (square feet) (see Sections 3206.2 and 3206.3)	ALL STORAGE AREAS (see Sections 3206, 3207 and 3208)[b]				SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (see Section 3207.3)		
		Automatic fire-extinguishing system (see Section 3206.4)	Fire detection system (see Section 3206.5)	Fire department access doors (see Section 3206.7)	Smoke and heat removal (see Section 3206.8)	Maximum pile dimension[c] (feet)	Maximum permissible storage height[d] (feet)	Maximum pile volume (cubic feet)
I–IV	0–500	Not Required[a]	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
	501–2,500	Not Required[a]	Yes[g]	Not Required	Not Required	120	40	100,000
	2,501–12,000 Open to the public	Yes	Not Required	Not Required	Not Required	120	40	400,000
	2,501–12,000 Not open to the public (Option 1)	Yes	Not Required	Not Required	Not Required	120	40	400,000
	2,501–12,000 Not open to the public (Option 2)	Not Required[a]	Yes	Yes	Yes[h, i]	120	30[e]	200,000
	12,001–500,000	Yes	Not Required	Yes	Yes[h, i]	120	40	400,000
	Greater than 500,000[f]	Yes	Not Required	Yes	Yes[h, i]	120	40	400,000
High hazard	0–500	Not Required[a]	Not Required	Not Required	Not Required	60	Not Required	Not Required
	501–2,500 Open to the public	Yes	Not Required	Not Required	Not Required	60	30	75,000
	501–2,500 Not open to the public (Option 1)	Yes	Not Required	Not Required	Not Required	60	30	75,000
	501–2,500 Not open to the public (Option 2)	Not Required[a]	Yes[g]	Yes	Yes[h, i]	60	20	50,000
	2,501–300,000	Yes	Not Required	Yes	Yes[h, i]	60	30	75,000
	Greater than 300,000[f]	Yes	Not Required	Yes	Yes[h, i]	60	30	75,000

For SI: 1 foot = 304.8 mm, 1 cubic foot = 0.02832 m^3, 1 square foot = 0.0929 m^2.

a. Where automatic sprinklers are required for reasons other than those in Chapter 32, the portion of the sprinkler system protecting the high-piled storage area shall be designed and installed in accordance with Sections 3207 and 3208.

b. For aisles, see Section 3206.10.

c. Piles shall be separated by aisles complying with Section 3206.10.

d. For storage in excess of the height indicated, special fire protection shall be provided in accordance with Note f where required by the fire code official. See Chapters 51 and 57 for special limitations for aerosols and flammable and combustible liquids, respectively.

e. For storage exceeding 30 feet in height, Option 1 shall be used.

f. Special fire protection provisions including, but not limited to, fire protection of exposed steel columns; increased sprinkler density; additional in-rack sprinklers, without associated reductions in ceiling sprinkler density; or fire department hose connections shall be provided where required by the fire code official.

g. Not required where an automatic fire-extinguishing system is designed and installed to protect the high-piled storage area in accordance with Sections 3207 and 3208.

h. Not required where storage areas are protected by either early suppression fast response (ESFR) sprinkler systems or control mode special application sprinklers (CMSA) with a response time index of 50 (meters-seconds)$^{1/2}$ or less that are listed to control a fire in the stored commodities with 12 or fewer sprinklers, installed in accordance with Section 903.3.1.1~~NFPA 13~~.

i. Not required in refrigerated ~~frozen~~ food warehouses used solely for storage of Class I, II and III commodities where protected by an *approved* automatic sprinkler system.

2024 International Building Code

Revise as follows:

[F] 910.2 Where required.

Smoke and heat vents or a mechanical smoke removal system shall be installed as required by Sections 910.2.1 and 910.2.2.

Exceptions:

1. Refrigerated ~~Frozen~~ food warehouses used solely for storage of Class I, II, and III commodities where protected by an *approved automatic sprinkler system*.
2. Smoke and heat removal shall not be required in areas of Group S *buildings* equipped with early suppression fast-response (ESFR) sprinklers or control mode special application (CMSA) sprinklers with a response time index (RTI) of 50 (m x s) 1/2 or less that are listed to control a fire in stored commodities with 12 or fewer sprinklers. .
3. ~~Smoke and heat removal shall not be required in areas of *buildings* equipped with control mode special application sprinklers with a response time index of 50 (m × s)$^{1/2}$ or less that are *listed* to control a fire in stored commodities with 12 or fewer sprinklers.~~

Reason: This proposal updates the name of these frozen food facilities, an increase in commodity classification, and clarifying which sprinklers are acceptable for the exception.

There are many different types of cold storage, not just freezers. From individual units to entire dedicated facilities: refrigerated containers blast freezers and chillers, cold rooms, pharmaceutical grade cold storage, plant-attached cold storage, dedicated custom facilities and more. According to the Global Cold Chain Alliance (GCCA), the best term to use that replaces “frozen” is “refrigerated warehouse”, defined as, “A warehouse that provides refrigeration and temperature control for perishable products.”

In Exception 1, the limitation to only Class I and II commodities is inconsistent with other standards. Upon reviewing commodity classifications outlined in various standards (NFPA 13, FM Global and the International Fire Code), there are only minor differences in criteria between Class II and Class III commodities. FM Global actually has the same criteria for Class I-III commodities and further segregates Class IV with Cartoned Unexpanded Plastics. In the IFC, Tables 3203.9 (1) and 3203.9 (2), although used for mixed commodities, it helps to see that the IFC also puts Class III along with Class I and II in the mixed commodity tables. NFPA 13, Figures

20.4.3.3 (a) and 20.4.3.3 (b) are mixed commodity tables, just like the IFC has, and starts with Class III.

Add this IFC Table 3203.9 (1): https://www.cdpaccess.com/proposal/10040/29300/files/download/4149/

Adding Group S (Storage) to Exception 2 would apply to both S-1 and S-2 facilities, which could include the refrigerated food warehouses. If the Group-S building is sprinklered with ESFR and CMSA sprinklers, no smoke or heat vents are required. If the Group-S building is not sprinklered, (as an unlimited area building per IBC Section 507.3) then Section 910.2.1 or 910.2.2 would apply.NFPA 13 eliminated the exception exclusively for ESFR sprinklers in the upcoming 2025 edition of NFPA 13 and has applied the same criteria for all sprinklers protecting storage, i.e., CMDA, CMSA, and ESFR sprinklers. This change (Exception 2) would limit the exception to CMSA and ESFR, leaving CMDAs out. Below is the reason statement from the NFPA Discharge Technical Committee reason on (first revision) FR1266 -2022:

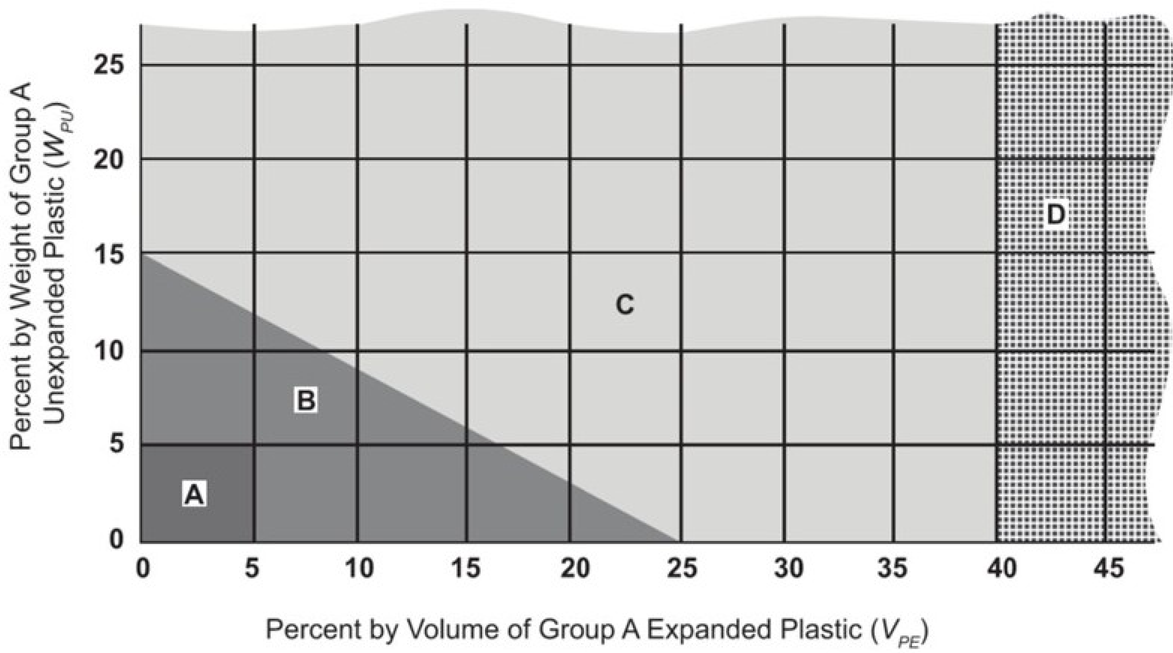
The presence of open roof vents is not considered in the sprinkler system design criteria in NFPA 13 and could detrimentally impact the operation of automatic sprinklers. This concern, while originally added to NFPA 13 for ESFR sprinklers, also exists for other types of automatic sprinklers and the requirements have been revised to include all types of sprinklers. Guidance has been added to the annex to caution again the use of manual roof vents prior to the control or suppression of the fire, which could also interfere with the performance of the automatic sprinkler system. Finally, in situations where automatic roof vents are provided and cannot be eliminated, requirements are provided to reasonably limit the detrimental impact of automatic roof vents on the performance of automatic sprinkler systems by limiting the potential for the roof vents to open automatically during a fire controlled by the sprinkler system.

Exception 3 is removed but is added to the exception 2, as is done in Footnote h in IFC Table 3206.2. There is no technical change by putting these criteria together. Footnote h and i have been updated to correlate with the proposed changes to Section 910.2.

CEBA reason: Experience with the installation of smoke ventilation systems in refrigerated warehouses shows that these systems do not perform as designed. The smoke ventilation systems act as a penetration of the thermal envelope, impacting the energy efficiency of the building. The systems also penetrate the vapor envelopes and thus become points of vapor drive into the buildings. In freezers, this leads to frost build-up. While operators will try to maintain the systems and break up the frost, it ultimately leads to the failure of the mechanisms. In cooler warehouses or in freezers where heat trace is used to mitigate frost build-up, the vapor will become condensation, leading to indoor rain that can compromise the safety of food stored in these warehouses. Finally, Ice build-up (from vapor leaks) leads to potential slip and fall accidents along with falling ice, etc.

Ultimately, the requirements for smoke ventilation in refrigerated warehouses, if met in new construction, become an ongoing maintenance issue, sacrificing energy efficiency and risking food safety for systems that will typically end up failing to perform as designed due to the unique factors on the environment in which they are installed.

FIGURE 3203.9(1)—EVALUATION OF CARTONED COMMODITIES CONTAINING GROUP A PLASTICS[a, b]



A = Class I, II or III commodity
B = Class IV commodity
C = High-hazard commodity (Group A Unexpanded)
D = High-hazard commodity (Group A Expanded)

Cost Impact: Decrease

Estimated Immediate Cost Impact:

Source: Actual estimates and RS Means

Eliminates a $2,500 - $3,500 smoke or heat vent every 180 ft. on center (for a 45ft. high warehouse), $0.08 – $0.11/sq ft savings.

This does not include labor, other materials, such as framing openings and flashing.

For a 1,000,000 sq ft warehouse, it saves from $80,000 to 110,000 in construction costs and also eliminates the cost of annual maintenance and operational tested every five years required by this code.

Estimated Immediate Cost Impact Justification (methodology and variables):

Analogous methodology using actual current cost estimates and data from RS Means to create a range of cost. This code already eliminates smoke and heat vents in buildings with automatic sprinkler systems, specifically using ESFR or CMSA sprinklers. This proposal adds another class (III) commodity in refrigerated warehousing.

F140-24

F141-24

IFC: 910.3.5; IBC: [F] 910.3.5

Proponents: Chase Browning, Chase A. Browning Consulting (chase.browning@cityofmedford.org)

2024 International Fire Code

Revise as follows:

910.3.5 ~~Fusible link temperature rating~~ Vent operation in areas protected with automatic sprinklers. Where vents are installed in areas provided with automatic fire sprinklers, ~~and~~ the automatic means of operation required by 910.3.4 shall be limited to one of the following methods:

1. ~~vents operate by fusible link, the fusbile~~ Fusible ~~link~~ links ~~shall~~ that have a minimum temperature rating of 360°F (182°C).
2. Fixed temperature heat detection that has a minimum temperature rating of 360°F (182°C).
3. Approved automatic means of operation which prevents vents from operating prior to sprinkler activation.

2024 International Building Code

Revise as follows:

[F] 910.3.5 ~~Fusible link temperature rating~~ Vent operation in areas protected with automatic sprinklers.
Where vents are installed in areas provided with automatic fire sprinklers, ~~and~~ the automatic means of operation required by 910.3.4 shall be limited to one of the following methods:

1. ~~vents operate by fusible link, the fusbile~~ Fusible ~~link~~ links ~~shall~~ that have a minimum temperature rating of 360°F (182°C).
2. Fixed temperature heat detection that has a minimum temperature rating of 360°F (182°C).
3. Approved automatic means of operation which prevents vents from operating prior to sprinkler activation.

Reason: There are smoke and heat vents available on the market that can utilize detection systems for automatic release, and release from smoke detection can be problematic in areas protected with automatic sprinklers, as there could be a delay in sprinkler activation if smoke detectors release the vents too early. This proposal is intended to build upon the 2021 revisions that address fusible automatic vent operations in areas protected with sprinklers by providing an automatic means beyond fusible links, and at the same time limiting the use of a detection system to fixed temperature heat detectors.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Utilizing automatic means beyond a conventional fusible link is permissive.

F141-24

F142-24

IFC: 910.4.3, AMCA (New) IBC: [F] 910.4.3, AMCA Chapter 35 (New)

Proponents: Amanda Hickman, The Hickman Group, Air Movement and Control Association International, Inc. (AMCA) (amanda@thehickmangroup.com)

2024 International Fire Code

Revise as follows:

910.4.3 System design criteria. The mechanical smoke removal system shall be sized to exhaust the building at a minimum rate of two air changes per hour based on the volume of the building or portion thereof without contents. The capacity of each exhaust fan shall not exceed 30,000 cubic feet per minute (14.2 m^3/s).<u>Exhaust fan performance shall be *listed* and *labeled* in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.</u>

Add new text as follows:

Add new standard(s) as follows:

<u>**ANSI/AMCA 210-ANSI/ASHRAE 51-16.** Laboratory Methods of Testing Fans for Aerodynamic Performance Rating</u>

2024 International Building Code

Revise as follows:

[F] 910.4.3 System design criteria. The mechanical smoke removal system shall be sized to exhaust the *building* at a minimum rate of two air changes per hour based on the volume of the *building* or portion thereof without contents. The capacity of each exhaust fan shall not exceed 30,000 cubic feet per minute (14.2 m^3/s).<u>Exhaust fan performance shall be *listed* and *labeled* in accordance with ANSI/AMCA 210-ANSI/ASHRAE 51.</u>

Add new standard(s) as follows:

AMCA

Air Movement and Control Association International
30 West University Drive
Arlington Heights, IL 60004

<u>ANSI/AMCA 210-ANSI/ASHRAE 51-16</u> <u>Laboratory Methods of Testing Fans for Aerodynamic Performance Rating</u>

Staff Analysis: The proposed referenced standard, ***Laboratory Methods of Testing Fans for Aerodynamic Performance Rating (ANSI/AMCA 210—<u>16</u>/ANSI/ASHRAE 51—<u>16)</u>***, is currently referenced in the ***IMC***.

Reason: This proposal provides the appropriate test standards to ensure that exhaust fans will meet the performance requirements of the mechanical smoke removal system design. Including listing and labeling requirements to the appropriate standards will not only ensure that the fans are tested to the appropriate standards, but also will facilitate easier code enforcement. This is critical for life-safety products that must function as designed to protect building occupants. This proposal is also consistent with the general requirements of section 301.7 of this code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Because listing and labeling to AMCA 210 is common practice, especially for life-safety fans and because the cost to list/certify a product is incurred by the manufacturer and divided across multiple projects, there is no cost increase associated with this proposal.

F142-24

F143-24

IFC: 911.1, 911.2, 911.3, 911.4, 911.5

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

911.1 General.
Explosion control in accordance with this section shall be provided in the following locations:

1. Where a structure, room or space is occupied for purposes involving explosion hazards as identified in Table 911.1.
2. Where quantities of hazardous materials specified in Table 911.1 exceed the maximum allowable quantities in Table 5003.1.1(1).

~~Such areas shall be provided with explosion (*deflagration*) venting, explosion (*deflagration*) prevention systems or *barricades* in accordance with this section and NFPA 68, NFPA 69 or NFPA 495 as applicable. *Deflagration* venting shall not be utilized as a means to protect buildings from *detonation* hazards.~~

Delete without substitution:

~~**911.2 Required deflagration venting.**~~
~~Areas that are required to be provided with *deflagration* venting shall comply with the following:~~

1. ~~Walls, ceilings and roofs exposing surrounding areas shall be designed to resist a minimum internal pressure of 100 pounds per square foot (psf) (4788 Pa). The minimum internal design pressure shall be not less than five times the maximum internal relief pressure specified in Item 5 of this section.~~
2. ~~*Deflagration* venting shall be provided only in *exterior walls* and roofs.~~

   ~~**Exception:** Where sufficient *exterior wall* and roof venting cannot be provided because of inadequate *exterior wall* or roof area, *deflagration* venting shall be allowed by specially designed shafts vented to the exterior of the building.~~

3. ~~*Deflagration* venting shall be designed to prevent unacceptable structural damage. Where relieving a *deflagration*, vent closures shall not produce projectiles of sufficient velocity and mass to cause life threatening injuries to the occupants or other persons on the property or adjacent *public ways*.~~
4. ~~The aggregate clear area of vents and venting devices shall be governed by the pressure resistance of the construction assemblies specified in Item 1 of this section and the maximum internal pressure allowed by Item 5 of this section.~~
5. ~~Vents shall be designed to withstand loads in accordance with the *International Building Code*. Vents shall consist of any one or any combination of the following to relieve at a maximum internal pressure of 20 pounds per square foot (958 Pa), but not less than the loads required by the *International Building Code*:~~
   - ~~5.1. *Exterior walls* designed to release outward.~~
   - ~~5.2. Hatch covers.~~
   - ~~5.3. Outward swinging doors.~~
   - ~~5.4. Roofs designed to uplift.~~
   - ~~5.5. Venting devices *listed* for the purpose.~~
6. ~~Vents designed to release from the *exterior walls* or roofs of the building when venting a *deflagration* shall discharge directly to the exterior of the building where an unoccupied space not less than 50 feet (15 240 mm) in width is provided between the *exterior walls* of the building and the *lot line*.~~

   ~~**Exception:** Vents complying with Item 7 of this section.~~

7. ~~Vents designed to remain attached to the building when venting a *deflagration* shall be so located that the discharge opening shall be not less than 10 feet (3048 mm) vertically from window openings and *exits* in the building and 20 feet (6096 mm) horizontally from *exits* in the building, from window openings and *exits* in adjacent buildings on the same lot and from the *lot line*.~~
8. ~~Discharge from vents shall not be into the interior of the building.~~

Revise as follows:

~~911.3~~ <u>911.2</u> Explosion prevention systems.
Explosion prevention systems shall be of an *approved* type and installed <u>and maintained</u> in accordance with the provisions of this code and NFPA 69.

~~911.4~~ <u>911.3</u> Deflagration venting.
Deflagration venting shall be of an *approved* type and installed <u>and maintained</u> in accordance with the provisions of this code and NFPA 68.

~~911.5~~ <u>911.4</u> Barricades.
Barricades shall be designed and installed in accordance with NFPA 495.

Reason: This proposal is to delete the limited prescriptive language that had been in the IFC specifying how deflagration venting should be designed and installed. The language existed prior to the reference to NFPA 68 Standard on Explosion Protection by Deflagration Venting was added to the IFC starting with the 2021 edition.

The existing language was simplistic, lacked proper guidance and because of of it's simplicity it can conflict with NFPA 68 provisions. By applying NFPA 68 Issues such as the degree of health hazard (health hazard rating) of the material involved is addressed, performance and well as prescriptive options are available and specific guidance on deflagration of Gas Mixtures and Mists, Dusts and Hybrid Mixtures, Gases ad Dusts in Pipes and Ducts Operating at or Near Atmospheric Pressure, is provided along with guidance on Deflagration Vents and Vent Closures.

Existing Sections 911.3 and 911.4 are modified to include "and maintained" because both documents contain extensive maintenance requirements and maintenance is not currently provided by the IFC.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

These revisions better correlate with the appropriate industry standard.

F143-24

F144-24

IFC: 508.1.6; IBC: [F] 911.1.6

Proponents: Steve Skalko, Stephen V. Skalko, P.E. & Associates LLC, self (svskalko@svskalko-pe.com)

2024 International Fire Code

Revise as follows:

508.1.6 Required features.
The *fire command center* shall comply with NFPA 72 and shall contain the following features:

1. The emergency voice/alarm communications system control unit, where required.
2. The fire department communications system.
3. Fire detection and alarm system annunciator.
4. Where elevators are provided, the ~~Annunciator~~ annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air distribution systems.
6. Where smoke control is provided, ~~The~~ the firefighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Where *interior exit stairways* are provided, ~~Controls~~ controls for unlocking *interior exit stairway* doors simultaneously.
8. Sprinkler valve and water-flow detector display panels.
9. Where emergency and standby power are provided, ~~Emergency~~ emergency and standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. Where fire pumps are provided, ~~Fire~~ fire pump status indicators.
12. Schematic building plans indicating the typical floor plan and detailing the building core, *means of egress*, *fire protection systems*, firefighter air-replenishment systems, firefighting equipment and fire department access, and the location of *fire walls*, *fire barriers, fire partitions, smoke barriers* and smoke partitions.

13. An *approved* Building Information Card that includes, but is not limited to, all of the following information:
    13.1. General building information that includes: property name, address, the number of floors in the building above and below grade, use and occupancy classification (for mixed uses, identify the different types of occupancies on each floor) and the estimated building population during the day, night and weekend.
    13.2. Building emergency contact information that includes: a list of the building's emergency contacts including but not limited to building manager, building engineer and their respective work phone number, cell phone number and email address.
    13.3. Building construction information that includes: the type of building construction including but not limited to floors, walls, columns and roof assembly.
    13.4. *Exit access stairway* and *exit stairway* information that includes: number of *exit access stairways* and *exit stairways* in building; each *exit access stairway* and *exit stairway* designation and floors served; location where each *exit access stairway* and *exit stairway* discharges, *interior exit stairways* that are pressurized; *exit stairways* provided with emergency lighting; each *exit stairway* that allows reentry; *exit stairways* providing roof access; elevator information that includes: number of elevator banks, elevator bank designation, elevator car numbers and respective floors that they serve; location of elevator machine rooms, control rooms and control spaces; location of sky lobby; and location of freight elevator banks.
    13.5. Building services and system information that includes: location of mechanical rooms, location of building management system, location and capacity of all fuel oil tanks, location of emergency generator and location of natural gas service.
    13.6. *Fire protection system* information that includes: location of standpipes, location of fire pump room, location of fire department connections, floors protected by automatic sprinklers and location of different types of *automatic sprinkler systems* installed including but not limited to dry, wet and pre-action.
    13.7. Hazardous material information that includes: location and quantity of hazardous material.
14. Work table.
15. Generator supervision devices, manual start and transfer features.
16. Public address system, where specifically required by other sections of this code.
17. Elevator fire recall switch in accordance with ASME A17.1/CSA B44.
18. Elevator emergency or standby power selector switch(es) in accordance with ASME A17.1/CSA B44.

2024 International Building Code

Revise as follows:

[F] 911.1.6 Required features.
The *fire command center* shall comply with NFPA 72 and shall contain ~~all of~~ the following features:
1. The emergency voice/alarm communication system control unit, where required.
2. The fire department communications system.
3. Fire detection and alarm system *annunciator*.
4. Where elevators are provided, the ~~*Annunciator*~~annunciator unit visually indicating the location of the elevators and whether they are operational.
5. Status indicators and controls for air distribution systems.
6. Where smoke control is provided, ~~The~~ the firefighter's control panel required by Section 909.16 for smoke control systems installed in the building.
7. Where *interior exit stairways* are provided, ~~Controls~~ controls for unlocking *interior exit stairway* doors simultaneously.
8. Sprinkler valve and waterflow detector display panels.

9. <u>Where emergency and standby power are provided,</u> ~~Emergency~~ <u>emergency</u> and standby power status indicators.
10. A telephone for fire department use with controlled access to the public telephone system.
11. <u>Where fire pumps are provided,</u> ~~Fire~~ <u>fire</u> pump status indicators.
12. Schematic building plans indicating the typical floor plan and detailing the building core, *means of egress*, *fire protection systems*, firefighter air replenishment system, firefighting equipment and fire department access and the location of *fire walls, fire barriers, fire partitions, smoke barriers* and *smoke partitions*.
13. An *approved Building* Information Card that contains, but is not limited to, the following information:
    - 13.1. General building information that includes: property name, address, the number of floors in the *building* above and below grade, use and occupancy classification (for mixed uses, identify the different types of occupancies on each floor), and the estimated building population during the day, night and weekend.
    - 13.2. Building emergency contact information that includes: a list of the building's emergency contacts including but not limited to building manager and building engineer and their respective work phone number, cell phone number, e-mail address.
    - 13.3. Building construction information that includes: the type of building construction including but not limited to floors, walls, columns, and roof assembly.
    - 13.4. *Exit access* and *exit stairway* information that includes: number of *exit access* and *exit stairways* in the building, each *exit access* and *exit stairway* designation and floors served, location where each *exit access* and *exit stairway* discharges, *interior exit stairways* that are pressurized, *exit stairways* provided with emergency lighting, each *exit stairway* that allows reentry, *exit stairways* providing roof access; elevator information that includes: number of elevator banks, elevator bank designation, elevator car numbers and respective floors that they serve; location of elevator machine rooms, control rooms and control spaces; location of sky lobby, location of freight elevator banks.
    - 13.5. Building services and system information that includes: location of mechanical rooms, location of *building* management system, location and capacity of all fuel oil tanks, location of emergency generator, location of natural gas service.
    - 13.6. *Fire protection system* information that includes: location of *standpipes*, location of fire pump room, location of fire department connections, floors protected by automatic sprinklers, location of different types of *automatic sprinkler systems* installed including, but not limited to, dry, wet and pre-action.
    - 13.7. *Hazardous material* information that includes: location of *hazardous material*, quantity of *hazardous material*.
14. Work table.
15. Generator supervision devices, manual start and transfer features.
16. Public address system, where specifically required by other sections of this code.
17. Elevator fire recall switch in accordance with ASME A17.1/CSA B44.
18. Elevator emergency or standby power selector switch(es), where emergency or standby power is provided.

Reason: Section [F] 911.1.6 specifies required features of a fire command center and indicates the command center shall contain "all of the following features." However, though the items listed are common in high-rise buildings, not all of the items listed may be present or required in large single story Group F-1 or S-1 buildings. The submitter of the original code change F42-18 (i.e. California Fire Chiefs Association) acknowledged in their reason statement that the intent was not to *"require items not otherwise required by the building construction."* The Fire Committee also noted in their approval reason that a *"more defined list as to what will be included in the fire command center that possibly differs from what is necessary for a high-rise building may be necessary."* These statements made clear the addition of large F-1 and S-1 buildings to the requirement for a Fire Command Center did not automatically require that additional features such as an emergency voice/alarm communication system noted in Section [F] 911.1.6 Item No. 1, or smoke control in Item 6, or a fire pump in Item 11 be provided in such building types if not required.

This change clarifies that if such listed items are not required, then feature associated with the item need not be provided.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal makes clear that if fire safety features listed for the fire command center are not required, then they need not be provided. There is no cost associated with such a decision.

F144-24

F145-24

IFC: 911.3, 911.3.1 (New), 1203.2, 1203.2.7 (New), 105.6.7 (New); IBC: [F] 2702.2, 2702.2.7 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

911.3 Explosion prevention systems.
Explosion prevention systems shall be of an *approved* type and installed in accordance with the provisions of this code and NFPA 69.

Add new text as follows:

911.3.1 Emergency power. Powered components included as part of explosion prevention systems shall be provided with emergency power. The required duration for operation on emergency power shall be established in the hazard analysis required by NFPA 69.

Revise as follows:

1203.2 Where required.
Emergency and standby power systems shall be provided where required by Sections 1203.2.1 through ~~1203.2.19~~ 1203.2.20.

Add new text as follows:

1203.2.7 Explosion prevention systems.. Emergency power shall be provided for explosion prevention systems as required in Section 911.3.1.

105.6.7 Explosion control systems. A construction permit is required for installation of or modification to explosion control systems.

2024 International Building Code

Revise as follows:

[F] 2702.2 Where required.
Emergency and *standby power systems* shall be provided where required by Sections 2702.2.1 through ~~2702.2.19~~ 2702.2.20.

Add new text as follows:

2702.2.7 Explosion prevention systems. Emergency power shall be provided for explosion prevention systems as required in Section 911.3.1 of the *International Fire Code.*

Reason: Explosion prevention systems rely on components requiring power to function including detection systems, exhaust fans, louvers, etc. The fire code relies on NFPA 69 for the design of the systems, but NFPA 69 does not provide specific guidance on emergency power needs other than a general requirement for reliability which is found at NFPA 69 Section 6.3.

There have been designs for explosion prevention systems with as little as 2 hours of emergency power for events (hazards) that can last as long as 6-12 hours. By adding these sections, the designer will be required to include in a hazard analysis addressing how long the hazard may exist to determine the length of time the emergency power must be available for. The difference would be where some designers attempt to use a UPS with limited time duration as compared to installing an emergency generator.

NFPA 69 currently requires a hazard analysis to be performed at Section 4.2.3, this proposed language would dovetail with that requirement and ensure that the necessary emergency power is addressed.

A construction permit is added to Section 105 for explosion control systems. These systems need to be designed and inspected as part of the overall building safety scheme.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal could add cost to some explosion prevention system designs that do not properly address the necessary emergency power needs in the required hazard analysis and ultimately the design. However, if the explosion prevention system is not provided with the necessary emergency power it is not reliable as required presently and the resulting explosive event would cost much more in property loss and potentially serious injuries and/or loss of lives.

F145-24

F146-24

IFC: 912.5, 912.5.1, 912.5.2, 912.5.3, 912.5.4, 912.2.2; IBC: [F] 912.5, [F] 912.5.1, [F] 912.5.2, [F] 912.5.3, [F] 912.5.4, [F] 912.2.2

Proponents: Chad Sievers, NYS, NYS DOS (chad.sievers@dos.ny.gov); Jeanne Rice, NYS DOS, NYS DOS (jeanne.rice@dos.ny.gov); Kevin Duerr-Clark, NYS DOS, NYS DOS (kevin.duerr-clark@dos.ny.gov); China Clarke, New York State Dept of State, Manager Technical Support Unit (china.clarke@dos.ny.gov); Brian Tollisen, NYS Department of State, NYS Department of State (brian.tollisen@dos.ny.gov); John R Addario - NYS Department of State, NEW YORK STATE CODES DIVISION, New York State Department of State Division of Building Standards and Codes (john.addario@dos.ny.gov)

2024 International Fire Code

Revise as follows:

912.5 Signs.
A metal sign with raised letters not less than 1 inch (25 mm) in size shall be mounted on all fire department connections serving automatic sprinklers, standpipes or fire pump connections. Such signs shall read: “AUTOMATIC SPRINKLERS,” “STANDPIPES,” “TEST CONNECTION,” “STANDPIPE AND AUTOSPKR” or “AUTOSPKR AND STANDPIPE,” or a combination thereof as applicable.

912.5.1 Lettering.
Each fire department connection (FDC) shall be designated by a sign with letters not less than 1 inch (25.4 mm) in height. For manual standpipe systems, the sign shall also indicate that the system is manual and that it is either wet or dry.

912.5.2 Serving multiple buildings.
Where a fire department connection (FDC) services multiple buildings, structures or locations, a sign shall be provided indicating the building, structures or locations served. Where the FDC does not serve the entire building, a sign shall be provided indicating the portions of the building served.

912.5.3 Multiple or combined systems.
Where combination or multiple system types are supplied by the fire department connection, the sign or combination of signs shall indicate both designated services.

912.5.4 Indication of pressure.
The sign also shall indicate the pressure required at the outlets to deliver the standpipe system demand.

Exception: Where the pressure required is 150 pounds per square inch (1034 kPa) or less.

Revise as follows:

~~912.2.2~~ 912.5.5 Existing buildings. On existing buildings, wherever the fire department connection is not visible to approaching fire apparatus, the fire department connection shall be indicated by an *approved* sign mounted on the street front or on the side of the building. Such sign shall have the letters “FDC” not less than 6 inches (152 mm) high and words in letters not less than 2 inches (51 mm) high or an arrow to indicate the location. Such signs shall be subject to the approval of the *fire code official*.

2024 International Building Code

[F] 912.5 Signs.
A metal sign with raised letters not less than 1 inch (25 mm) in size shall be mounted on all fire department connections serving automatic sprinklers, standpipes or fire pump connections. Such signs shall read: “AUTOMATIC SPRINKLERS,” “*STANDPIPES*,” “TEST CONNECTION,” “STANDPIPE AND AUTOSPKR” or “AUTOSPKR AND STANDPIPE,” or a combination thereof as applicable.

[F] 912.5.1 Lettering.
Each fire department connection (FDC) shall be designated by a sign with raised letters not less than 1 inch (25.4 mm) in height. For manual standpipe systems, the sign shall also indicate that the system is manual and that it is either wet or dry.

[F] 912.5.2 Serving multiple buildings.
Where a fire department connection (FDC) services multiple *buildings*, *structures* or locations, a sign shall be provided indicating the *building*, *structures* or locations served. Where the FDC does not serve the entire *building*, a sign shall be provided indicating the portions of the *building* served.

[F] 912.5.3 Multiple or combined systems.
Where combination or multiple system types are supplied by the fire department connection, the sign or combination of signs shall indicate both designated services.

[F] 912.5.4 Indication of pressure. The sign also shall indicate the pressure required at the outlets to deliver the *standpipe system* demand.

Exception: Where the pressure required is 150 pounds per square inch (1034 kPa) or less.

Revise as follows:

[F] ~~912.2.2~~ 912.5.5 Existing buildings. On *existing buildings*, wherever the fire department connection is not visible to approaching fire apparatus, the fire department connection shall be indicated by an *approved* sign mounted on the street front or on the side of the *building*. Such sign shall have the letters "FDC" not less than 6 inches (152 mm) high and words in letters not less than 2 inches (51 mm) high or an arrow to indicate the location. Such signs shall be subject to the approval of the *fire code official*.

Reason: This is a simple editorial modification to the code, moving the requirement for a sign (which directs fire departments to the FDC on existing buildings) from the FDC "Location" code section to the more appropriate code section that addresses signs, the FDC "Sign" section. The intent is to include the FDC sign requirements in one section.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is just an organizational change in the code moving the requirment from one location to another.

F146-24

F147-24

IFC: 912.2.3 (New); IBC: [F] 912.2.3 (New)

Proponents: John Swanson, NFSA, National Fire Sprinkler Association (swanson@nfsa.org); Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Add new text as follows:

<u>**912.2.3** **Connection height.** Fire department connections shall be located not less than 18 inches (457 mm) and not more than 4 feet (1.2 m) above the level of the adjacent grade or access level.</u>

2024 International Building Code

Add new text as follows:

<u>**[F] 912.2.3** **Connection height.** Newly installed fire department connections shall be located not less than 18 inches (457 mm) and not more than 4 feet (1.2 m) above the level of the adjacent grade or access level.</u>

Reason: This addition to the IFC will provide clear and enforceable criteria for minimum and maximum mounting height of the fire department connection. Currently, both NFPA 13 (sprinklers) and NFPA 14 (standpipes) contain requirements for minimum and maximum mounting heights of fire department connections. It is not uncommon for criteria within NFPA standards to be carried forward to the IFC. The IFC currently does not provide any guidance on mounting height in Section 912. Therefore, this proposal takes similar language currently found in NFPA 13 and NFPA 14 and adds it to the IFC.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This addition will not increase or decrease the cost of construction.
Fire department connections are already required by the referenced installation standards at these height ranges, this proposal installs them at a standard height in the codes.

F147-24

F148-24

IFC: SECTION 915, 1103.9; IBC: SECTION 915

Proponents: Jeffrey Shapiro, International Code Consultants, Lake Travis Fire Rescue (jshapiro@ltfr.org)

2024 International Fire Code

SECTION 915
CARBON MONOXIDE (CO) DETECTION

Delete without substitution:

~~915.1 General~~.
~~Carbon monoxide (CO) detection shall be installed in new buildings in accordance with Section 915.1.1. Carbon monoxide detection shall be installed in existing buildings in accordance with Section 1103.9.~~

> ~~**Exception:** Carbon monoxide detection is not required in Group S, Group F and Group U occupancies that are not normally occupied.~~

~~915.1.1 Where required~~.
~~Carbon monoxide detection shall be installed in the locations specified in Section 915.2 where any of the following conditions exist.~~

1. ~~In buildings that contain a *CO source*.~~
2. ~~In buildings that contain or are supplied by a CO-producing forced-air furnace.~~
3. ~~In buildings with attached private garages.~~
4. ~~In buildings that have a CO-producing vehicle that is used within the building.~~

~~915.2 Locations~~.
~~Carbon monoxide detection shall be installed in the locations specified in Sections 915.2.1 through 915.2.3.~~

~~915.2.1 Dwelling units.~~ ~~Carbon monoxide detection shall be installed in *dwelling units* outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a *CO source* is located within a bedroom or its attached bathroom, carbon monoxide detection shall be installed within the bedroom.~~

~~915.2.2 Sleeping units~~.
~~Carbon monoxide detection shall be installed in *sleeping units*.~~

> ~~**Exception:** Carbon monoxide detection shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the *sleeping unit* where the *sleeping unit* or its attached bathroom does not contain a *CO source* and is not served by a CO-producing forced-air furnace.~~

~~915.2.3 Group E occupancies.~~ ~~A carbon monoxide system that uses carbon monoxide detectors shall be installed in Group E occupancies. Alarm signals from carbon monoxide detectors shall be automatically transmitted to an on-site location that is staffed by school personnel.~~

> ~~**Exception:** Carbon monoxide alarm signals shall not be required to be automatically transmitted to an on-site location that is staffed by school personnel in Group E occupancies with an *occupant load* of 30 or less.~~

~~915.2.4 CO-producing forced-air furnace~~.

~~Carbon monoxide detection complying with Item 2 of Section 915.1.1 shall be installed in all enclosed rooms and spaces served by a fuel-burning, forced-air furnace.~~

~~Exceptions:~~

1. ~~Where a carbon monoxide detector is provided in the first room or space served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an *approved* location.~~
2. ~~*Dwelling units* that comply with Section 915.2.1.~~

~~915.2.5 Private garages~~.

~~Carbon monoxide detection complying with Item 3 of Section 915.1.1 shall be installed within enclosed occupiable rooms or spaces that are contiguous to the attached private garage.~~

~~Exceptions:~~

1. ~~In buildings without communicating openings between the private garage and the building.~~
2. ~~In rooms or spaces located more than one story above or below a private garage.~~
3. ~~Where the private garage connects to the building through an *open-*ended corridor.~~
4. ~~An open parking garage complying with Section 406.5 of the *International Building Code* or an enclosed parking garage complying with Section 406.6 of the *International Building Code* shall not be considered a private garage.~~
5. ~~*Dwelling units* that comply with Section 915.2.1.~~

~~915.2.6 All other occupancies~~.

~~For locations other than those specified in Sections 915.2.1 through 915.2.5, carbon monoxide detectors shall be installed on the ceiling of enclosed rooms or spaces containing CO producing devices or served by a *CO source* forced-air furnace.~~

~~Exception:~~ ~~Where environmental conditions prohibit the installation of carbon monoxide detector in an enclosed room or space, carbon monoxide detectors shall be installed in an *approved* enclosed location contiguous with the room or space that contains a *CO source*.~~

~~915.3 Carbon monoxide detection~~.

~~Carbon monoxide detection required by Sections 915.1 through 915.2.3 shall be provided by carbon monoxide alarms complying with Section 915.4 or carbon monoxide detection systems complying with Section 915.5.~~

~~915.3.1 Alarm limitations~~.

~~Carbon monoxide alarms shall only be installed in *dwelling units* and in sleeping units. They shall not be installed in locations where the code requires carbon monoxide detectors to be used.~~

~~915.3.2 Fire alarm system required~~.

~~New buildings that are required by Section 907.2 to have a *fire alarm system* and by Section 915.2 to have carbon monoxide detectors shall be connected to the *fire alarm system* in accordance with NFPA 72.~~

~~915.3.3 Fire alarm systems not required~~.

~~In new buildings that are not required by Section 907.2 to have a *fire alarm system*, carbon monoxide detection shall be provided by one of the following:~~

1. ~~Carbon monoxide detectors connected to an *approved* carbon monoxide detection system in accordance with NFPA 72.~~

2. ~~Carbon monoxide detectors connected to an *approved* combination system in accordance with NFPA 72.~~
3. ~~Carbon monoxide detectors connected to an *approved fire alarm system* in accordance with NFPA 72.~~
4. ~~Where *approved* by the *fire code official*, carbon monoxide alarms maintained in accordance with the manufacturer's instructions.~~

~~915.3.4 Installation.~~
~~Carbon monoxide detection shall be installed in accordance with NFPA 72 and the manufacturer's instructions.~~

~~915.4 Carbon monoxide alarms.~~
~~Carbon monoxide alarms shall comply with Sections 915.4.1 through 915.4.4.~~

~~915.4.1 Power source.~~ ~~Carbon monoxide alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.~~

> **~~Exception:~~** ~~Where installed in buildings without commercial power, battery-powered carbon monoxide alarms shall be an acceptable alternative.~~

~~915.4.2 Listings.~~ ~~Carbon monoxide alarms shall be *listed* in accordance with UL 2034.~~

~~915.4.3 Combination alarms.~~
~~Combination carbon monoxide/smoke alarms shall be an acceptable alternative to carbon monoxide alarms. Combination carbon monoxide/smoke alarms shall be *listed* in accordance with UL 217 and UL 2034.~~

~~915.4.4 Interconnection.~~
~~Where more than one carbon monoxide alarm is required to be installed, carbon monoxide alarms shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms. Physical interconnection of carbon monoxide alarms shall not be required where listed wireless alarms are installed and all alarms sound upon activation of one alarm.~~

~~915.5 Carbon monoxide detection systems.~~
~~Carbon monoxide detection systems shall be an acceptable alternative to carbon monoxide alarms and shall comply with Sections 915.5.1 through 915.5.3.~~

~~915.5.1 General.~~
~~Carbon monoxide detectors shall be *listed* in accordance with UL 2075.~~

~~915.5.2 Locations.~~
~~Carbon monoxide detectors shall be installed in the locations specified in Section 915.2. These locations supersede the locations specified in NFPA 72.~~

~~915.5.3 Combination detectors.~~
~~Combination carbon monoxide/smoke detectors shall be an acceptable alternative to carbon monoxide detectors, provided that they are *listed* in accordance with UL 268 and UL 2075.~~

~~**915.5.4 Occupant notification.**~~
~~Activation of a carbon monoxide detector shall annunciate at the control unit and shall initiate audible and visible alarm notification throughout the building.~~

> ~~**Exception:** Occupant notification is permitted to be limited to the area where the carbon monoxide alarm signal originated and other signaling zones in accordance with the fire safety plan, provided that the alarm signal from an activated carbon monoxide detector is automatically transmitted to an *approved* on-site location or off-premises location.~~

~~**915.5.5 Duct detection.**~~
~~Carbon monoxide detectors placed in environmental air ducts or plenums shall not be used as a substitute for the required protection in Section 915.~~

~~**915.6 Maintenance.**~~
~~Carbon monoxide alarms and carbon monoxide detection systems shall be maintained in accordance with NFPA 72. Carbon monoxide alarms and carbon monoxide detectors that become inoperable or begin producing end-of-life signals shall be replaced.~~

~~**915.6.1 Enclosed parking garages.**~~
~~Carbon monoxide and nitrogen dioxide detectors installed in enclosed parking garages in accordance with Section 404.1 of the International Mechanical Code shall be maintained in accordance with the manufacturer's instructions and their listing. Detectors that become inoperable or begin producing end-of-life signals shall be replaced.~~

Delete and substitute as follows:

~~**CARBON MONOXIDE SOURCE.** A piece of commonly used equipment or permanently installed appliance, fireplace or process that produces or emits carbon monoxide gas.~~
CARBON MONOXIDE SOURCE. A combustion process that has the potential to: 1. Produce carbon monoxide as a product of combustion under normal or abnormal conditions, and 2. Expose building occupants to carbon monoxide. Carbon monoxide sources include, but are not limited to solid-, liquid-, or gas-fueled appliances, equipment, devices, or systems, such as fireplaces, furnaces, heaters, boilers, cooking equipment, and vehicles with internal combustion engines.
Carbon Monoxide Source, Direct. A permanently installed *carbon monoxide source*, other than a *direct-vent appliance*, that is located in an interior space

Carbon Monoxide Source, Forced-indirect. A *carbon monoxide source* connected to an interior space by a forced air supply duct.

Add new text as follows:

915.1 General. New and existing buildings shall be provided with carbon monoxide (CO) detection in accordance with Sections 915.2 through 915.5.

915.2 Where required. Carbon monoxide detection shall be provided in interior spaces, other than dwelling units or sleeping units, that are exposed to a *carbon monoxide source* in accordance with Sections 915.2.1 through 915.2.3. Carbon monoxide detection for dwelling units or sleeping units that are exposed to a *carbon monoxide source* shall be in accordance with Section 915.2.4.

915.2.1 Interior spaces with direct carbon monoxide sources. In all occupancies, interior spaces with a *direct carbon monoxide source* shall be provided with carbon monoxide detection located in close proximity to the *direct carbon monoxide source* and in accordance with Section 915.3.

> **Exception**: Where environmental conditions in an enclosed space are incompatible with carbon monoxide detection devices, carbon

monoxide detection shall be provided in an *approved* adjacent location.

915.2.2 Interior spaces adjacent to a space containing a carbon monoxide source. In *Groups A, B, E, I, M and R Occupancies*, interior spaces that are separated from and adjacent to an enclosed parking garage or an interior space that contains a *direct carbon monoxide source* shall be provided with carbon monoxide detection if there are communicating openings between the spaces. Detection devices shall be located in close proximity to communicating openings on the side that is furthest from the *carbon monoxide source* and in accordance with Section 915.3

Exceptions:

1. Where communicating openings between the space containing a *direct carbon monoxide source* and the adjacent space are permanently sealed airtight, carbon monoxide detection is not required for the adjacent space.
2. Where the *fire code official* determines that the volume or configuration of the adjacent interior space is such that dilution or geometry would diminish the effectiveness of carbon monoxide detection devices located in such spaces, detection devices additional to those required by Section 915.2.1 shall be located on the side of communicating openings that is closest to the *carbon monoxide source*.

915.2.3 Interior spaces with forced-indirect carbon monoxide sources. In all occupancies, interior spaces with a *forced-indirect carbon monoxide source* shall be provided with carbon monoxide detection in accordance with either of the following:

1. Detection in each space with a forced-indirect carbon monoxide source, located in accordance with Section 915.3.
2. Detection only in the first space served by the main duct leaving the *forced-indirect carbon monoxide source*, located in accordance with Section 915.3, with an audible and visual alarm signal provided at an *approved* location.

915.2.4 Dwelling units and sleeping units. Carbon monoxide detection for *dwelling units* and *sleeping units* shall comply with Sections 915.2.4.1 and 915.2.4.2.

915.2.4.1 Direct carbon monoxide sources. Where a *direct carbon monoxide* source is located in a bedroom or sleeping room, or a bathroom attached to either, carbon monoxide detection shall be installed in the bedroom or sleeping room.
Where carbon monoxide detection is not installed in bedrooms or sleeping rooms, carbon monoxide detection shall be installed outside of each separate sleeping area in close proximity to bedrooms or sleeping rooms for either of the following conditions:

1. The *dwelling unit* or *sleeping unit* has a communicating opening to an attached, enclosed garage.
2. A *direct carbon monoxide source* is located in the *dwelling unit* or *sleeping unit* outside of bedrooms or sleeping rooms.

915.2.4.2 Forced-indirect carbon monoxide sources. Bedrooms or sleeping rooms in dwelling units or sleeping units that are exposed to a forced-indirect carbon monoxide source shall be provided with carbon monoxide detection in accordance with Section 915.2.4.1 or Section 915.2.3.

915.3 Location of detection devices. Carbon monoxide detection devices shall be installed in accordance with manufacturer's instructions in a location that avoids dead air spaces, turbulent air spaces, fresh air returns, open windows, and obstructions that would inhibit accumulation of carbon monoxide at the detection location. Carbon monoxide detection in air ducts or plenums shall not be permitted as an alternative to required detection locations.

915.4 Permissible detection devices. Carbon monoxide detection shall be provided by a carbon monoxide detection system complying with Section 915.4.2 unless *carbon monoxide alarms* are permitted by Sections 915.4.1.

915.4.1 Carbon monoxide alarms. *Carbon monoxide alarms* complying with Sections 915.4.1.1 through 915.4.1.3 shall be permitted in lieu of a carbon monoxide detection system in both of the following:

1. *Dwelling units* and *sleeping units*.
2. Locations other than *dwelling units* or *sleeping units*, where *approved*, provided that the manufacturer's instructions do not prohibit installation in locations other than *dwelling units* or *sleeping units* and that the alarm signal for any *carbon monoxide alarm* installed in a normally unoccupied location is annunciated by an audible and visual signal in an *approved* location.

915.4.1.1 Power source. In buildings with a wired power source, *carbon monoxide alarms* shall receive their primary power from a permanent connection to building wiring, with no disconnecting means other than for overcurrent protection, and shall be provided with a battery backup. In buildings without a wired power source, *carbon monoxide alarms* shall be battery powered.

> **Exception:** *Carbon monoxide alarms* shall be permitted to be battery powered or plug-in with a battery backup where such alarms are being retrofitted into an existing building that was not previously required to have carbon monoxide detection permanently connected to a wired power source.

915.4.1.2 Listings. *Carbon monoxide alarms* shall be *listed* in accordance with UL 2034. Combination carbon monoxide/smoke alarms shall also be listed in accordance with UL 217.

915.4.1.3 Interconnection. Where more than one *carbon monoxide alarm* is installed, actuation of any alarm shall cause all of the alarms to signal an alarm condition.

915.4.2 Carbon monoxide detection systems. Carbon monoxide detection systems shall be installed in accordance with NFPA 72.

915.4.2.1 Fire alarm system integration. Where a building fire alarm system or combination fire alarm system, as defined in NFPA 72, is installed, carbon monoxide detection shall be provided by connecting *carbon monoxide detectors* to the fire alarm system. Where a building fire alarm system or a combination fire alarm system is not installed, carbon monoxide detection shall be provided by connecting *carbon monoxide detectors* to a carbon monoxide detection system complying with NFPA 72.

915.4.2.2 Listings. *Carbon monoxide detectors* shall be *listed* in accordance with UL 2075. Combination carbon monoxide/smoke detectors shall be listed in accordance with UL 268 and UL 2075.

915.4.2.3 Alarm notification. For other than Group E Occupancies, activation of a *carbon monoxide detector* shall initiate alarm notification in accordance with any of the following:

1. An audible and visible alarm notification throughout the building and at the control unit.
2. Where specified in an *approved* fire safety plan, an audible and visible alarm in the signaling zone where the carbon monoxide has been detected and other signaling zones specified in the fire safety plan, and at the control unit.
3. Where a sounder base is provided for each detector, an audible alarm at the activated *carbon monoxide detector* and an audible and visible alarm at the control unit.

For Group E Occupancies having an occupant load of 30 or less, alarm notification shall be provided in an on-site location staffed by school personnel or in accordance with the notification requirements for other occupancies. For Group E occupancies having an occupant load of more than 30, an audible and visible alarm shall be provided in an on-site location staffed by school personnel.

915.5 Maintenance. *Carbon monoxide alarms* and carbon monoxide detection systems shall be maintained in accordance with NFPA 72 and the manufacturer's instructions. *Carbon monoxide alarms* and *carbon monoxide detectors* that become inoperable or begin producing end-of-life signals shall be replaced.

Delete and substitute as follows:

~~**1103.9 Carbon monoxide detection.**~~
~~Carbon monoxide detection shall be installed in existing buildings where any of the conditions identified in Section 915.1.1~~

~~exist. Carbon monoxide alarms shall be installed in the locations specified in Section 915.2 and the installation shall be in accordance with Section 915.4.~~

~~Exceptions:~~

1. ~~Carbon monoxide alarms are permitted to be solely battery operated where the code that was in effect at the time of construction did not require carbon monoxide detectors to be provided.~~
2. ~~Carbon monoxide alarms are permitted to be solely battery operated in *dwelling units* that are not served from a commercial power source.~~
3. ~~A carbon monoxide detection system in accordance with Section 915.5 shall be an acceptable alternative to carbon monoxide alarms.~~

<u>**1103.9** **Carbon monoxide detection.**</u> <u>Carbon monoxide detection shall be installed in existing buildings in accordance with Section 915.</u>

2024 International Building Code

SECTION 915
CARBON MONOXIDE (CO) DETECTION

Delete without substitution:

~~[F] 915.1 General~~.
~~Carbon monoxide (CO) detection shall be installed in new *buildings* in accordance with Section 915.1.1. Carbon monoxide detection shall be installed in *existing buildings* in accordance with Chapter 11 of the International Fire Code.~~

~~Exception:~~ ~~Carbon monoxide detection is not required in Group S, Group F and Group U occupancies that are not normally occupied.~~

~~[F] 915.1.1 Where required~~.
~~Carbon monoxide detection shall be installed in the locations specified in Section 915.2 where any of the following conditions exist.~~

1. ~~In *buildings* that contain a CO source.~~
2. ~~In *buildings* that contain or are supplied by a CO-producing forced-air furnace.~~
3. ~~In *buildings* with attached *private garages*.~~
4. ~~In *buildings* that have a CO-producing vehicle that is used within the *building*.~~

~~[F] 915.2 Locations~~.
~~Carbon monoxide detection shall be installed in the locations specified in Sections 915.2.1 through 915.2.3.~~

~~[F] 915.2.1 Dwelling units~~.
~~Carbon monoxide detection shall be installed in *dwelling units* outside of each separate sleeping area in the immediate vicinity of the bedrooms. Where a CO source is located within a bedroom or its attached bathroom, carbon monoxide detection shall be installed within the bedroom.~~

~~[F] 915.2.2 Sleeping units~~. ~~Carbon monoxide detection shall be installed in *sleeping units*.~~

~~Exception:~~ ~~Carbon monoxide detection shall be allowed to be installed outside of each separate sleeping area in the immediate vicinity of the *sleeping unit* where the *sleeping unit* or its attached bathroom does not contain a CO source and is not served by a CO~~

~~producing forced-air furnace.~~

~~**[F] 915.2.3 Group E occupancies**. A carbon monoxide system that uses carbon monoxide detectors shall be installed in Group E occupancies. *Alarm signals* from carbon monoxide detectors shall be automatically transmitted to an on-site location that is staffed by school personnel.~~

~~**Exception:** *Carbon monoxide alarm* signals shall not be required to be automatically transmitted to an on-site location that is staffed by school personnel in Group E occupancies with an *occupant load* of 30 or less.~~

~~**[F] 915.2.4 CO-producing forced-air furnace.**~~

~~Carbon monoxide detection complying with Item 2 of Section 915.1.1 shall be installed in all enclosed rooms and spaces served by a fuel-burning, forced-air furnace.~~

~~**Exceptions:**~~

1. ~~Where a *carbon monoxide detector* is provided in the first room or space served by each main duct leaving the furnace, and the carbon monoxide *alarm signals* are automatically transmitted to an *approved* location.~~
2. ~~*Dwelling units* that comply with Section 915.2.1.~~

~~**[F] 915.2.5 Private garages.**~~

~~Carbon monoxide detection complying with Item 3 of Section 915.1.1 shall be installed within enclosed occupiable rooms or spaces that are contiguous to the attached *private garage*.~~

~~**Exceptions:**~~

1. ~~In *buildings* without communicating openings between the *private garage* and the *building*.~~
2. ~~In rooms or spaces located more than one *story* above or below a *private garage*.~~
3. ~~Where the *private garage* connects to the *building* through an *open-ended corridor*.~~
4. ~~An *open parking garage* complying with Section 406.5 or an enclosed parking garage complying with Section 406.6shall not be considered a *private garage*.~~
5. ~~*Dwelling units* that comply with Section 915.2.1.~~

~~**[F] 915.2.6 All other occupancies.**~~

~~For locations other than those specified in Section 915.2.1 through 915.2.5, *carbon monoxide detectors* shall be installed on the ceiling of enclosed rooms or spaces containing CO producing devices or served by a CO source forced-air furnace.~~

~~**Exception:** Where environmental conditions prohibit the installation of *carbon monoxide detector* in an enclosed room or space, *carbon monoxide detectors* shall be installed in an *approved* enclosed location contiguous with the room or space that contains a CO source.~~

~~**[F] 915.3 Carbon monoxide detection.**~~

~~Carbon monoxide detection required by Sections 915.1 through 915.2.3 shall be provided by *carbon monoxide alarms* complying with Section 915.4 or carbon monoxide detection systems complying with Section 915.5.~~

~~**[F] 915.3.1 Alarm limitations.**~~

~~*Carbon monoxide alarms* shall only be installed in *dwelling units* and in *sleeping units*. They shall not be installed in locations where the code requires *carbon monoxide detectors* to be used.~~

~~**[F] 915.3.2 Fire alarm system required.**~~

~~New *buildings* that are required by Section 907.2 to have a *fire alarm system* and by Section 915.2 to have *carbon monoxide detectors* shall be connected to the *fire alarm system* in accordance with NFPA 72.~~

~~**[F] 915.3.3 Fire alarm systems not required.**~~

~~In new *buildings* that are not required by Section 907.2 to have a *fire alarm system*, carbon monoxide detection shall be provided by one of the following:~~

1. ~~*Carbon monoxide detectors* connected to an *approved* carbon monoxide detection system in accordance with NFPA 72.~~
2. ~~*Carbon monoxide detectors* connected to an *approved* combination system in accordance with NFPA 72.~~
3. ~~*Carbon monoxide detectors* connected to an *approved fire alarm system* in accordance with NFPA 72.~~
4. ~~Where *approved* by the fire code official, *carbon monoxide alarms* maintained in accordance with the manufacturer's instructions.~~

~~**[F] 915.3.4 Installation.**~~

~~Carbon monoxide detection shall be installed in accordance with NFPA 72 and the manufacturer's instructions.~~

~~**[F] 915.4 Carbon monoxide alarms.**~~

~~*Carbon monoxide alarms* shall comply with Sections 915.4.1 through 915.4.4.~~

~~**[F] 915.4.1 Power source.**~~

~~*Carbon monoxide alarms* shall receive their primary power from the *building* wiring where such wiring is served from a commercial source, and when primary power is interrupted, shall receive power from a battery. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.~~

> ~~**Exception:** Where installed in *buildings* without commercial power, battery-powered *carbon monoxide alarms* shall be an acceptable alternative.~~

~~**[F] 915.4.2 Listings.**~~

~~*Carbon monoxide alarms* shall be *listed* in accordance with UL 2034.~~

~~**[F] 915.4.3 Combination alarms.**~~

~~Combination carbon monoxide/*smoke alarms* shall be an acceptable alternative to *carbon monoxide alarms*. Combination carbon monoxide/*smoke alarms* shall be *listed* in accordance with UL 217 and UL 2034.~~

~~**[F] 915.4.4 Interconnection.**~~

~~Where more than one *carbon monoxide alarm* is required to be installed, *carbon monoxide alarms* shall be interconnected in such a manner that the actuation of one alarm will activate all of the alarms. Physical interconnection of *carbon monoxide alarms* shall not be required where *listed* wireless alarms are installed and all alarms sound upon activation of one alarm.~~

~~**[F] 915.5 Carbon monoxide detection systems.**~~

~~Carbon monoxide detection systems shall be an acceptable alternative to *carbon monoxide alarms* and shall comply with Sections 915.5.1 through 915.5.3.~~

~~**[F] 915.5.1 General**~~**.**
~~*Carbon monoxide detectors* shall be *listed* in accordance with UL 2075.~~

~~**[F] 915.5.2 Locations**~~**.**
~~*Carbon monoxide detectors* shall be installed in the locations specified in Section 915.2. These locations supersede the locations specified in NFPA 72.~~

~~**[F] 915.5.3 Combination detectors**~~**.**
~~Combination carbon monoxide/*smoke detectors* shall be an acceptable alternative to *carbon monoxide detectors*, provided that they are *listed* in accordance with UL 268 and UL 2075.~~

~~**[F] 915.5.4 Occupant notification**~~**.**
~~Activation of a *carbon monoxide detector* shall annunciate at the control unit and shall initiate audible and visible alarm notification throughout the *building*.~~

> ~~**Exception:** Occupant notification is permitted to be limited to the area where the carbon monoxide *alarm signal* originated and other signaling zones in accordance with the fire safety plan, provided that the *alarm signal* from an activated *carbon monoxide detector* is automatically transmitted to an *approved* on-site location or off-premises location.~~

~~**[F] 915.5.5 Duct detection**~~**.**
~~*Carbon monoxide detectors* placed in environmental air ducts or plenums shall not be used as a substitute for the required protection in Section 915.~~

~~**[F] 915.6 Maintenance**~~**.**
~~*Carbon monoxide alarms* and carbon monoxide detection systems shall be maintained in accordance with the *International Fire Code* .~~

Add new text as follows:

[F] 915.1 General. New and existing buildings shall be provided with carbon monoxide (CO) detection in accordance with Sections 915.2 through 915.5.

[F] 915.2 Where required. Carbon monoxide detection shall be provided in interior spaces, other than dwelling units or sleeping units, that are exposed to a *carbon monoxide source* in accordance with Sections 915.2.1 through 915.2.3. Carbon monoxide detection for dwelling units or sleeping units that are exposed to a *carbon monoxide source* shall be in accordance with Section 915.2.4.

[F] 915.2.1 Interior spaces with direct carbon monoxide sources. In all occupancies, interior spaces with a *direct carbon monoxide source* shall be provided with carbon monoxide detection located in close proximity to the *direct carbon monoxide source* and in accordance with Section 915.3.

> **Exception**: Where environmental conditions in an enclosed space are incompatible with carbon monoxide detection devices, carbon monoxide detection shall be provided in an *approved* adjacent location.

[F] 915.2.2 Interior spaces adjacent to a space containing a carbon monoxide source. *Groups A, B, E, I, M and R Occupancies*, interior spaces that are separated from and adjacent to an enclosed parking garage or an interior space that contains a *direct carbon monoxide source* shall be provided with carbon monoxide detection if there are communicating openings between the spaces. Detection devices shall be located in close proximity to communicating openings on the side that is furthest from the *carbon monoxide* *source* and in accordance with Section 915.3

Exceptions:

1 Where communicating openings between the space containing a *direct carbon monoxide source* and the adjacent space are permanently sealed airtight, carbon monoxide detection is not required for the adjacent space.

2 Where the *fire code official* determines that the volume or configuration of the adjacent interior space is such that dilution or geometry would diminish the effectiveness of carbon monoxide detection devices located in such spaces, detection devices additional to those required by Section 915.2.1 shall be located on the side of communicating openings that is closest to the *carbon monoxide source*.

[F] 915.2.3 Interior spaces with forced-indirect carbon monoxide sources. In all occupancies, interior spaces with a *forced-indirect carbon monoxide source* shall be provided with carbon monoxide detection in accordance with either of the following:

1. Detection in each space with a forced-indirect carbon monoxide source, located in accordance with Section 915.3.
2. Detection only in the first space served by the main duct leaving the *forced-indirect carbon monoxide source*, located in accordance with Section 915.3, with an audible and visual alarm signal provided at an *approved* location.

[F] 915.2.4 Dwelling units and sleeping units. Carbon monoxide detection for *dwelling units* and *sleeping units* shall comply with Sections 915.2.4.1 and 915.2.4.2.

[F] 915.2.4.1 Direct carbon monoxide sources. Where a *direct carbon monoxide* source is located in a bedroom or sleeping room, or a bathroom attached to either, carbon monoxide detection shall be installed in the bedroom or sleeping room.
Where carbon monoxide detection is not installed in bedrooms or sleeping rooms, carbon monoxide detection shall be installed outside of each separate sleeping area in close proximity to bedrooms or sleeping rooms for either of the following conditions:

1. The *dwelling unit* or *sleeping unit* has a communicating opening to an attached, enclosed garage.
2. A *direct carbon monoxide source* is located in the *dwelling unit* or *sleeping unit* outside of bedrooms or sleeping rooms.

[F] 915.2.4.2
Forced-indirect carbon monoxide sources.
. Bedrooms or sleeping rooms in dwelling units or sleeping units that are exposed to a forced-indirect carbon monoxide source shall be provided with carbon monoxide detection in accordance with Section 915.2.4.1 or Section 915.2.3.

[F] 915.3 Location of detection devices. Carbon monoxide detection devices shall be installed in accordance with manufacturer's instructions in a location that avoids dead air spaces, turbulent air spaces, fresh air returns, open windows, and obstructions that would inhibit accumulation of carbon monoxide at the detection location. Carbon monoxide detection in air ducts or plenums shall not be permitted as an alternative to required detection locations.

[F] 915.4 Permissible detection devices.. Carbon monoxide detection shall be provided by a carbon monoxide detection system complying with Section 915.4.2 unless *carbon monoxide alarms* are permitted by Sections 915.4.1.

[F] 915.4.1 Carbon monoxide alarms.. *Carbon monoxide alarms* complying with Sections 915.4.1.1 through 915.4.1.3 shall be permitted in lieu of a carbon monoxide detection system in both of the following:

1. *Dwelling units* and *sleeping units*.
2. Locations other than *dwelling units* or *sleeping units*, where *approved*, provided that the manufacturer's instructions do not prohibit installation in locations other than *dwelling units* or *sleeping units* and that the alarm signal for any *carbon monoxide alarm* installed in a normally unoccupied location is annunciated by an audible and visual signal in an *approved* location.

[F] 915.4.1.1 Power source. In buildings with a wired power source, *carbon monoxide alarms* shall receive their primary power from a permanent connection to building wiring, with no disconnecting means other than for overcurrent protection, and shall be provided with a battery backup. In buildings without a wired power source, *carbon monoxide alarms* shall be battery powered.

> **Exception:** *Carbon monoxide alarms* shall be permitted to be battery powered or plug-in with a battery backup where such alarms are being retrofitted into an existing building that was not previously required to have carbon monoxide detection permanently connected to a wired power source.

[F] 915.4.1.2 Listings. *Carbon monoxide alarms* shall be *listed* in accordance with UL 2034. Combination carbon monoxide/smoke alarms shall also be listed in accordance with UL 217.

[F] 915.4.1.3 Interconnection.. Where more than one *carbon monoxide alarm* is installed, actuation of any alarm shall cause all of the alarms to signal an alarm condition.

[F] 915.4.2 Carbon monoxide detection systems.. Carbon monoxide detection systems shall be installed in accordance with NFPA 72.

[F] 915.4.2.1 Fire alarm system integration.. Where a building fire alarm system or combination fire alarm system, as defined in NFPA 72, is installed, carbon monoxide detection shall be provided by connecting *carbon monoxide detectors* to the fire alarm system. Where a building fire alarm system or a combination fire alarm system is not installed, carbon monoxide detection shall be provided by connecting *carbon monoxide detectors* to a carbon monoxide detection system complying with NFPA 72.

[F] 915.4.2.2 Listings.. *Carbon monoxide detectors* shall be *listed* in accordance with UL 2075. Combination carbon monoxide/smoke detectors shall be listed in accordance with UL 268 and UL 2075.

[F] 915.4.2.3 Alarm notification. For other than Group E Occupancies, activation of a *carbon monoxide detector* shall initiate alarm notification in accordance with any of the following:

1. An audible and visible alarm notification throughout the building and at the control unit.
2. Where specified in an *approved* fire safety plan, an audible and visible alarm in the signaling zone where the carbon monoxide has been detected and other signaling zones specified in the fire safety plan, and at the control unit.
3. Where a sounder base is provided for each detector, an audible alarm at the activated *carbon monoxide detector* and an audible and visible alarm at the control unit.

For Group E Occupancies having an occupant load of 30 or less, alarm notification shall be provided in an on-site location staffed by school personnel or in accordance with the notification requirements for other occupancies. For Group E occupancies having an occupant load of more than 30, an audible and visible alarm shall be provided in an on-site location staffed by school personnel.

[F] 915.5
Maintenance
. *Carbon monoxide alarms* and carbon monoxide detection systems shall be maintained in accordance with the International Fire Code.

Reason: The final version of the 2024 edition text for Section 915 that was approved at the public comment hearing last cycle fell short of clearly conveying requirements. When I was asked by interested parties this cycle to help develop text for a couple "simple" changes, it became evident to me that this section of the code, which has been in flux for multiple editions, was so difficult to follow that an entire re-write was needed. I initially attempted to do this in legislative format, but the result was nearly impossible to follow. Furthermore, the adopted code text seems to require a level of protection for some occupancies that is excessive and for other occupancies insufficient.

This rewrite is intended to add clarity and was filtered by what I considered to be reasonable interpretation of the existing provisions, guided by New York state regulations, NFPA 72, and other sources of similar content. Beyond that, I modified content to address what I considered to be shortcomings or excessive provisions, or which were suggested by the task group that assisted with development of this proposal. For example:

1. The current code treats most buildings/occupancies in an equivalent fashion. It seems reasonable to provide a higher level of protection for occupancies with more occupant exposure (those other than F, H, S or U), so detection in adjacent spaces with communicating openings to a space with a CO source have been added.
2. The current code recognizes battery powered CO alarms in existing buildings but does not allow plug-in detectors in such cases. It seems reasonable to allow a plug-in detector if a battery-powered detector is allowed.
3. The allowance of expanded use of CO alarms in 915.4.1 was suggested by others.
4. The current code requires most detection to take place at the ceiling level. Clearly, that's not optimal for high ceiling, large volume spaces, especially if the CO source is small or if there is not a heat source to add buoyancy to a CO release. While the suggested text of locating "in close proximity" to a source isn't optimal or prescriptive, it allows for the designer to determine preferred locations.
5. Requiring CO detection for any occupancy that has a CO producing vehicle seems excessive. One LP forklift or a riding LP floor cleaner?
6. Detection device location guidance in 915.3 is derived from NY State regulations.
7. The allowance of detectors with sounder bases in lieu of alarm system notification was agreed to by the task group.
8. Exceptions that were in 1103.9 have been incorporated into 915 for simplification and to avoid conflict/overlap.

I expect that others will have differing opinions on some of the technical changes that have been suggested, and I welcome that dialogue during the code development process. I have no client interest in this proposal and my contribution of many hours developing and submitting this is exclusively seeking to clarify and improve the code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

It is impossible to assess the cost impact of this proposal because many of the current code provisions are vague and difficult, if not impossible, to uniformly interpret. The overall intent of this proposal is to make the provisions intelligible so that the requirements are clearly stated for more uniform application and enforcement. Beyond that, some of the revisions might be seen as increasing costs in some cases; whereas, others might be seen as decreasing costs by allowing new reduced-cost compliance options or clarifying a lesser extent of detection areas.

F148-24

F149-24

IFC: 915.3.2, 915.3.3, 915.5.4; IBC: [F] 915.3.2, [F] 915.3.3, [F] 915.5.4

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

915.3.2 ~~Fire~~ Connection to fire alarm system ~~required~~.

~~New~~ In buildings ~~that are~~ required to provide a fire alarm system by Section 907.2 ~~to have a *fire alarm system*~~ and carbon monoxide detection by Section 915.2, ~~to have~~ the carbon monoxide detectors shall be connected to the *fire alarm system* in accordance with NFPA 72.

915.3.3 Fire alarm systems not required.

In ~~new~~ buildings ~~that are~~ not required to provide a fire alarm system by Section 907.2 ~~to have a *fire alarm system*~~, carbon monoxide detection shall be provided by one of the following:

1. Carbon monoxide detectors connected to an *approved* carbon monoxide detection system in accordance with NFPA 72.
2. Carbon monoxide detectors connected to an *approved* combination system in accordance with NFPA 72.
3. Carbon monoxide detectors connected to an *approved fire alarm system* in accordance with NFPA 72.
4. Where *approved* by the *fire code official*, carbon monoxide alarms maintained in accordance with the manufacturer's instructions.

915.5.4 Occupant notification.

Activation of a carbon monoxide detector shall annunciate at the control unit and shall initiate audible and ~~visible~~ visual alarm notification throughout the building.

Exception: Occupant notification is permitted to be limited to the area where the carbon monoxide alarm signal originated and other signaling zones in accordance with the fire safety and evacuation plan, provided that the alarm signal from an activated carbon monoxide detector is automatically transmitted to an *approved* on-site location or off-premises location.

2024 International Building Code

Revise as follows:

[F] 915.3.2 ~~Fire~~ Connection to fire alarm system ~~required~~.

~~New~~ In buildings ~~that are~~ required to provide a fire alarm system by Section 907.2 ~~to have a *fire alarm system*~~ and carbon monoxide detection by Section 915.2, ~~to have~~ the carbon monoxide detectors shall be connected to the *fire alarm system* in accordance with NFPA 72.

[F] 915.3.3 Fire alarm systems not required.

In ~~new~~ buildings ~~that are~~ not required to provide a fire alarm system by Section 907.2 ~~to have a *fire alarm system*~~, carbon monoxide detection shall be provided by one of the following:

1. *Carbon monoxide detectors* connected to an *approved* carbon monoxide detection system in accordance with NFPA 72.
2. *Carbon monoxide detectors* connected to an *approved* combination system in accordance with NFPA 72.
3. *Carbon monoxide detectors* connected to an *approved fire alarm system* in accordance with NFPA 72.
4. Where *approved* by the fire code official, *carbon monoxide alarms* maintained in accordance with the manufacturer's instructions.

[F] 915.5.4 Occupant notification.

Activation of a carbon monoxide detector shall annunciate at the control unit and shall initiate audible and ~~visible~~ visual alarm notification throughout the building.

Exception: Occupant notification is permitted to be limited to the area where the carbon monoxide alarm signal originated and other signaling zones in accordance with the fire safety <u>and evacuation</u> plan, provided that the alarm signal from an activated carbon monoxide detector is automatically transmitted to an *approved* on-site location or off-premises location.

Reason: These sections were added in the 2021 Group A cycle. This proposal does not change the requirements; it simply clarifies the requirements.

Section 915.3.2 is editorially revised to remove unnecessary words and clarify that the building is required to a fire alarm system vs. a fire alarm system was installed for some other reason.

Section 915.3.3 is revised to correlate with the wording in Section 915.5.2.

Section 915.5.4 is revised to utilize the correct terms found in the IFC. The code uses “visual notification” and Chapter 4 addresses fire safety and evacuation plans.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

See reason statement.

F149-24

F150-24

IFC: SECTION 916, 916.1, 916.3, 916.4, 916.5, 916.6, 916.7, 916.8, 916.9, 916.10, 916.11, 1203.2.7, SECTION 6004, 6004.2.2.7; IBC: SECTION 916, [F] 916.1, [F] 916.3, [F] 916.4, [F] 916.5, [F] 916.6, [F] 916.7, [F] 916.8, [F] 916.9, [F] 916.10, [F] 916.11, SECTION 2702, [F] 2702.2.7

Proponents: Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com); Scott Lang, Honeywell, Honeywell (scott.lang@honeywell.com); Richard Roberts, Honeywell Building Automation, Honeywell Building Automatation (richard.roberts@systemsensor.com)

2024 International Fire Code

SECTION 916 GAS DETECTION SYSTEMS

Revise as follows:

916.1 Gas detection systems.
Gas detection systems required by this code shall comply with Sections 916.2 through ~~916.11~~ 916.10.

916.3 Equipment. *Gas detection system* equipment shall be designed for use with the gases being detected and shall be installed in accordance with an engineering analysis, the manufacturer's instructions , and their listings when applicable.

916.4 Power connections. *Gas detection systems* shall be ~~permanently connected to the building electrical power supply or shall be permitted to be cord connected to an unswitched receptacle using an *approved* restraining means that secures the plug to the receptacle~~ powered in accordance with NFPA 72.

916.5 Emergency ~~and standby~~ power. ~~Standby or e~~ Emergency power shall be provided ~~or the *gas detection system* shall initiate a trouble signal at an *approved* location if the power supply is interrupted~~ in accordance with NFPA 110 or NFPA 111 for a length of time that is based upon an engineering analysis of the hazards the gas detection system is providing protection for in relation to how long the protection systems are needed to function to respond to a potential hazard.

916.6 Sensor locations. Sensors shall be installed in *approved* locations ~~where leaking gases are expected to accumulate~~ pursuant to an engineering evaluation in accordance with NFPA 72.

916.7 Gas sampling. Gas sampling shall be performed ~~continuously~~in accordance with the engineering analysis performed in accordance with NFPA 72 and manufacturer's instructions. ~~Sample analysis shall be processed immediately after sampling, except as follows:~~

1. ~~For HPM gases, sample analysis shall be performed at intervals not exceeding 30 minutes~~
2. ~~For toxic gases that are not HPM, sample analysis shall be performed at intervals not exceeding 5 minutes, in accordance with Section 6004.2.2.7.~~
3. ~~Where a less frequent or delayed sampling interval is *approved*~~

916.8 System activation.
A gas detection alarm shall be initiated ~~where any sensor detects a concentration of gas exceeding the following thresholds:~~ based upon the engineering analysis prepared and submitted in compliance with NFPA 72.

1. ~~For *flammable gases*, a gas concentration exceeding 25 percent of the lower flammability limit (LFL).~~
2. ~~For nonflammable gases, a gas concentration exceeding one-half of the IDLH, unless a different threshold is specified by the section of this code requiring a *gas detection system*.~~

~~Upon activation of a gas detection alarm, alarm signals or other required responses shall be as specified by the section of this code~~

~~requiring a *gas detection system*. Audible and visible alarm signals associated with a gas detection alarm shall be distinct from fire alarm and carbon monoxide alarm signals.~~

916.9 ~~Signage~~ Signal response.. ~~Signs shall be provided adjacent to *gas detection system* alarm signaling devices~~ Facility emergency action plans shall include procedures and training that advise occupants of the nature of the signals and actions to take in response to the signal.

Delete without substitution:

~~**916.10 Fire alarm system connections.** Gas sensors and *gas detection systems* shall not be connected to fire alarm systems unless *approved* and connected in accordance with the fire alarm equipment manufacturer's instructions.~~

Revise as follows:

~~916.11~~ 916.10 Inspection, testing and sensor calibration.
Inspection and testing of *gas detection systems* shall be conducted ~~not less than annually~~ in accordance with NFPA 72. Sensor calibration shall be confirmed at the time of sensor installation and calibration shall be performed at the frequency specified by the sensor manufacturer.

1203.2.7 Gas detection systems.
Emergency power shall be provided for *gas detection systems* ~~where required by Sections 1203.2.10 and 1203.2.17. Standby power shall be provided for *gas detection systems* where required by Sections 916.5 and 1207.6.1.2.4~~ fora length of time that is based upon an engineering analysis of the hazards the gas detection system is providing protection for in relation to how long the protection systems are needed to function to respond to a potential hazard.

SECTION 6004
HIGHLY TOXIC AND TOXIC COMPRESSED GASES

Revise as follows:

6004.2.2.7 Treatment systems.
The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required in Sections 6004.2.2.4 and 6004.2.2.5 shall be directed to a treatment system. The treatment system shall be utilized to handle the accidental release of gas and to process exhaust ventilation. The treatment system shall be designed in accordance with Sections 6004.2.2.7.1 through 6004.2.2.7.5 and Section 509 of the International Mechanical Code.

Exceptions:

1. Highly toxic and toxic gases—storage. A treatment system is not required for cylinders, containers and tanks in storage where all of the following controls are provided:
   1.1. Valve outlets are equipped with gastight outlet plugs or caps.
   1.2. Handwheel-operated valves have handles secured to prevent movement.
   1.3. *Approved* containment vessels or containment systems are provided in accordance with Section 6004.2.2.3.
2. Toxic gases—use. Treatment systems are not required for toxic gases supplied by cylinders or portable tanks not exceeding 1,700 pounds (772 kg) water capacity where a *gas detection system* complying with Section 6004.2.2.10 and *listed* or *approved* automatic-closing fail-safe valves are provided. The *gas detection system* shall have a sensing interval not exceeding 5 minutes. Automatic-closing fail-safe valves shall be located immediately adjacent to cylinder valves and shall close when gas is detected at the permissible exposure limit (PEL) by a gas sensor monitoring the exhaust system at the point of discharge from the gas cabinet, exhausted enclosure, ventilated enclosure or gas room.

2024 International Building Code

SECTION 916
GAS DETECTION SYSTEMS

Revise as follows:

[F] 916.1 Gas detection systems.
Gas detection systems required by this code shall comply with Sections 916.2 through ~~916.11~~ 916.10.

[F] 916.3 Equipment. *Gas detection system* equipment shall be designed for use with the gases being detected and shall be installed in accordance with an engineering analysis, the manufacturer's instructions , and their listing when applicable.

[F] 916.4 Power connections. *Gas detection systems* shall be ~~permanently connected to the *building* electrical power supply or shall be permitted to be cord connected to an unswitched receptacle using an *approved* restraining means that secures the plug to the receptacle~~ powered in accordance with NFPA 72.

[F] 916.5 Emergency ~~and standby~~ power. ~~Standby or e~~ Emergency power shall be provided ~~or the *gas detection system* shall initiate a *trouble signal* at an *approved* location if the power supply is interrupted~~ in accordance with NFPA 110 or NFPA 111 for a length of time that is based upon an engineering analysis of the hazards the gas detection system is providing protection for in relation to how long the protection systems are needed to function to respond to a potential hazard.

[F] 916.6 Sensor locations.
Sensors shall be installed in *approved* locations ~~where leaking gases are expected to accumulate~~ pursuant to an engineering evaluation in accordance with NFPA 72..

[F] 916.7 Gas sampling.
Gas sampling shall be performed ~~continuously~~in accordance with the engineering analysis performed in accordance with NFPA 72 and manufacturer's instructions. ~~. Sample analysis shall be processed immediately after sampling, except as follows:~~

1. ~~For *HPM* gases, sample analysis shall be performed at intervals not exceeding 30 minutes.~~
2. ~~For *toxic* gases that are not *HPM*, sample analysis shall be performed at intervals not exceeding 5 minutes in accordance with Section 6004.2.2.7 of the International Fire Code.~~
3. ~~Where a less frequent or delayed sampling interval is *approved*.~~

[F] 916.8 System activation.
A gas detection alarm shall be initiated ~~where any sensor detects a concentration of gas exceeding the following thresholds:~~ based upon the engineering analysis prepared and submitted in compliance with NFPA 72.

1. ~~For flammable gases, a gas concentration exceeding 25 percent of the lower flammability limit (*LFL*).~~
2. ~~For nonflammable gases, a gas concentration exceeding one-half of the *IDLH*, unless a different threshold is specified by the section of this code requiring a *gas detection system*.~~

~~Upon activation of a gas detection alarm, *alarm signals* or other required responses shall be as specified by the section of this code requiring a *gas detection system*. Audible and visible *alarm signals* associated with a gas detection alarm shall be distinct from fire alarm and carbon monoxide *alarm signals*.~~

[F] 916.9 ~~Signage~~ Signal response..
~~Signs shall be provided adjacent to *gas detection system* alarm signaling devices~~ Facility emergency action plans shall include procedures and training that advise occupants of the nature of the signals and actions to take in response to the signal.

Delete without substitution:

~~**[F] 916.10 Fire alarm system connections**~~**.**

~~Gas sensors and *gas detection systems* shall not be connected to *fire alarm systems* unless *approved* and connected in accordance with the fire alarm equipment manufacturer's instructions.~~

Revise as follows:

[F] ~~916.11~~ <u>916.10</u> Inspection, testing and sensor calibration.
Gas detection systems and sensors shall be inspected, tested and calibrated in accordance with the *International Fire Code* .

SECTION 2702
EMERGENCY AND STANDBY POWER SYSTEMS

Revise as follows:

[F] 2702.2.7 Gas detection system.
Emergency ~~or standby~~ power shall be provided for *gas detection systems* in accordance with the *International Fire Code* .

Reason: The main purpose of this proposal is correlation. Gas detection systems are now part of NFPA 72 which the IFC and IBC reference and this section should be correlated with that document.

Section 916 is modified to include and engineering analysis which NFPA 72 requires for placement of gas detectors. Factually you cannot place a gas detector and expect a proper response without an engineering analysis. It also includes complying with listing when applicable.

Section 916.4 is modified to delete the prescriptive language and to refer to NFPA 72.

Section 916.5 is modified to refer to emergency power only, NFPA 110 has been modified to refer to Emergency Power Supply Systems (EPSS) generally, then engineering analysis provides for the Classification, Type and Level of emergency power supply. The new language specifies that the duration of the emergency power is based upon the expected duration of the required gas detection protection. There are no cookie cutter time frames for this need, each hazard protected will have differing needs.

Section 916.6 deletes subjective language and links the sensor location to the NFPA 72 required engineering analysis.

Section 916.7 again deletes all the subjective language and links this issue to the engineering analysis and manufacturer's instructions. This section had a link to IFC Section 6004.2.2.7, and that section is included in this proposal with a deletion of that subjective language.

Section 916.8 deletes the prescriptive language and ties the gas sampling to the NFPA 72 required engineering analysis.

Section 916.9 Is modified to eliminate signs for employees to read when an event occurs and replace same with a requirement that the facility EAP include procedures and training for employees on their expected response.

Section 916.10 is deleted. In many cases the gas detection shares the FACP in accordance with NFPA 72. The code requires all alarm system submittals to be approved.

Section 916.11 is renumbered, and the inspection and testing has been linked to NFPA 72.

Section 1203.2.7 has been modified to state that the gas detection emergency power must be provided based upon the engineering analysis of the hazards being protected, there are no set time frames, each situation requires separate analysis.

Section 6004.2.2.7 has been modified to delete the prescriptive 5-minute response time (which actually could be too long in some circumstances), the required engineering analysis will address this issue.

From a practical standpoint, engineering submittals typically comply with NFPA 72 and include the analysis that these changes correlate with.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is primarily editorial. It correlates the existing IFC language with the standards that the IFC refers to that have undergone improvements since these provisions were added to the IFC.

F151-24

IFC: 917.1, 917.2; IBC: [F] 917.1, [F] 917.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

917.1 ~~College and university campuses~~ General.
A mass notification risk analysis in accordance with NFPA 72 shall be conducted prior ~~Prior~~ to construction of a new building requiring a *fire alarm system* ~~on a multiple-building college or university campus having a cumulative building *occupant load* of 1,000 or more, a mass notification risk analysis shall be conducted in accordance with NFPA 72.~~ for any of the following:

1. The building is part of a college or university campus having multiple buildings and a cumulative occupant load of 1,000 or more
2. The building is a Group E occupancy having an occupant load of 500 or more.
3. For occupancies other than Group E, the building has a lockdown plan in accordance with Section 404.2.3.

Where the risk analysis determines a need for mass notification, an approved mass notification system shall be provided in accordance with the findings of the risk analysis.

Delete without substitution:

~~917.2 Group E occupancies~~.
~~Prior to construction of a new building containing a Group E occupancy requiring a *fire alarm system* and having an occupant load of 500 or more, a mass notification risk analysis shall be conducted in accordance with NFPA 72. Where the risk analysis determines a need for mass notification, an *approved* mass notification system shall be provided in accordance with the findings of the risk analysis.~~

2024 International Building Code

Revise as follows:

[F] 917.1 ~~College and university campuses~~ General.
A mass notification risk analysis in accordance with NFPA 72 shall be conducted prior ~~Prior~~ to construction of a new *building* requiring a *fire alarm system* ~~on a multiple-*building* college or university campus having a cumulative *building occupant load* of 1,000 or more, a mass notification risk analysis shall be conducted in accordance with NFPA 72.~~ for any of the following:

1. The building is part of a college or university campus having multiple buildings and a cumulative occupant load of 1,000 or more.
2. The building is a Group E occupancy having an occupant load of 500 or more.
3. For occupancies other than Group E, the building has a lockdown plan in accordance with Section 404.2.3 of the International Fire Code.

Where the risk analysis determines a need for mass notification, an *approved* mass notification system shall be provided in accordance with the findings of the risk analysis.

Delete without substitution:

~~[F] 917.2 Group E occupancies~~.
~~Prior to construction of a new *building* containing a Group E occupancy requiring a *fire alarm system* and having an *occupant load* of 500 or more, a mass notification risk analysis shall be conducted in accordance with NFPA 72. Where the risk analysis determines a need for mass notification, an *approved* mass notification system shall be provided in accordance with the findings of the risk analysis.~~

Reason: This is the first of two proposals relating to notifying occupants during a lockdown. This proposal reorganizes, consolidates, and clarifies the previous 917.1 and 917.2, but does not change the requirements for educational occupancies, or colleges and universities.

The risk of death and injuries are shifting from fire incidences towards incidences of violence through a combination of reduction of fire deaths and an increase of violence. Mass notification often utilizes both voice and other communication technologies and is intended to communicate information about emergencies including but not limited to fire, human caused events (accidental and intentional), other dangerous situations, accidents, and natural disasters. A lockdown situation often requires a subsequent evacuation depending on the threat, and therefore is a reasonable trigger to perform a mass notification risk analysis. Furthermore, although lockdown planning is addressed in section 404.2.3, a lockdown response is not mandated by the code. Since lockdown is voluntary this proposed requirement is not compulsory unless lockdown is a planned emergency response.

For example, active shooters are one specific kind of threat that is often a concern. Active shooter incidences continue to increase in frequency, and the number of injuries and fatalities. Many associate active shooters with K-12 schools, colleges, and universities. However, statistics gathered by the FBI, and US Secret Service, National Institute of Justice, and The Violence Project show that workplaces (Business/Commerce/Retail/Factory) exceed educational occupancies as locations of concern. [1]

Every facility is unique and has specific risks. A risk analysis is a process to determine the likelihood, vulnerability, and magnitude of all potential emergencies. The complexity of the risk analysis should be commensurate to the complexity of the building(s) and hazards being considered. The risk analysis will determine if a mass notification system is needed and the type of mass notification system that best meets the specific needs of the building. This is important because mass notification is defined as "a technology capable of sending different layers of messaging that provides real-time information to groups of individuals within buildings, campus settings, geographic regions, or entire nations by using one or a combination of the following technologies:

<u>Layer 1:</u>

Voice messages

Visible notification appliances

Digital signage

<u>Layer 2:</u>

Wide-area outdoor mass notification systems

<u>Layer 3:</u>

Text messages

Emails

Tactile devices

Computer pop-ups

<u>Layer 4:</u>

Social networks

Radio broadcast

Television broadcast

Weather radios

Moreover, the key to determining if a mass notification system is required, is to review the Fire Safety, Lockdown and Evacuation Plans in-conjunction with the mass notification risk analysis. The risk analysis may identify hazards that are facility specific that lead to specific response plans with specific communication system requirements for that facility.

Requiring a risk analysis will result in a more comprehensive emergency response plan that is customized for the specific hazards and risks associated with the building. The risk analysis and emergency response plan can be as elaborate or as basic as the fire code official and building owner determines it needs to be. In some cases, other types of one-way communications may be needed to provide effective protection. This proposal ***only*** emphasizes the need to document how communicating with the occupants of the building and possibly occupants that are outside the building will be accomplished.

Sections 917.1 and 917.2 are moved to Items 1 and 2. In the proposal, these two items are clarified. The occupant load threshold for college and university campuses is based on the aggregate occupant load of all buildings on the campus. In Item 2, the occupant load is the occupant load of the single new building, not an aggregate occupant load of the school. The trigger for Item 3 is the construction of a new building as stated in the 1st sentence. The trigger is not the development of a new lockdown plan for an existing building. Item 3 requires any occupancy where a fire alarm system is required must provide a risk analysis. For all Items 1 through 3, if the risk analysis determines a need for mass notification, mass notification must be provided.This proposal **does not automatically** mandate the installation of any mass notification systems. Rather, it only requires a risk analysis be conducted for a new building that chooses to utilize lockdown in conjunction with evacuation plans as detailed in section 404. The responsibility for the risk analysis rests on the building owner who may employ the necessary professionals to satisfy the requirements.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Bibliography: [1] References

FBI: https://www.fbi.gov/file-repository/active-shooter-incidents-in-the-us-2022-042623.pdf/view

US Secret Service: https://www.secretservice.gov/sites/default/files/reports/2023-01/usss-ntac-maps-2016-2020.pdf

The Violence Project: https://www.theviolenceproject.org/key-findings/

National Institute of Justice: https://nij.ojp.gov/topics/articles/public-mass-shootings-database-amasses-details-half-century-us-mass-shootings

Cost Impact: Increase

Estimated Immediate Cost Impact:

The code change proposal will increase the costs of construction for buildings utilizing lockdown as a planned emergency response.

Estimated Immediate Cost Impact Justification (methodology and variables):

The code change proposal will increase the costs of construction for buildings, not classified as Group E, utilizing lockdown as a planned emergency response. Group E Occupancies with occupant load over 500 and College campus buildings with cumulative occupant load over 1000 already requires a mass notification risk analysis and so there is no cost increase associated with those occupancies.

The cost of the risk analysis will be based on the complexity of the facility, and in most cases, there will be some additional costs to conduct the risk analysis. Typically, the cost of an MNS Risk Analysis is in the range of 0.5% of the cost of the fire alarm system.

In extreme cases, the risk analysis may cost thousands of dollars to produce an expansive report of risks, and strategies to mitigate those risks. For example, a comprehensive analysis for a typical K-12 school with 500 to 1000 occupants may require 25-50 hours to complete at an engineering cost of ~$200/hour. This varies depending on overall size, location, and school features (i.e., simple/small vs. theater buildings, athletic facilities and fields, etc.). An MNS Risk Analysis for a campus educational occupancy (e.g., college/university) may cost $12,000 - $25,000 depending on overall size, location, number of students, number of buildings, and campus features (i.e., again simple/small vs. large/complex, large arenas, large stadiums, etc.).

While the K-12 & Collage University MNS Risk Analysis is not part of this proposal, these examples may be applied to other occupancies of similar size and complexity. But there are many other variables that affect the cost including: types of risks associated with the location, facility type, nearby facilities and types of risks associated with those, maturity of emergency response planning already in place, etc.

An MNS Risk Analysis for a hospitality and entertainment complex (e.g., hotel and casino, hotel and waterpark, etc.) is $10,000 -

$25,000 depending on overall size, location, number of occupants, high-rise vs. non-high-rise, number of buildings or interconnected buildings, and facility features (i.e., again simple/small vs. large/complex; use of alternative notification sequences like high-rise sequencing, positive alarm sequence, and Pre Signal; and use of building paging systems, PAVA, house sound systems, etc.).

When already required emergency communications systems (i.e., EVAC) are identified as the only means of communication needed, there will be no increased cost of construction other than performing the risk analysis. If the conclusion of the risk analysis identifies the need for additional methods of notification, there will be some additional incremental expense for systems.

F151-24

F152-24

IFC: (New), SECTION 202 (New), SECTION 918 (New), 918.1 (New), 918.2 (New), 918.2.1 (New), 918.2.1.2 (New), 918.2.1.3 (New), 918.3 (New), 918.3.1 (New), 918.3.1.1 (New), 918.3.1.2 (New), 918.3.1.3 (New), 918.3.2 (New), 918.3.2.1 (New), 918.3.2.2 (New), 918.3.2.3 (New), 918.4 (New), NFPA Chapter 80 (New), UL Chapter 80 (New); IBC: SECTION 202 (New), SECTION 918 (New), [F] 918.1 (New), [F] 918.2 (New), [F] 918.2.1 (New), [F] 918.2.1.2 (New), [F] 918.2.1.3 (New), [F] 918.3 (New), [F] 918.3.1 (New), [F] 918.3.1.1 (New), [F] 918.3.1.2 (New), [F] 918.3.1.3 (New), [F] 918.3.2 (New), [F] 918.3.2.1 (New), [F] 918.3.2.2 (New), [F] 918.3.2.3 (New), [F] 918.4 (New), NFPA Chapter 35 (New), UL Chapter 35 (New)

Proponents: Rick Trieste, Consolidated Edison Company of New York, Consolidated Edison Company of New York (triester@coned.com)

2024 International Fire Code

Add new definition as follows:

FUEL GAS ALARM . A single- or multiple-station alarm intended to detect fuel gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit.

FUEL GAS DETECTOR. A device with an integral sensor to detect fuel gas and transmit an alarm signal to a connected alarm control unit and is part of a fuel gas detection system.

FUEL GAS DETECTION SYSTEM. A system or portion of a combination system consisting of components and circuits arranged to monitor and annunciate the status of fuel gas detectors and to initiate the appropriate response to those signals.

FUEL-GAS SOURCE. Any combustion equipment that utilizes a gas that, when combined with an oxidizer (typically air or oxygen), could be burned to produce thermal energy. Examples of fuel gases include, but are not limited to, natural gas, methane, or liquefied petroleum gases (LP-Gas) such as propane and butane.

Add new text as follows:

SECTION 918
FUEL-GAS DETECTION

918.1 General. New and existing buildings shall be provided with fuel-gas detection in accordance with Section 918.

918.2 Where required. Fuel-gas detection shall be provided in Group R occupancies that are served by a fuel-gas source.

918.2.1 Dwelling units and sleeping units. Fuel-gas detection for *dwelling units* and *sleeping units* shall comply with Sections 918.2.1.2 and 918.2.1.3.

918.2.1.2 Fuel-Gas source. Where a *fuel-gas source* is located outside of a bedroom or sleeping room, fuel-gas detection shall be installed in *dwelling units* and *sleeping units* either outside of each separate sleeping area in the immediate vicinity of the bedrooms or sleeping room or within each bedroom or sleeping room. Where a fuel-gas source is located within a bedroom or sleeping room, or a bathroom attached to either, fuel-gas detection shall be installed within the bedroom or sleeping room.

918.2.1.3 Environmental limitations for detection devices. Where environmental conditions in an enclosed room or space are incompatible with fuel-gas detection devices, fuel-gas detection shall be provided in an approved adjacent location.

918.3 Detection devices. Fuel-gas detection shall be provided by fuel-gas alarms complying with Section 918.3.1 or a fuel-gas detection system complying with Section 918.3.2.

918.3.1 Fuel-gas alarms. Fuel-gas alarms complying with Sections 918.3.1 through 918.3.1.3 and installed in accordance with NFPA

715 and the manufacturer’s instructions shall be provided in either of the following:

1. In dwelling units and sleeping units in accordance with 918.2.1.
2. In normally occupied locations other than dwelling units or sleeping units, where approved by the fire code official and the manufacturer’s instructions, fuel-gas alarms shall be annunciated by an audible and visual signal in an approved location.

918.3.1.1 Power source. Fuel-gas alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be provided with a battery backup. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Fuel-gas alarms shall be permitted to be battery powered in buildings without a power source.

918.3.1.2 Listings. Fuel-gas alarms shall be listed in accordance with UL 1484.

918.3.1.3 Interconnection. Where more than one fuel-gas alarm is installed, actuation of any alarm shall cause all alarms to signal an alarm condition.

918.3.2 Fuel-gas detection systems. Fuel-gas detection systems shall be installed in accordance with NFPA 715 and the manufacturer’s instructions.

918.3.2.1 Fire alarm system integration. Where a building fire alarm system or combination fire alarm system, as defined in NFPA 72, is provided, fuel-gas detection shall be provided by connecting fuel-gas detectors to the fire alarm system.

918.3.2.2 Listings. Fuel-gas detectors shall be listed in accordance with UL 2075.

918.3.2.3 Alarm notification. Activation of a fuel-gas detector shall initiate audible and visible alarm notification throughout the building and annunciate the alarm signal at the control unit.

Exception: Notification shall be permitted to be limited to the area where the fuel-gas alarm signal originated and other signaling zones specified in an approved fire safety plan, provided that an approved on-site or off-site location is automatically notified.

918.4 Maintenance. Fuel-gas alarms and fuel-gas detection systems shall be maintained in accordance with NFPA 715 and the manufacturer's instructions.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

715-2023 Standard for the Installation of Fuel Gases Detection and Warning Equipment

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

1484-2022 Residential Gas Detectors

2024 International Building Code

Add new definition as follows:

[F] FUEL GAS ALARM. A single- or multiple-station alarm intended to detect fuel gas and alert occupants by a distinct audible signal. It incorporates a sensor, control components and an alarm notification appliance in a single unit.

[F] FUEL GAS DETECTOR. A device with an integral sensor to detect fuel gas and transmit an alarm signal to a connected alarm control unit and is part of a fuel gas detection system.

[F] FUEL GAS DETECTION SYSTEM. A system or portion of a combination system consisting of components and circuits arranged to monitor and annunciate the status of fuel gas detectors and to initiate the appropriate response to those signals.

[F] FUEL-GAS SOURCE. Any combustion equipment that utilizes a gas that, when combined with an oxidizer (typically air or oxygen), could be burned to produce thermal energy. Examples of fuel gases include, but are not limited to, natural gas, methane, or liquefied petroleum gases (LP-Gas) such as propane and butane.

Add new text as follows:

SECTION 918
FUEL-GAS DETECTION

[F] 918.1 General. New and existing buildings shall be provided with fuel-gas detection in accordance with Section 918.

[F] 918.2 Where required. Fuel-gas detection shall be provided in Group R occupancies that are served by a fuel-gas source.

[F] 918.2.1 Dwelling units and sleeping units. Fuel-gas detection for *dwelling units* and *sleeping units* shall comply with Sections 918.2.1.2 and 918.2.1.3.

[F] 918.2.1.2 Fuel-Gas source. Where a *fuel-gas source* is located outside of a bedroom or sleeping room, fuel-gas detection shall be installed in *dwelling units* and *sleeping units* either outside of each separate sleeping area in the immediate vicinity of the bedrooms or sleeping room or within each bedroom or sleeping room. Where a fuel-gas source is located within a bedroom or sleeping room, or a bathroom attached to either, fuel-gas detection shall be installed within the bedroom or sleeping room.

[F] 918.2.1.3 Environmental limitations for detection devices. Where environmental conditions in an enclosed room or space are incompatible with fuel-gas detection devices, fuel-gas detection shall be provided in an approved adjacent location.

[F] 918.3 Detection devices. Fuel-gas detection shall be provided by fuel-gas alarms complying with Section 918.3.1 or a fuel-gas detection system complying with Section 918.3.2.

[F] 918.3.1 Fuel-gas alarms. Fuel-gas alarms complying with Sections 918.3.1 through 918.3.1.3 and installed in accordance with NFPA 715 and the manufacturer's instructions shall be provided in either of the following:

1. In dwelling units and sleeping units in accordance with 918.2.1.
2. In normally occupied locations other than dwelling units or sleeping units, where approved by the fire code official and the manufacturer's instructions, fuel-gas alarms shall be annunciated by an audible and visual signal in an approved location.

[F] 918.3.1.1 Power source. Fuel-gas alarms shall receive their primary power from the building wiring where such wiring is served from a commercial source and shall be provided with a battery backup. Wiring shall be permanent and without a disconnecting switch other than that required for overcurrent protection.

Exception: Fuel-gas alarms shall be permitted to be battery powered in buildings without a power source.

[F] 918.3.1.2 Listings. Fuel-gas alarms shall be listed in accordance with UL 1484.

[F] 918.3.1.3 Interconnection. Where more than one fuel-gas alarm is installed, actuation of any alarm shall cause all alarms to signal an alarm condition.

[F] 918.3.2 Fuel-gas detection systems. Fuel-gas detection systems shall be installed in accordance with NFPA 715 and the manufacturer’s instructions.

[F] 918.3.2.1 Fire alarm system integration. Where a building fire alarm system or combination fire alarm system, as defined in NFPA 72, is provided, fuel-gas detection shall be provided by connecting fuel-gas detectors to the fire alarm system.

[F] 918.3.2.2 Listings. Fuel-gas detectors shall be listed in accordance with UL 2075.

[F] 918.3.2.3 Alarm notification. Activation of a fuel-gas detector shall initiate audible and visible alarm notification throughout the building and annunciate the alarm signal at the control unit.

Exception: Notification shall be permitted to be limited to the area where the fuel-gas alarm signal originated and other signaling zones specified in an approved fire safety plan, provided that an approved on-site or off-site location is automatically notified.

[F] 918.4 Maintenance. Fuel-gas alarms and fuel-gas detection systems shall be maintained in accordance with NFPA 715 and the manufacturer's instructions.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

715-2023 Standard for the Installation of Fuel Gases Detection and Warning Equipment

UL

UL LLC
333 Pfingsten Road
Northbrook, IL 60062

1484-2022 Residential Gas Detectors

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024:

- ***Standard for the Installation of Fuel Gases Detection and Warning Equipment (NFPA 715-2023)***
- ***Residential Gas Detectors (UL 1484-2022)***

Reason: This Proposal seeks to protect occupants in Group-R occupancies from fires caused by natural gas or propane explosions or leaks. The proposal is in response to recommendation by the National Transportation Safety Board (NTSB) in NTSB Report NTSB/PAR-19/01 PB2019-100722 *Building Explosion and Fire Silver Spring, Maryland* that the ICC “….. requires methane detection systems for all types of residential occupancies with gas service.” The recommendation by the NTSB is supported by a 2018 NFPA report, *Natural Gas and Propane Fires, Explosions and Leaks Estimates and Incidents - Marty Ahrens and Ben Evarts October 2018:*

- Between 2012 and 2016 an estimated average of 4,200 U.S. home structure fires per year started with the ignition of natural gas that caused an average of 40 deaths per year. The report classifies homes as one- and two-family homes, including manufactured homes, and apartments and other multi-family housing.
- Natural gas or LP-Gas leaks have generally been increasing since 2007

The requirements in this proposal are based on the 2023 edition of NFPA 715 standard, *Installation for Fuel Gas Detection and Warning Equipment*. The technical requirements in NFPA 715 were based on the Fire Protection Research Foundation (FPRF) report, *Combustible Gas Dispersion in Residential Occupancies and Detector Location Analysis.* The report studied combustible gas leaks and dispersion in residential buildings, as well as an analysis of combustible gas detector placement.

Con Edison recognizes the life-saving benefit of fuel gas detection devices and as such is installing gas detection devices in every building served with natural gas with over 275,000 devices in service to date of a program that will install about 375,000 devices. The in-service devices report all detection alarms wirelessly to the Company. The program is the US largest case study for safety benefit of fuel gas detection devices and has demonstrated the reliability of the technology and the safety benefit. The Company devices have detected multiple atmospheric natural gas readings that posed a risk of fire/explosion, which was avoided by an immediate action by first responders that arrive in under 5 minutes of first detection. New York City through its Local Law 157 requires natural gas detection devices in residential occupancies served with natural gas.

Additionally, this proposal is adding new definitions for fuel gas alarm, fuel gas detector and fuel gas detection system to clarify what is intended by these terms.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The installation of fuel gas detection as part of building construction is estimated to be approximately $500.

Estimated Immediate Cost Impact Justification (methodology and variables):

Estimated detector unit cost: $50 ea.

Estimated electric box/wiring installation cost based on NYC licensed electrical contractor cost when being installed as part of new construction or renovation: $120 ea.

Estimate based on three (3) wired detectors: One (1) unit by cooking appliances; one (1) unit by heating/clothes drying equipment; one (1) outside sleeping area as required in proposal.

Estimated cost of 3 units installed in 3 wired boxes: Approximately $500

F152-24

F153-24

IFC: SECTION 1032, 1032.1, 1032.2 (New), 1032.3 (New)

Proponents: Jonathan Flannery, Pandemic Task Force Code Development Working Group, PTF CDWG (jflannery@aha.org)

2024 International Fire Code

SECTION 1032
MAINTENANCE OF THE MEANS OF EGRESS

1032.1 General. The *means of egress* for buildings or portions thereof shall be maintained in accordance with this section.

Add new text as follows:

1032.2 Maximum Occupant Load. For temporary events, where the occupant load for for a building or space is greater than that specified by Section 1004, the fire code official shall be authorized to allow a higher occupant load, provided health, life, and safety requirements are maintained. The fire code official is authorized to require a public safety plan in accordance with Section 403.11.2.

1032.3 Reduced Occupant Load. For declared public emergencies, where the occupant load for a building or space is required to be less than that specified by Section 1004 the means of egress shall be maintained. Any alterations to the means of egress shall be *approved* by the *building official* or *fire code official*.

Reason: This added section would accomplish two things: under normal circumstances, the occupant load shall not be exceeded; and where circumstance dictate, an occupant loads greater than, or in some circumstances less than, would only be allowed to be modified by the fire code official.

A search for a requirement in the fire code that the occupant load cannot be exceeded did not appear readily available. Under normal operations, without any special considerations for public safety, the occupancy load should not be exceeded.

Where special considerations are provided, such as outlined in this section of the fire code, and where approved by the fire code official, occupant loads may be exceeded with provision such as a fire watch, a public safety plan for gatherings, and/or crowd managers as noted in this section. When approved by the fire code official implies other hazards or risks to both occupants and first responder not readily obvious would be addressed by the approval.

Also, as discovered during the COVID-19 pandemic, public health officials declared reduced occupancy as a function of “social distancing” or by a percentage that occupancy would need be limited to protect public health and safety. The code provides no ability to enforce a limited occupancy in such cases. Although a smaller overall occupant load represents a lower risk to egress components and other compliance issues, in some cases exits were compromised that may affect code compliance and public safety.

As examples, in certain applications doors that serve both ingress and egress were modified to ingress only without consideration of the overall egress requirements of the building. Portions of buildings were closed off, possibly altering total travel distance and/or common path of travel. Where egress travel is modified existing exit signage may cause confusion in emergency scenarios delaying egress of occupants to the public way.

In other cases, building owners created alternative arrangements to provide full services without consideration to public safety, including using sidewalks, parking lots, and other areas that may impede egress to the public way and/or the ability for first responders to provide emergency services in a manner intended by the codes.

In this scenario, the fire code official may employ one or more of the provisions of 403.11 to ensure compliance or evaluate any other hazards to improve the code compliance in circumstance where reduced occupant load may impose alternative risks to occupants, first responders, and provide overall safety in the built environment.

The ICC/NEHA Pandemic Task Force (PTF) was organized and tasked with researching the effects of the COVID-19 pandemic on the built environment and developing a roadmap and proposing needed resources – including guidelines, recommended practices, publications and updates to the International Codes® (I-Codes®) – that are necessary to overcome the numerous challenges that may be faced during future pandemics and to construct and manage safe, sustainable and affordable occupancy of the built environment. The ICC Pandemic Task Force Code Development Work Group (PTF CDWG) has conducted a comprehensive review of current code requirements as they relate to the prevention of the transmission of diseases and other serious health concerns and suggested revisions to current code requirements based on this assessment.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This new section will not impact construction and therefore will not increase the cost of construction.

F153-24

F154-24

IFC: 1032.10, 1032.10.1, 1032.10.2

Proponents: Chad Sievers, NYS, NYS DOS (chad.sievers@dos.ny.gov); Jeanne Rice, NYSDOS (jeanne.rice@dos.ny.gov); Kevin Duerr-Clark, NYS DOS, NYS DOS (kevin.duerr-clark@dos.ny.gov); China Clarke, New York State Dept of State, Manager Technical Support Unit (china.clarke@dos.ny.gov); John R Addario - NYS Department of State, NEW YORK STATE CODES DIVISION, New York State Department of State Division of Building Standards and Codes (john.addario@dos.ny.gov)

2024 International Fire Code

Revise as follows:

1032.10 Emergency lighting equipment inspection and testing.
Emergency lighting shall be maintained in accordance with Section 110 and shall be inspected and tested in accordance with Sections 1032.10.1 and 1032.10.2. <u>Records of inspections, Power testing, Activation Testing, and maintenance shall be maintained in accordance with Section 110.3.</u>

1032.10.1 Activation test. Emergency lighting equipment shall be tested monthly for a duration of not less than 30 seconds. The test shall be performed manually or by an automated self-testing and self-diagnostic routine. Where testing is performed by self-testing and self-diagnostics, a visual inspection of the emergency lighting equipment shall be conducted monthly to identify any equipment displaying a trouble indicator or that has become damaged or otherwise impaired.

1032.10.2 Power test. Battery-powered emergency lighting equipment shall be tested annually by operating the equipment on battery power for not less than 90 minutes.

Reason: Although this appears to be a new requirement, this is not because section 110.3 already requires that records be maintained this is simply providing a direct reminder for the code user.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is only editorial as it is pointing to another code section which is required.

F154-24

F155-24

IFC: 1032.7

Proponents: Jeff Grove, Chair, Building Code Action Committee (BCAC) (bcac@iccsafe.org); Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

1032.7 Emergency escape and rescue openings.
Required *emergency escape and rescue openings* shall be maintained in accordance with the code in effect at the time of construction, and both of the following:

1. Required *emergency escape and rescue openings* shall be operational from the inside of the room without the use of keys or tools. Window-opening control devices complying with ASTM F2090 shall be permitted for use on windows serving as a required *emergency escape and rescue opening*.
2. Bars, grilles, grates or similar devices are permitted to be placed over *emergency escape and rescue openings* or area well that serve such openings provided that the minimum net clear opening size complies with the code that was in effect at the time of construction and the unit is equipped with smoke alarms installed in accordance with Section 907.2.11. Such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the *emergency escape and rescue opening*.

Reason: The EERO's have been extensively coordinated between the IBC and IRC over the last couple of cycles. It is suggested that this section be revised to not repeat items that are addressed in Section 1031.2.1 and 1031.6.This proposal is submitted by the ICC Building Code Action Committee (BCAC) and the ICC Fire Code Action Committee (FCAC).

BCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 the BCAC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the BCAC website at BCAC webpage.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This provides clarification for requirements and meets the original intent.

F155-24

F156-24

IFC: SECTION 1101, 1101.1, 1101.2, 1101.3, 1101.4, 1101.4.1, 1101.4.2, 1101.4.3, 1101.4.3 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

SECTION 1101
GENERAL

1101.1 Scope. The provisions of this chapter shall apply to existing buildings constructed prior to the adoption of this code.

Revise as follows:

1101.2 Intent.
The intent of this chapter is to provide a minimum degree of fire and life safety to persons occupying existing buildings by providing minimum construction requirements where of Sections 1103 through 1106 of the *International Building Code*. Noncompliance with this chapter shall not, in itself, be a basis for causing a building to be deemed as an unsafe building.

1101.3 Permits.
Permits shall be required as set forth in Sections 105.5 and 105.6 and the *International Building Code*.

Revise as follows:

~~1101.4~~ 1101.3 Owner notification. When a building is found to be in noncompliance with this chapter, the *fire code official* shall duly notify the *owner* of the building. Upon receipt of such notice, the *owner* shall notify the fire official within sixty days of receiving the written notice of the, ~~subject to the following time limits, take~~ necessary actions to comply with the provisions of this chapter.

~~1101.3~~ 1101.4 Permits and construction documents.
~~Permits shall be required as set forth in Sections 105.5 and 105.6 and the *International Building Code*.~~ Permits and construction documents necessary to comply with this chapter shall be completed and submitted within a time schedule approved by the fire code official.

Delete without substitution:

~~**1101.4.1 Construction documents.** *Construction documents* necessary to comply with this chapter shall be completed and submitted within a time schedule *approved* by the *fire code official*.~~

Revise as follows:

~~1101.4.2~~ 1101.4.1 Completion of work. Work necessary to comply with this chapter shall be completed within a time schedule *approved* by the *fire code official*.

~~1101.4.3~~ 1101.4.2 Extension of time. The *fire code official* is authorized to grant necessary extensions of time where it can be shown that the specified time periods are not physically practical or pose an undue hardship. The granting of an extension of time for compliance shall be based on the showing of good cause and subject to the filing of an acceptable systematic plan of correction with the *fire code official*.

Add new text as follows:

1101.4.3 Compliance. Once compliance with this chapter is achieved, the building shall not be subject to the same provision(s) of this chapter, including future changes to the technical referenced standard requirements associated with of Sections 1103 through 1106, unless new requirements in the code or standard are specifically added in future editions of this chapter.

Reason: Several previous attempts to improve the code after though there was consensus that Chapter 11 enforcement was problematic were unsuccessful. At the request of Building Owners and Managers Association, International the issue was brought to FCAC with a request for assistance for the 2027 code development process. FCAC established a specific workgroup within Workgroup 3 to study the issue and develop consensus provisions. The adjustments proposed reached consensus within FCAC.

Section 1101.2 clarifies that Chapter 11 is intended to make previously constructed buildings safer through code requirements added after initial construction. Section 1101.2 provides clarifications that buildings not in compliance with Chapter 11 are not to be deemed unsafe buildings. The exception would be if violations of the unsafe provisions of Chapter 1 were found in addition to the Chapter 11 compliance issues.

Section 1101.3 addresses issue identified with short compliance notices for items that require planning, budgeting, building disruption issues, and designer and contractor availability. This provides that the building owner must address the planning portion of compliance with the fire official in 60 days after receiving a notice to comply. Establishing the 60-day period will stop the short notice, and in a very few cases, no notices situations that have arisen around the country.

Section 1101.4 consolidated two sections that dealt with permits and construction documents. permitting and documents are addressed in the Chapter 1 Administrative provisions in the IFC, IBC, and IEBC.

Section 1101.4.3 prohibits the interpretation by a fire code official that a technical change to one of the broader categories' technical standards for something later added, from reciting a building that was subjected to and complied with Chapter 11, to meet the latest technical requirements. Should a “Fatal Flaw” be found in the current standard used to conduct the the work, a future edition of the IFC, Chapter 11 would need to adopt the "fix". Otherwise, changes to the technical requirements in and of themselves are not a basis for reciting a compliant building.

Table 1103.1 - The group recommended that a column be added in table 1103.1 with the code edition a technical provision made its way into chapter 11. It would then make it easier to determine if new provisions have been added since a building was inspected for compliance with this chapter. Example: A is being inspecting that was built in 2007. There have been no new provisions added to Chapter 11 since it's construction except the high-rise sprinkler requirements. The building is fully sprinklered. An inspector and the building owner would then know that there are no Chapter 11 issues to comply with.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Bibliography: None

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no cost impact as nothing has been added or deleted from the technical provisions found in Chapter 11. This will better clarify how the retroactive building construction related provisions should be enforced.

F156-24

F157-24

IFC: 1103.1.2 (New), 80 NFPA

Proponents: Ken Brouillette, Seattle Fire Department, Seattle Fire Department (ken.brouillette@seattle.gov)

2024 International Fire Code

Add new text as follows:

1103.1.2 **Animal housing facilities..** Existing animal housing facilities as defined in NFPA 150 shall comply with the applicable provisions in NFPA 150**.**

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Fire and Life Safety in Animal Housing Facilities Code (NFPA 150-22)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: The IBC and IFC need to set requirements for these types of facilities due to past incidents.

Cost Impact: Increase

Estimated Immediate Cost Impact:

There will be a cost increase associated with adding a smoke/fire alarm system of approximately $1 to $5 per square foot and the fire sprinkler system of the range of $1 to $2 per square foot.

Estimated Immediate Cost Impact Justification (methodology and variables):

Increased cost for the addition of fire sprinkler and fire alarm systems.
New businesses will need to be located in buildings that meet NFPA 150 or provide improvements.

Various web sites suggested the quoted price ranges and obviously will vary based on location and associated conditions as well as specific installation requirements

F157-24

F158-24

IFC: TABLE 1104.18

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

TABLE 1104.18 COMMON PATH, DEAD-END AND TRAVEL DISTANCE LIMITS (by occupancy)

OCCUPANCY	COMMON PATH OF EGRESS TRAVEL LIMIT		DEAD-END LIMIT		EGRESS ACCESS TRAVEL DISTANCE LIMIT	
	Unsprinklered (feet)	Sprinklered (feet)	Unsprinklered (feet)	Sprinklered (feet)[j]	Unsprinklered (feet)	Sprinklered (feet)
Group H-1	25	25[~~l~~l]	0	0	75	75[j,~~l~~]
Group H-2	50	100[~~l~~l]	0	0	75	100[j,~~l~~]
Group H-3	50	100[~~l~~l]	20	20	100	150[j,~~l~~]
Group H-4	75	75[~~l~~l]	20	20	150	175[j,~~l~~]
Group H-5	75	75[j,l]	20	50	150	200[j,l]

NR = No Requirements.

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2.

a. See Section 1030.9.5 for dead-end *aisles* in Group A occupancies.

b. This dimension is for the total travel distance, assuming incremental portions have fully utilized their allowable maximums. For travel distance within the room, and from the room exit access door to the exit, see the appropriate occupancy chapter.

c. See Section 412 of the International Building Code for special requirements on spacing of doors in aircraft hangars.

d. Separation of exit access doors within a care recipient sleeping room, or any suite that includes care recipient sleeping rooms, shall comply with Section 1105.5.6.

e. In *smoke compartments* containing care recipient sleeping rooms and treatment rooms, dead-end *corridors* shall comply with Section ~~1105.6.5~~1105.6.7.

f. In Group I-2, Condition 2, care recipient sleeping rooms or any suite that includes care recipient sleeping rooms shall comply with Section ~~1105.7~~1105.6.6.

g. Where a tenant space in Group B, S and U occupancies has an occupant load of not more than 30, the length of a common path of egress travel shall be not more than 100 feet.

h. Where the building, or portion of the building, is limited to one story and the height from the finished floor to the bottom of the ceiling or roof slab or deck is 24 feet or more, the exit access travel distance is increased to 400 feet.

i. For covered and open malls, the exit access travel distance is increased to 400 feet.

j. Buildings equipped with an *approved* automatic sprinkler system in accordance with Section 903.3.1.1.

k. Buildings equipped with an *approved* automatic sprinkler system in accordance with Section 903.3.1.2.

l. Group H occupancies equipped with an *approved* automatic sprinkler system in accordance with Section 903.2.5.

Reason: This proposal makes several revisions to Table 1104.18 which are essentially editorial. There are no technical intended with this code change.

Footnote d is revised to reference the correct section for separation of exit access doors in Group I-2.

Footnote e is revised to reference the correct section for dead-end corridors in Group I-2.

Footnote j refers to Section 903.3.1.1 for sprinkler design under NFPA 13. The sprinkler system design in Group H-1 through H-4 occupancies is Footnote j. Therefore, Footnote j is added to Group H-1, H-2, H-3 and H-4.

Footnote l refers to Section 903.2.5 which specifies fire sprinkler design for Group H-5 occupancies, so it is not appropriate for other Group H occupancies. Therefore, Footnote l is removed in all locations except Group H-5.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal corrects editorial items in the 2024 IFC.

F158-24

F159-24

IFC: TABLE 1105.4; IBC: [F] TABLE 509.1

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

TABLE 1105.4 INCIDENTAL USES IN EXISTING GROUP I-2 OCCUPANCIES

Portions of table not shown remain unchanged.

ROOM OR AREA	SEPARATION AND/OR PROTECTION
~~Paint shops~~Spray rooms not classified as Group H	2 hours; or 1 hour and provide an automatic sprinkler system

For SI: 1 square foot = 0.0929 m^2, 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L.

2024 International Building Code

Revise as follows:

[F] TABLE 509.1 INCIDENTAL USES

Portions of table not shown remain unchanged.

ROOM OR AREA	SEPARATION AND/OR PROTECTION
~~Paint shops, not classified as Group H, located in occupancies other than Group F~~Spray rooms	2 hours and provide an automatic sprinkler system[a]

a. In a building equipped throughout with an automatic sprinkler system, the fire separation can be reduced to 1-hour.

For SI: 1 square foot = 0.0929 m^2, 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L, 1 cubic foot = 0.0283 m^3.

Reason: This proposal is designed to correlate requirements in the IFC Chapter 24, IBC Section 307.1.1, IBC Section 416 and IBC Table 509.1.

Table 509.1 allows an incidental use area to contain a “paint shop” provided it is separated by 2-hour construction. Table 509.1 only requires sprinklers where a 1-hour separation is provided. Other code sections read as follows:

1. IBC Section 307.1.1 Item 1 states that the application of flammable finishes is not classified as a Group H occupancy provided that the operation and use comply with the IFC and IBC.
2. IFC Section 2404.2 states that spray rooms shall be constructed under the IBC and shall have a minimum 1-hour separation.
3. IBC Section 416.2 states that spray rooms shall have a minimum 1-hour separation.
4. IFC Section 2404.4 states that spray rooms shall be protected with sprinklers or a fire-extinguishing system.
5. IBC Section 2404.4 states that spray rooms shall be protected with sprinklers or a fire-extinguishing system.

The inconsistency occurs in Table 509.1 which allows an incidental use area to have 2-hour separation without sprinklers or a fire-extinguishing system. Since the spray room is not a Group H, then it would be classified as Group F-1. The only time a 2-hour separation is required is when the spray room is located in an unsprinklered building according to IBC Table 508.4. But even when the spray room is located within an unsprinklered building, the spray room is required to be protected with sprinklers or a fire-extinguishing system.

Table 509.1 implies that an spray room is acceptable if it is separated by 2-hour construction without any type of fire-extinguishing system.

The term “paint shop” is not used anywhere else in the IBC, and only appears once in IFC Table 1105.4, and does not appear at all in NFPA 33 or NFPA 34. It is an outdated term and is not appropriate. This term will be replaced with spray room in IFC Table 1105.4 and IBC Table 509.1. IFC Table 1105.4 retains the language of “not classified as Group H” to address existing facilities that may have been designed as a Group H occupancy.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal simply clarifies the text and correlates the terminology.

F159-24

F160-24

IFC: 1105.12 (New)

Proponents: Jeff O'Neil, Chair, Committee on Healthcare (ahc@iccsafe.org)

2024 International Fire Code

Add new text as follows:

1105.12 Group I-2 Electrical Systems. In Group I-2 Condition 2 occupancies, existing electrical systems shall comply with the requirements for existing electrical systems in NFPA 99.

Reason: There are only very small sections of Chapter 6 that are applicable to existing buildings. It does cover items such as routine testing of both normal and emergency power, testing of electrical systems, defining surgery operating rooms as wet locations unless approved risk assessment determines otherwise. Cover plates on life safety and critical branch receptacles are a distinct color. Requiring tamperproof receptacles in designated pediatric locations.

This change is a part of a series of changes that assure the IFC, IBC and IEBC align with the requirements of CMS facilities regulations. The changes are designed to improve the safety of existing facilities regardless of year constructed. This change aligns with existing federal requirements for the healthcare industry.

Adding reference to NFPA 99 reinforces to local design teams and code officials the need modify healthcare facilities electrical system to conform with both NFPA 99 and NFPA 70. The patients and staff are depending upon a reliable electric system to support delivery of care and their lives may depend upon this. Without having designers, code officials and owners aligned on this expectation, facilities may face compliance challenges from Center for Medicare and Medicaid during inspection.

This proposal is submitted by the ICC Committee for Healthcare (CHC).
The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is a current requirement for hospitals in the United States, so while this is a change to IFC, it is not a change in overall cost for hospitals.

F160-24

F161-24

IFC: SECTION 1107, 1107.1, 1107.1.1, 1107.1.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

Delete without substitution:

~~SECTION 1107~~
~~ENERGY STORAGE SYSTEMS~~

Revise as follows:

~~1107.1~~ 1207.12 Pre-existing Lithium-ion technology energy storage systems. The owner of an energy storage system (ESS) utilizing lithium-ion battery technology having capacities exceeding the values in Table 1207.1.3 and ~~installed prior to the jurisdiction's adoption of the 2018 or later edition of the *International Fire Code*~~ that are not listed to UL 9540 shall provide the *fire code official* a ~~failure modes and effects analysis (FMEA) or other *approved* hazard mitigation analysis~~ technical report in accordance with Section 104.2.2 for review and approval.

> ~~**Exception:** Detached one- and two-family *dwellings* and *townhouses*.~~

~~1107.1.1~~ 1207.12.1 Early detection.
In addition to ~~the requirements of Sections 1207.1.8.1 and 1207.1.8.2~~ identifying potential failure events, the ~~analysis~~ report shall include an assessment of the ability of the installed protection systems to provide for early detection and notification of ~~a thermal runaway event in relation to the ability of~~ emergency responders ~~to safely mitigate the size and impact of a thermal runaway event~~.

~~1107.1.2~~ 1207.12.2 Corrective action plan.
Where hazards are identified by the analysis, a plan that includes a timetable for corrective action shall be submitted to the *fire code official* for review and approval. The plan shall include actions and system improvements necessary for eliminating or mitigating any identified hazards, including listed methods for early detection and notification of a thermal runaway event.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

The main purpose of this proposal is to move the language from Chapter 11 over to Section 1207. The issue is not a building feature retrofit topic, it is one of ongoing operation and maintenance of energy storage systems which requires an operational permit from the fire code official. As an operational issue the language belongs in Section 1207 for application to the existing systems before operational permits are issued or renewed.

If the Committee approves the proposal to have 1207 point to NFPA 855, the reference to Table 1207.1.3 would be changed to a reference to the thresholds Table in NFPA 855, Chapter 1.

The exception for one- and two-family dwelling and townhouses has been deleted. The exception conflicts with over all application of the IFC pursuant to Chapter 1, the IFC generally applies to all occupancies, any exceptions are based upon the adopting authority. The hazards presented by unlisted ESS are similar and the AHJ needs the flexibility to rely on this requirement if they have an active program for these occupancies, and more importantly, when they become aware of a potential problem with an existing installation.

In Section 1207.12 The use of the IFC edition date has been eliminated and replaced with the lack of a UL 9540 listing as the more accurate trigger relative to system safety. The language referring to an FMEA or other approved HMA has been replaced with "Technical

Report, with what is to be covered by the technical report provided in the following subsections.

In Section 1207.12.1 The reference to Sections 1207.1.6.1 and 1207.1.8.2 have been deleted to eliminate a conflict, both sections are geared to assessing new installations and Section 1207.1.6.1 could lead one to believe if none of those listed items apply, they are done. Replacing the language with “identifying potential failure events” provides clearer instruction within the section itself. The language referring to the emergency responders' abilities has been removed as subjective and unpredictable in many cases. The intent of the requirements is to assess potential hazards and take action to correct the hazards preventing an event.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The change proposed is to move an existing requirement addressing operational activities subject to an annual permit from Chapter 11 to Section 1207 for ESS. The additional changes made clarifies the language and eliminated a conflict. The end result of application has not changed.

F161-24

F162-24

IFC: SECTION 1108 (New), 1108.1 (New)

Proponents: Jeffrey Shapiro, International Code Consultants, Lake Travis Fire Rescue (jshapiro@ltfr.org)

2024 International Fire Code

Add new text as follows:

SECTION 1108 FIRE PROTECTION FOR POST-FIRE REPAIR OR RECONSTRUCTION

1108.1 Institutional and residential occupancies. Where an unsprinklered Group I, Group R-1, Group R-2 or Group R-4 Occupancy is repaired or reconstructed following a fire incident that caused more than 25-percent of a *fire area* to remain unoccupiable for a period of 60 or more days, an automatic sprinkler system complying with Section 903.3 shall be installed throughout such *fire area* or *fire areas* as part of the repair or reconstruction.

Reason: This proposal reflects the progress of a FCAC task group on the topic of retrofitting certain occupancies that have suffered a catastrophic fire. There was insufficient time to further discussion and consideration that might have yielded a consensus proposal, so I am submitting this as a basis for continued discussion.

Although I serve as a consultant to the National Fire Sprinkler Association, this proposal has not been reviewed or endorsed by NFSA, and I am not representing NFSA on this issue. My motivation comes from many years in the fire service observing reconstruction of unsprinklered buildings without sprinklers following a catastrophic fire, which has always struck me as illogical. If a newly built occupancy requires sprinklers, repair or reconstruction of a previously existing occupancy that suffered a catastrophic fire, particularly residential and institutional uses where occupants will be sleeping, should not be permitted by code.

During task group discussions, there was broad agreement that something could be done to address this concern in the code, but reaching agreement on code text was challenging. Essentially, the questions are, 1) what should be the trigger, or level of loss, warranting the addition of fire sprinklers in repair or reconstruction, and 2) what portion of a building should be required to be sprinklered?

Discussion explored the possibility of using fire fatalities as a Step 1 trigger, but consensus on a number of fatalities could not be reached. Some believed that a single fire fatality should be enough, while others looked at two or more or didn't support the concept. Also, defining a "fire fatality" in the code is challenging as an enforcement tool because the term might refer to individuals who were deceased at the scene, or it might also include individuals who are injured and later die as a result of such injuries. And, severe injuries might be regarded by those who deal with burn injuries as an equally sufficient justification vs. a fatality. For these reasons, the life-loss and injury triggers were abandoned in this proposal, in favor of trying to define a level of property damage that could be reasonably associated with a catastrophic fire.

Another Step 1 trigger that was considered was "multiple offender" buildings, or buildings that experience repeated fire incidents. This approach was also abandoned because consensus could not be reached on the number of fires over a time period, the damage level that should be considered as a contributing fire, or how a jurisdiction would keep track of a repeating fire incident history over time.

The approach that did gain sufficient traction was looking at a "fire area" as defined in the code to require a minimum 2-hour separation from other portions of a building, and a level of damage to a fire area that should be considered as sufficient to warrant requiring sprinklers as part of repair or reconstruction. There is not a scientific basis for establishing a threshold of this nature, so the threshold must ultimately be decided by a consensus of stakeholders. The suggested 25% of a fire area being unhabitable for a period of 90 or more days seems sufficient to serve as a benchmark. It was pointed out during discussion that, due to permitting delays, 30 days could be a very short timeframe for construction to be completed. However, it's difficult to argue that a fire wasn't a major incident if 25% of a fire area remains uninhabitable for 60 days. For example, an 8-unit fire area in an apartment building would require 3 or more units to be vacated for 60 days to trigger this section. A 40-room hotel would require 11 rooms to be vacated for more than 60 days to trigger this section. True, this might encourage a rapid pace of reconstruction by some to avoid the sprinkler requirement, but so be it. It's better to have this requirement as a starting point in the code, and if someone can beat the clock, that should not be a reason to do nothing in the code.

With regard to Step 2, the portion of a building that should be required to be sprinklered where Step 1 has been satisfied, there were two discussion paths, either the entire building or only a sufficiently damaged fire area. This proposal suggests the latter based on feedback from the task group. Considering that a fire area might be a floor or section of a large building, much of which might not have been affected by the fire incident, some would regard it as excessive to require retrofitting sprinklers in those unaffected areas since such areas would not otherwise undergo repair or reconstruction. Hence, the suggested path of only requiring sufficiently impacted fire areas to be sprinklered. Such areas would probably experience substantial removal of drywall due to smoke and water damage, allowing for sprinkler system installation when the structure is exposed.

Cost Impact: Increase

Estimated Immediate Cost Impact:

There is no way to competently assign a cost value to this proposal.

Estimated Immediate Cost Impact Justification (methodology and variables):

Cost will vary depending on the extent of damage and repair or reconstruction to be done after a particular incident. Also, existing water supply and standpipe piping have an impact on the extent of work required to accomplish an installation. In addition, sprinkler installation costs may be offset by taking advantage of sprinkler incentives associated with other aspects of construction that reduce overall costs.

F162-24

F163-24

IFC: 1203.1.3, 1203.4, 1203.4.1, 1203.5, 1203.5.1; IBC: [F] 2702.1.3

Proponents: Jeff O'Neil, Chair, Committee on Healthcare (ahc@iccsafe.org)

2024 International Fire Code

Revise as follows:

1203.1.3 Installation.
Microgrids, Emergency power systems and standby power systems shall be installed in accordance with the *International Building Code*, NFPA 70, and where applicable, NFPA 99, NFPA 110 and NFPA 111.

1203.4 Maintenance.
Emergency and standby power systems shall be maintained in accordance with NFPA 110 and NFPA 111 such that the system is capable of supplying service within the time specified for the type and duration required.

Revise as follows:

1203.4.1 Group I-2 and ambulatory care facilities.
In Group I-2 occupancies and ambulatory care facilities, microgrids, emergency and standby power systems shall be maintained in accordance with NFPA 99.

1203.5 Operational inspection and testing.
Emergency power systems, including all appurtenant components, shall be inspected and tested under load in accordance with NFPA 110 and NFPA 111.

Exception: Where the emergency power system is used for standby power or peak load shaving, such use shall be recorded and shall be allowed to be substituted for scheduled testing of the generator set, provided that appropriate records are maintained.

Revise as follows:

1203.5.1 Group I-2 and ambulatory care facilities.
In Group I-2 occupancies and ambulatory care facilities, microgrids, emergency and standby power systems shall be inspected and tested under load in accordance with NFPA 99.

2024 International Building Code

Revise as follows:

[F] 2702.1.3 Installation.
Microgrids,*Emergency power systems* and *standby power systems* required by this code or the *International Fire Code* shall be installed in accordance with the *International Fire Code* , NFPA 70, and where applicable, NFPA 99, NFPA 110 and NFPA 111.

Reason: Memorandum Summary excerpts from Centers for Medicare and Medicaid Services

• 2021 edition of the NFPA 99 permits emergency power for an EES to be supplied by sources other than a generator or battery system, including a health care microgrid system (HCMS)

• HCMSs are small-scale electrical grids where the sources of electricity can be provided by clean energy technologies (e.g., fuel cells, solar, wind, energy storage, etc.).

• Except as noted below, CMS is issuing a categorical waiver permitting new and existing health care facilities subject to CMS requirements to utilize alternate sources of power other than a generator set or battery system only if in accordance with the 2021 edition of the NFPA 99, 2023 edition of the National Electric Code (NFPA 70), and associated references.

• The categorical waiver excludes long-term care (LTC) facilities that provide life support as the LTC requirements at 42 CFR 483.90(c)(2) requires these facilities to have an emergency generator without exception.

Health care facilities are required to have a normal electrical power source and an alternate emergency power source provided to certain patient care rooms, equipment, and systems by an essential electric system (EES), where the loss of normal power is likely to result in injury or death. The 2012 edition of the NFPA 99 requires this emergency power source to be supplied by

a generator set or battery system. The large electrical loads and power duration required by most health care facilities traditionally demanded the use of a generator.

The 2021 edition of NFPA 99 now permits normal and emergency power to be supplied by sources other than a generator or battery system, including a health care microgrid system (HCMS). HCMSs are small-scale personalized electrical networks with intelligent controls that can operate independently, or in tandem with a large-scale electric grid. The power sources for an HCMS can be provided or supplemented by a combination of clean energy technologies such as fuel cells, solar panels, wind turbines, energy storage systems, and other alternate energy sources.

This proposal is submitted by the ICC Committee for Healthcare (CHC).
The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This change does not increase costs but provides additional options for facilities needing or wanting to reduce their emissions.

F163-24

F164-24

IFC: 1203.1.8, 1203.1.9 (New); IBC: [F] 2702.1.8, 2702.1.9 (New)

Proponents: Gregory Wilson, Federal Emergency Management Agency, FEMA (gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., FEMA Building Science (rebecca@rcquinnconsulting.com)

2024 International Fire Code

1203.1.8 Group I-2 occupancies.
In Group I-2 occupancies located in flood hazard areas established in Section 1612.3 of the International Building Code where new essential electrical systems are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24. Where connections for hook up of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.

Add new text as follows:

1203.1.9 Risk Category IV. In buildings and structures classified as Risk Category IV that are located in flood hazard areas established in Section 1612.3 of the *International Building Code*, where new essential electrical systems are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24. Where connections for hookup of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.

2024 International Building Code

[F] 2702.1.8 Group I-2 occupancies.
In Group I-2 occupancies located in *flood hazard areas* established in Section 1612.3, where new essential electrical systems are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24. Where connections for hookup of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.

Add new text as follows:

2702.1.9 Risk Category IV. In buildings and structures classified as Risk Category IV that are located in *flood hazard areas* established in Section 1612.3, where new essential electrical systems are installed, and where new essential electrical system generators are installed, the systems and generators shall be located and installed in accordance with ASCE 24. Where connections for hookup of temporary generators are provided, the connections shall be located at or above the elevation required in ASCE 24.

Reason: Risk Category IV is defined in the IBC Table 1604.5 as “Buildings and other structures designated as essential facilities and buildings where loss of function represents a substantial hazard to occupants or users.” Essential facilities are further defined in the IBC as “*Buildings* and other *structures* that are intended to remain operational in the event of extreme environmental loading from *flood,* wind, snow or earthquakes.”

Risk Category IV buildings and structures located in flood hazard areas must remain operational during flooding because their services are necessary for emergency response and recovery, and disruption or failure poses not only a substantial hazard to the occupants or users, but the community at large as well.

An essential facility cannot remain operational in the event of flooding if its essential electrical systems and/or standby generators are flooded. For example, a hospital that loses all utility and backup power would lose use of onsite potable water and medical equipment and would not be able to provide complete medical services. Similarly, a fire station that loses power may lose communication systems and not be able to adequately provide residents throughout the affected area with fire and rescue services. FEMA’s Mitigation Assessment Teams deployed after some flood events have repeatedly observed impacts to essential facility operations due to loss of power, including as a result of flooded generators. For critical facilities to continue to operate during the loss of services provided by utilities, measures must be in place to accommodate those losses of service. The measures must have the capacity to provide the necessary services for the duration of the outages.

This proposal does not create a new requirement for Risk Category IV buildings and structures. It simply provides a reference to existing requirements for the location and installation of utilities and equipment in flood hazard areas, which are required by the IBC by reference to ASCE 24, *Flood-Resistant Design and Construction*. This proposal also provides specificity to the requirements of NFPA 110, Standard for Emergency and Standby Power Systems, Section 7.2.4 which states: “The rooms, enclosures, or separate buildings housing Level 1 or Level 2 EPSS equipment shall be designed and located to minimize damage from flooding” and Section 7.2.5 which states: “Minimizing the possibility of damage resulting from interruptions of the emergency source shall be a design consideration for EPSS equipment.” The best way to minimize damage and interruptions from flooding is to follow the established reference standard, ASCE 24. ASCE 24 requires utility equipment to resist flood loads and be elevated, inherently watertight, or protected by dry floodproofing.

This proposal is similar in nature to the successful code change in the 2015 IBC and IFC proposed by the Ad Hoc Committee on Healthcare, which initially established IFC Section 1203.1.8 and IBC Section 2702.1.8. The Ad hoc committee on healthcare identified this section as necessary to correct a coordination oversight as it has been identified in healthcare facilities and that generators are being installed in areas subject to flooding, and although they were designed to meet the structural loads for the flooding, they would operationally fail.”

The proposal aims to ensure that essential electrical systems and generators in Risk Category IV structures remain operational during conditions of flooding, given the substantial risk posed to occupants and users should these structures endure a service interruption due to failure of backup power. FEMA’s Mitigation Assessment Teams have observed disruption of operations during and after flooding for a variety of community services including hospitals, police stations, fire stations, and wastewater treatment plants. For example, after Hurricane Sandy FEMA documented the following for first responder facilities: In facilities that were flooded, all equipment in basements or un-elevated on the first floor was damaged. Damaged elements included electrical service equipment, distribution panels, generators, transfer switches, boilers/furnaces, and hot water heaters. When these vulnerable critical elements failed, the systems were rendered inoperative, and the functionality of the critical facilities suffered as a result. At facilities where emergency power was not available or generators failed as a result of inundation, mechanical, electrical, and communications systems became partially or completely unusable. At some locations, generators were elevated but still failed because components of the emergency power system —transfer switches or pumps—were located below flood levels. After flooding in the mid-west FEMA noted emergency generators for several law enforcement facilities were destroyed. In contrast, several successes after Hurricanes Sandy and Harvey were observed where municipal power was lost, but emergency power kept the essential facilities operational due to elevated emergency power systems/generators. However, FEMA continues to observe generator damage after flooding: as recently as Hurricane Ian in 2022, FEMA observed “The loss of utility service, and in some cases standby generators, severely impacted the ability of critical facilities to operate as intended.”

Bibliography: *Flood Resistant Design and Construction,* ASCE/SEI 24-14

FEMA P-765, Mitigation Assessment Team Report: Midwest Floods of 2008 in Iowa and Wisconsin (2009)

FEMA P-942, Mitigation Assessment Team Report: Hurricane Sandy in New Jersey and New York (2013)

FEMA P-2022, Mitigation Assessment Team Report: Hurricane Harvey in Texas (2019)

FEMA DR-4673-FL RA 2, Reducing “Loss of Utility” Impacts to Critical Facilities (2023)

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal does not increase or decrease the initial construction costs or life-cycle costs because it does not change any requirements; it only points out and reinforces existing requirements for development in flood hazard areas.

F164-24

F165-24

IFC: 1205.2, 1205.3, 1205.3.1, 1205.3.2, 1205.3.3

Proponents: William Koffel, Koffel Associates, Inc., California Solar and Storage Association (CALSSA) (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

1205.2 Access and pathways.
Roof access, pathways and spacing requirements shall be provided in accordance with Sections 1205.2.1 through 1205.3.3. Pathways shall be over areas capable of supporting firefighters accessing the roof. ~~Pathways shall be located in areas with minimal obstructions, such as vent pipes, conduit or mechanical equipment.~~Small obstructions, such as vent pipes, roof drains, conduit or mechanical equipment shall be permitted within the pathway, provided they do not impede access during fire fighting or smoke ventilation operations.

Exceptions:

1. Detached, nonhabitable Group U structures including, but not limited to, detached garages serving Group R-3 buildings, parking shade structures, carports, solar trellises and similar structures.
2. Roof access, pathways and spacing requirements need not be provided where the *fire code official* has determined that rooftop operations will not be employed.
3. Building-integrated photovoltaic (BIPV) systems where the BIPV systems are *approved*, integrated into the finished roof surface and are *listed* in accordance with UL 3741. The removal or cutting away of portions of the BIPV system during firefighting operations shall not expose a firefighter to electrical shock hazards.

1205.3 Other than Group R-3 buildings.
Access to systems for buildings, other than those containing Group R-3 occupancies, shall be provided in accordance with Sections 1205.3.1 through 1205.3.3.

Exception: Where it is determined by the *fire code official* that the roof configuration is similar to that of a Group R-3 occupancy, the residential access and ventilation requirements in Sections 1205.2.1.1 through 1205.2.1.3 are a suitable alternative.

Revise as follows:

1205.3.1 Perimeter pathways. There shall be a minimum 6-foot-wide (1829 mm) clear perimeter around the edges of each continguous ~~the~~ roof area. A roof area shall be considered contiguous if there is no unimpeded access to firefighters between roof sections.

Exception: Where either axis of the building is 250 feet (76 200 mm) or less, the clear perimeter around the edges of the roof shall be permitted to be reduced to a minimum width of 4 feet (1219 mm).

1205.3.2 Interior pathways. Interior pathways shall be provided as follows, and as required by Section 1205.3.3 Item 3 ~~between array sections to meet the following requirements~~:

1. ~~Pathways shall be provided at intervals not greater than 150 feet (45 720 mm) throughout the length and width of the roof.~~

~~2~~. A pathway not less than 4 feet (1219 mm) wide in a straight line to roof standpipes or ventilation hatches.

~~3~~2. A pathway not less than 4 feet (1219 mm) wide around roof access hatches, with not fewer than one such pathway to a parapet or roof edge.

1205.3.3 Smoke ventilation.
The solar installation shall be designed to meet the following requirements:

1. Where nongravity-operated smoke and heat vents occur, a pathway not less than 4 feet (1219 mm) wide shall be provided bordering all sides.

2. Where gravity-operated dropout smoke and heat vents occur, a pathway not less than 4 feet (1219 mm) wide on not fewer than one side.
3. ~~Smoke ventilation options between array sections shall be one of the following~~Interior pathways shall be provided for smoke ventilation at intervals not greater than 150 feet (45 720 mm) throughout the length and width of the roof. Interior smoke ventilation pathways shall be one or a combination of the following options:
    3.1. A pathway not less than 8 feet (2438 mm) wide.
    3.2. A pathway not less than 4 feet (1219 mm) wide bordering 4-foot by 8-foot (1219 mm by 2438 mm) venting cutouts every 20 feet (6096 mm) on alternating sides of the pathway. Smoke and heat vents are allowed in the venting cutout areas.
    3.3 A pathway not less than 4 feet (1219 mm) wide bordering an existing line of heat and smoke vents in the roof.
    3.4 Two perimeter pathways, per Section 1205.3.1, on each side of a wall or parapet separating roof or building sections.

Exception: Where the building is 150 feet (76 200 mm) or less in either axis, interior pathways will not be required in the directions where the building is less than 150 feet.

Reason: For 1205.2, The proposed code language intends to clarify the existing intent of the code, and is not intended to change the code. Some AHJs have miss-interpreted the existing language which has negative cost and schedule impacts on projects.

Since the existing code language does not specifically say obstructions are allowed in the pathway itself, some AHJs have interpreted 1205.2 to mean pathways need to be located in areas of the roof with few obstructions (presumably so the pathways don't zig-zag around obstructions too much), but those obstructions still cannot be in the pathway itself. However, the intent of the code was to allow small obstructions in the pathway as long as they did not hinder rooftop fire operations. The inconsistency of enforcement causes significant system design changes and project delays. This proposed language intends to clarify smaller obstructions are allowed to be located in the fire pathway as long as they do not impede rooftop fire operations based on AHJ interpretation and judgment.

The proposed language in 1205.3.3 clarifies that interior pathways are only needed at intervals greater than 150' in either the length or width direction of the roof. The proposed language also clarifies the type of pathways between array sections can utilize either section 1205.3.3 items 3.1, 3.2, 3.3, 3.4 or a combination of any of these options.

Smoke and heat vents are, by definition, intended to be used to vent smoke and heat, and therefore are accepted by AHJ's as venting locations. The proposed language in 1205.3.3 item 2 clarifies this by allowing smoke and heat vents to be located in the required 'venting cutout' areas.

Additionally, many large buildings include lines or arrays of heat and smoke vents (often as shrink out skylights). Providing a continuous 4' pathway bordering these existing venting locations should provide sufficient venting access for fire fighting purposes. Requiring additional 'venting cutout' areas every 20' on alternating sides is unnecessarily redundant as firefighters would simply use the existing vents, rather than cutting additional holes in the roof. In situations where an 8' pathway is utilized, 1205.3.3 item 3.4 clarifies that two 4' or 6' pathways on the opposite sides of a parapet is an acceptable option to satisfy the ventilation requirements.

The exception clarifies that no interior fire pathways are needed for any building axis that is less than 150' in length. AHJ's sometimes interpret the existing language to mandate interior pathways even when the building is very small. (less than 150'x150'), if the array was not contiguous, or just because the code called for an interior pathway. This exception clarifies that smaller buildings smaller than 150'x150' do not require interior pathways.

The suggested commentary below will be useful to PV system designers (and some permitting authorities) to understand what a heat and smoke vent is.

Suggested Commentary: Smoke and heat vents referred to in section 1205.3.3 are openings through the building roof that are opened during a fire emergency only. These smoke and heat vents intended for emergency purposes are not typically connected to any interior ducting or other equipment. That is: these vents do not operate regularly to vent heat and smoke from HVAC, combustion equipment or other processes. Gravity-operated dropout smoke and heat vents are often installed in the form of “shrink out” acrylic dome skylights.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The change proposal is editorial in nature or a clarification and has the potential to reduce cost by mitigating miss-interpretation of the code. Additionally the change to 1205.3.3 item 3.3 will reduce cost by reducing unnecessary, redundant venting options, reducing array irregularity, reduced attachment or ballast counts, and increase space available for PV arrays..

F165-24

F166-24

IFC: 1205.2.1

Proponents: Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA) (joecainpe@gmail.com); Paul Armstrong, SEIA (paul@7arms.com)

2024 International Fire Code

Revise as follows:

1205.2.1 Solar photovoltaic (PV) systems for Group R-3 buildings.
Solar photovoltaic (PV) systems for Group R-3 buildings shall comply with Sections 1205.2.1.1 through 1205.2.3.

Exceptions:

1. These requirements shall not apply to PV systems installed on structures designed and constructed in accordance with the *International Residential Code*.
2. These requirements shall not apply to PV systems installed on roofs with slopes ~~of~~ less than 2 units vertical in 12 units horizontal (16.7-percent slope) ~~or less~~.

Reason: This proposal includes editorial changes to both exceptions under IFC 1205.2.1, to clarify that IFC Section 1205.2.1 applies to the PV systems themselves and not to the structures or roofs on which the PV systems are installed.

For Exception 2, further changes are made to correlate the language with the new definition of "low-slope" in the 2024 IBC, where "low-slope" is not inclusive of a roof slope of 2 units vertical in 12 units horizontal.

2024 IBC Section 202 Definitions:

LOW-SLOPE. A roof slope less than 2 units vertical in 12 units horizontal (17-percent slope).

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal includes editorial changes only. It does not increase nor decrease cost of construction. See reason statement.

F166-24

F167-24

IFC: 1205.4, 1205.4.1, FIGURE 1205.4.1(1), FIGURE 1205.4.1(2), 1205.4.1.1, 1205.4.1.2, 1205.4.2, 1205.4.3

Proponents: Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA) (joecainpe@gmail.com); Paul Armstrong, SEIA (paul@7arms.com)

2024 International Fire Code

Revise as follows:

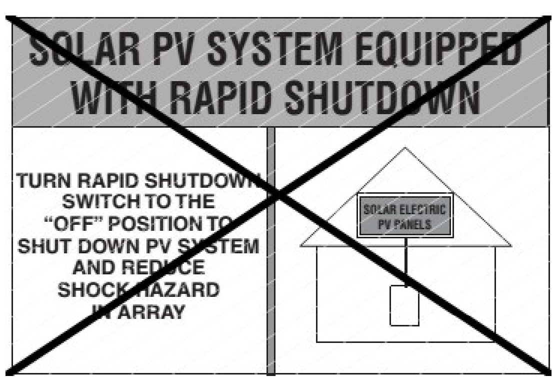
1205.4 Buildings with rapid shutdown.
Buildings with rapid shutdown solar photovoltaic systems shall have permanent labels in accordance with ~~Sections 1205.4.1 through 1205.4.3.~~ NFPA 70.

Delete without substitution:

~~**1205.4.1 Rapid shutdown type.**~~
~~The type of solar photovoltaic system rapid shutdown shall be labeled with one of the following:~~

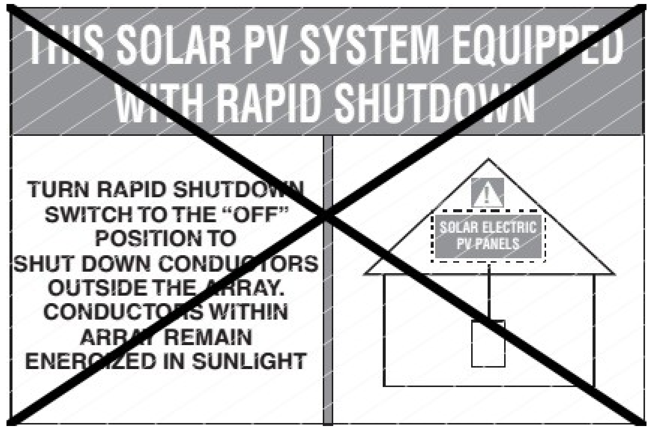
1. ~~For solar photovoltaic systems that shut down the array and the conductors leaving the array, a label shall be provided. The first two lines of the label shall be uppercase characters with a minimum height of $^3/_8$ inch (10 mm) in black on a yellow background. The remaining characters shall be uppercase with a minimum height of $^3/_{16}$ inch (5 mm) in black on a white background. The label shall be in accordance with Figure 1205.4.1(1) and state the following:~~
~~SOLAR PV SYSTEM EQUIPPED WITH~~
~~RAPID SHUTDOWN. TURN RAPID~~
~~SHUTDOWN SWITCH TO THE "OFF"~~
~~POSITION TO SHUT DOWN PV SYSTEM~~
~~AND REDUCE SHOCK HAZARD IN ARRAY.~~

2. ~~For photovoltaic systems that only shut down conductors leaving the array, a label shall be provided. The first two lines of the label shall be uppercase characters with a minimum height of $^3/_8$ inch (10 mm) in white on a red background and the remaining characters shall be capitalized with a minimum height of $^3/_{16}$ inch (5 mm) in black on a white background. The label shall be in accordance with Figure 1205.4.1(2) and state the following:~~
~~THIS SOLAR PV SYSTEM EQUIPPED~~
~~WITH RAPID SHUTDOWN. TURN RAPID~~
~~SHUTDOWN SWITCH TO THE "OFF"~~
~~POSITION TO SHUT DOWN CONDUCTORS~~
~~OUTSIDE THE ARRAY. CONDUCTORS~~
~~WITHIN ARRAY REMAIN ENERGIZED IN SUNLIGHT.~~



~~**FIGURE 1205.4.1(1) LABEL FOR SOLAR PV SYSTEMS THAT REDUCE SHOCK HAZARD WITHIN ARRAY AND SHUT DOWN**~~

~~**CONDUCTORS LEAVING ARRAY**~~



~~**FIGURE 1205.4.1(2) LABEL FOR SOLAR PV SYSTEMS THAT ONLY SHUT DOWN CONDUCTORS LEAVING THE ARRAY**~~

~~**1205.4.1.1 Diagram**~~**.**
~~The labels in Section 1205.4.1 shall include a simple diagram of a building with a roof. Diagram sections in red signify sections of the solar photovoltaic system that are not shut down when the rapid shutdown switch is turned off.~~

~~**1205.4.1.2 Location**~~**.**
~~The rapid shutdown label in Section 1205.4.1 shall be located not greater than 3 feet (914 mm) from the service disconnecting means to which the photovoltaic systems are connected, and shall indicate the location of all identified rapid shutdown switches if not at the same location.~~

~~**1205.4.2 Buildings with more than one rapid shutdown type**~~**.**
~~Solar photovoltaic systems that contain rapid shutdown in accordance with both Items 1 and 2 of Section 1205.4.1 or solar photovoltaic systems where only portions of the systems on the building contain rapid shutdown, shall provide a detailed plan view diagram of the roof showing each different photovoltaic system and a dotted line around areas that remain energized after the rapid shutdown switch is operated.~~

Revise as follows:

~~**1205.4.3**~~ 1205.4.1 **Rapid shutdown switch.** A rapid shutdown switch shall have a label located not greater than 3 feet (914 mm) from the switch that states the following:

RAPID SHUTDOWN SWITCH
FOR SOLAR PV SYSTEM

Reason: The intent of this proposal is to remove duplication from the IFC of language and graphics that appear in NFPA 70 National Electrical Code.

Requirements in the NEC for Rapid Shutdown / PV Hazard Control have evolved over several cycles of development. These graphics were included in the IFC a few cycles ago as a way to distinguish between more-recent PV systems that included enhancements to hazard reduction versus those PV systems that have earlier versions of "rapid shutdown."

The overall goal of this proposal is to provide flexibility to the Code Council (through FCAC) and the fire service to take another look at what is needed for fire safety and to avoid conflict. The proponent is open to suggestions for modifications to this proposal.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The intent of this proposal is to remove duplication between the IFC and NFPA 70. It is editorial in nature, and does not increase nor decrease the cost of construction.

F167-24

F168-24 Part I

PART I - IFC: SECTION 1205.6 (NEW)

PART II - IMC: SECTION 805.9 (NEW), 806.2 (NEW)

Proponents: Ali Fattah, City of San Diego Development Services Department, San Diego Area Chapter of ICC (afattah@sandiego.gov)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE INTERNATIONAL FIRE CODE COMMITTEE AND PART II WILL BE HEARD BY THE INTERNATIONAL MECHANICAL CODE.

2024 International Fire Code

Add new text as follows:

1205.6 Pathways adjacent to chimneys. Where a solar photovoltaic (PV) system located adjacent to a chimney that is constructed to comply with Section 2113 of the *International Building Code*, or Section 805 or 806 of the *International Mechanical Code*, a 36-inch-wide (914 mm) pathway shall be provided between the chimney and a solar photovoltaic (PV) system. The pathway adjacent to a chimney shall continue and access other pathways.

F168-24 Part I

F168-24 Part II

PART II - IMC: SECTION 805.9 (NEW), 806.2 (NEW)

Proponents: Ali Fattah, City of San Diego Development Services Department, San Diego Area Chapter of ICC (afattah@sandiego.gov)

2024 International Mechanical Code

Add new text as follows:

805.9 Spark arrestor required. Factory-built *chimneys* serving solid fuel-burning *appliances* shall be protected with a spark arrestor complying with Section 2113.9.2 of the *International Building Code* where solar photovoltaic (PV) systems are located within 10 feet (3048 mm) of a chimney.

806.2 Spark arrestor required. Metal *chimneys* serving solid fuel-burning *appliances* shall be protected with a spark arrestor complying with Section 2113.9.2 of the *International Building Code* where solar photovoltaic (PV) systems are located within 10 feet (3048 mm) of a chimney.

Attached Files

- **Chimney 2.jpg**
  https://www.cdpaccess.com/proposal/10739/30945/files/download/4782/
- **Chimney 1.png**
  https://www.cdpaccess.com/proposal/10739/30945/files/download/4781/
- **Prefab chimney fire.pdf**
  https://www.cdpaccess.com/proposal/10739/30945/files/download/4724/
- **PV near Chimney.pdf**
  https://www.cdpaccess.com/proposal/10739/30945/files/download/4725/

Reason: The proposed code changes address a regulatory gap in the IBC, IRC and IMC where the interaction of rooftop solar PV systems with chimneys serving solid fuel-burning fireplaces and appliances is not addressed. Chimneys convey heat and products of combustion that include glowing sparks, which can land on solar PV systems and pose a fire hazard. The IBC, IRC and IMC do not require spark arrestors; however, the IBC addresses the construction of spark arrestors when added atop a chimney primarily to address possible interference with drafting a chimney.

The IBC, IRC and IMC also do not address working clearance around chimneys since it was not envisioned that structures occupying large portions of the roof area would be placed on the roof near chimneys. Solar photovoltaic systems are becoming very common, and the proposed code changes address clearances adjacent to the chimney necessary for firefighting access and for servicing a chimney.

The proposed code change will be processed in three parts since the IBC Structural Committee and the IRC Building Committee convene in the Group B cycle in 2025. The International Fire Code Committee and the International Mechanical Code Committee in Group A will consider the first two parts during 2024. In an effort to show participants in Group A the totality of the proposal, the following two bullet points show proposed Group B code changes.

· IBC Ch 21 is proposed to be amended in Group B and considered by the IBC Structural Committee as follows.

  2113.9.4 Spark Arrestor Required. Chimneys shall be protected with a spark arrestor complying with Section 2113.9.2 of the International Building Code when solar photovoltaic (PV) systems are located within 10 feet (3048 mm) of a chimney.

  IRC Ch 10 is proposed to be amended in Group B and considered by the IBC Structural Committee as follows. Note that prior to the submittal deadline for Group A, the 2024 IRC was not available for review through ICC's digital codes premium service, so text from the 2021 IRC is shown below.R1003.9.4 Spark Arrestor Required. Chimneys shall be protected with a spark arrestor complying with Section R1003.9.2 of the International Residential Code when solar photovoltaic (PV) systems are located within 10 feet (3048 mm) of a chimney.

Code change RB285-22 was submitted for the 2024 IRC, and the submitted public comment, similar to this proposed code change, was not considered during the PCH since insufficient votes were available to overturn the Committee. Several IRC Building Committee members were receptive to the issue, which in the initial submittal focused on treating the solar PV installation as a part of the building and, therefore, requiring the chimney to extend 2 ft higher than solar PV within 10 ft the chimney. The report of the CAH states in part, " When you add the roof-mounted photovoltaic system to a building, it becomes a portion of the building.", which styles the initial issue.

This code change addresses another problem identified during the CAH: firefighting and maintenance access to a Chimney. Plumbing vents and mechanical equipment had been the most common roof projections until the popularity of solar PV systems, with the latter occupying large areas of the roof when compared to discreet items that the plumbing code and mechanical regulates in proximity to product conveying ducts.

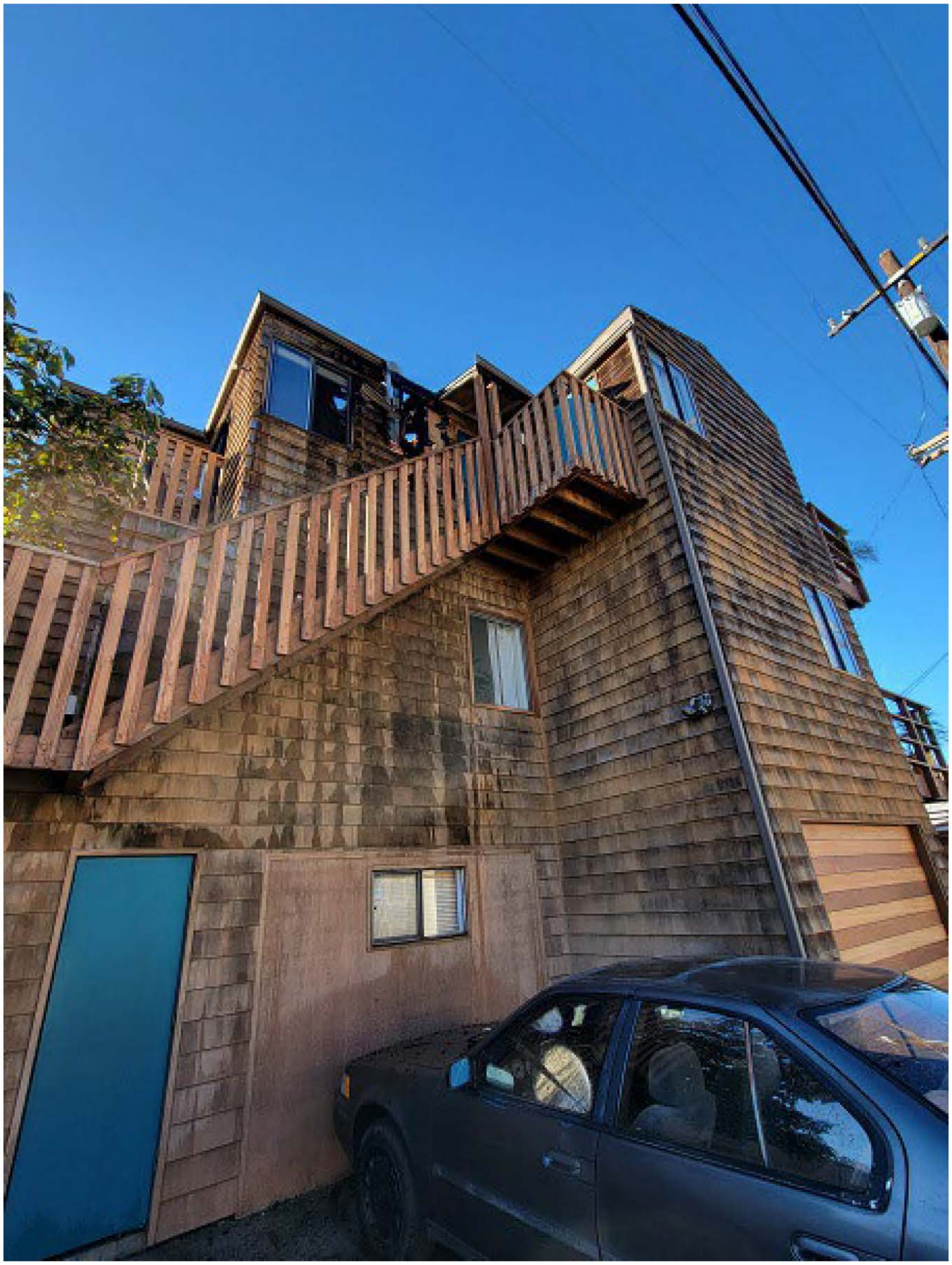
The proposed code change addresses the fire hazards and roof access issues the two independently regulated rooftop components pose. It is worth noting that the IBC, IRC, and IMC do not require spark arrestors and that the two building codes only address the construction of spark arrestors; the proposed code changes will address this regulatory gap. Additionally, chimney requirements have not changed for decades, and documentation regarding their functioning is not available or proprietary.

The proposal includes photos showing three cases (photos 3 to 5 spark arrestors would be required as well as 3 ft pathways) of what could happen when solar PV installations adjacent to the chimney are not regulated. Two photos (1 and 2) of a chimney fire to highlight why roof clearance should be required.

https://www.cdpaccess.com/proposal/9918/30619/files/download/4135/

https://www.cdpaccess.com/proposal/9918/30619/files/download/4780/

Chimney Fire



Bibliography:

- Rockfort Chimney Supply
- Forbes

Cost Impact: Increase

Estimated Immediate Cost Impact:

The average cost of a spark arrestor is approximately $300, and it can easily be installed by a solar contractor unable to set back rooftop-mounted photovoltaic panel systems. Additionally, the average cost of a rooftop solar system is approximately $11,278 after solar tax credits.

Estimated Immediate Cost Impact Justification (methodology and variables):

I went online to search the cost of spark arrestors at Rockfort Chimney Supply and went to Forbes for the cost of solar systems in California.

F169-24

IFC: SECTION 1207, 1203.2.5, 1203.2.7, 907.2.23; IBC: [F] 907.2.23

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

SECTION 1207
ELECTRICAL ENERGY STORAGE SYSTEMS (ESS)

Revise as follows:

1207.1 General.
The provisions in this section are applicable to stationary, portable, and mobile electrical energy storage systems (ESS).

> ~~**Exception:** ESS in Group R-3 and R-4 occupancies shall only be required to comply with Section 1207.11 except where Section 1207.11.4 requires compliance with Sections 1207.1 through 1207.9~~.

Delete without substitution:

~~**1207.1.1 Utilities and industrial applications**~~**.**
~~This section shall not apply to capacitors and capacitor equipment for electric utilities and industrial facilities used in applications such as flexible AC transmission (FACTS) devices, filter capacitor banks, power factor correction, and standalone capacitor banks for voltage correction and stabilization. [material based on NFPA 855 (2023)]~~

~~**1207.1.2 Mobile ESS**~~ **.**
~~Mobile ESS deployed at an electric utility substation or generation facility for 90 days or less shall not add to the threshold values in Table 1207.1.3 for the stationary ESS installation if both of the following conditions apply:~~

1. ~~The mobile ESS complies with Section 1207.10.~~
2. ~~The mobile ESS is being used only during periods in which the facility's stationary ESS is being tested, repaired, retrofitted or replaced.~~

~~[material based on NFPA 855 (2023)]~~

Revise as follows:

~~**1207.1.3**~~ **1207.1.1 Scope.**
ESS having capacities exceeding the values shown in ~~Table 1207.1.3~~ Table 1.3 of NFPA 855 shall comply with this section. ~~[material based on NFPA 855 (2023)]~~

Delete without substitution:

~~**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
Nonelectrochemical ESS[d]	70 kWh
Other battery technologies	10 kWh
Other electrochemical ESS technologies	3 kWh
Sodium nickel chloride batteries	70 kWh
Zinc manganese dioxide batteries ($Zn\text{-}MnO_2$)	70 kWh

~~For SI: 1 kilowatt hour = 3.6 megajoules.~~

a. ~~Energy capacity is the total energy capable of being stored (nameplate rating), not the usable energy rating. For units rated in amp-hours, kWh shall equal rated voltage times amp-hour rating divided by 1,000.~~

b. ~~Shall include vanadium, zinc bromine, polysulfide-bromide and other flowing electrolyte-type technologies.~~

c. ~~Fifty gallons of lead-acid battery electrolyte shall be considered equivalent to 70 kWh.~~

d. ~~Covers nonelectrochemical technologies such as flywheel and thermal ESS.~~

Revise as follows:

~~1207.1.4~~ 1207.2 Permits.
Permits shall be obtained for ESS as follows:

1. Construction permits shall be obtained for stationary ESS installations and for mobile ESS charging and storage installations ~~covered by Section 1207.10.1~~. Permits shall be obtained in accordance with Section 105.6.6.
2. Operational permits shall be obtained for stationary ESS installations and for mobile ESS deployment operations ~~covered by Section 1207.10.3~~. Permits shall be obtained in accordance with Section 105.5.14.

~~1207.1.4.1~~ 1207.2.1 Communication utilities.
Operational permits shall not be required for lead-acid and nickel-cadmium battery systems at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 voltage alternating current (VAC) and 60 voltage direct current (VDC).

Add new text as follows:

1207.2.2 Detached one- and two-family dwellings and townhouses. Operational permits shall not be required for ESS located at detached one- and two-family dwellings and townhouses, other than Group R-4.

Revise as follows:

1207.3 Installation. Stationary, mobile and portable electrical energy storage systems (ESS). shall be designed, constructed, installed, commissioned, operated, maintained, and decommissioned in accordance with NFPA 855, the required listings and the manufacturer's installation instructions, and the applicable requirements in this section.

Add new text as follows:

1207.4 Fire safety and evacuation plan. A fire safety and evacuation plan complying with NFPA 855 and Section 404 shall be provided for review and approval.

Revise as follows:

~~1207.4.5~~ 1207.5 Vehicle impact protection.
Where ESS are subject to impact by a motor vehicle, including forklifts, vehicle impact protection shall be provided in accordance with Section 312.

Add new text as follows:

1207.6 Fire detection. Where fire detection is required by NFPA 855, fire detection shall be installed in accordance with Section 907.

1207.7 Fire suppression systems.. Where automatic fire sprinkler system protection is required by NFPA 855, the automatic fire sprinkler system shall be installed in accordance with Chapter 9.

Revise as follows:

~~1207.6.3~~ 1207.8 Explosion control.
Where explosion control is required by ~~Table 1207.6~~ NFPA 855, ~~or elsewhere in this code,~~ an NFPA 69 explosion control system complying with Section 911 shall be provided for rooms, areas, ESS cabinets or ESS walk-in units containing the electrochemical ESS technologies. Where an ESS cabinet or ESS walk-in unit is installed within a room or building the design of the explosion control system shall include the cabinet, walk-in unit and the room it is installed within.

~~**Exceptions:**~~ ~~[material based on NFPA 855 (2023)]~~

1. ~~Where *approved*, explosion control is permitted to be waived by the *fire code official* based on large-scale fire testing complying with Section 1207.1.7 that demonstrates that *flammable gases* are not liberated from electrochemical ESS cells or modules.~~
2. ~~Where *approved*, explosion control is permitted to be waived by the *fire code official* based on documentation provided in accordance with Section 104.2.2 that demonstrates that the electrochemical ESS technology to be used does not have the potential to release *flammable gas* concentrations in excess of 25 percent of the LFL anywhere in the room, area, walk-in unit or structure under thermal runaway or other fault conditions.~~
3. ~~Where *approved*, ESS cabinets that have no debris, shrapnel or enclosure pieces ejected during large-scale fire testing complying with Section 1207.1.5 shall be permitted in lieu of providing explosion control complying with Section 911.~~
4. ~~Explosion control is not required for lead-acid and nickel-cadmium battery systems less than 50 VAC, 60 VDC in telecommunication facilities under the exclusive control of communications utilities located in building spaces or walk-in units used exclusively for such installations.~~
5. ~~Explosion control is not required for lead-acid and nickel-cadmium systems used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, located in building spaces or walk-in units used exclusively for such installations.~~
6. ~~Explosion control is not required for lead-acid battery systems in uninterruptable power supplies *listed* and *labeled* in accordance with UL 1778, utilized for standby power applications, and housed in a single cabinet in a single *fire area* in buildings or walk-in units.~~

Add new text as follows:

1207.9 Mechanical exhaust system. Where a mechanical exhaust system is required by NFPA 855, the mechanical exhaust system shall be installed in accordance with the International Mechanical Code.

1207.10 Gas detection system. Where a gas detection system is installed to comply with the requirements of NFPA 855, the gas detection system shall comply with Section 916.

1207.11 Fire-resistance rated separations. Where fire-resistance-rated separation is required by NFPA 855, the fire-resistance-rated-separations shall be provided by fire barriers constructed in accordance with Section 707 of the International Building Code and horizontal assemblies constructed in accordance with Section 711 of the International Building Code.

1207.12 Dedicated use buildings. Where ESS are installed within dedicated-use ESS buildings they shall be classified as Group F-1 occupancies in accordance with the *International Building Code*.

1207.13 Fire apparatus access roads. Fire apparatus access roads shall be provided in accordance with Section 503.

1207.14 Fire protection water supplies.. Fire protection water supplies shall be provided in accordance with Section 507.

Delete without substitution:

~~**1207.1.5 Construction documents.**~~
~~The following information shall be provided with the permit application:~~

1. ~~Location and layout diagram of the room or area in which the ESS is to be installed.~~
2. ~~Details on the hourly *fire-resistance ratings* of assemblies enclosing the ESS.~~
3. ~~The quantities and types of ESS to be installed.~~
4. ~~Manufacturer's specifications, ratings and listings of each ESS.~~
5. ~~Description of energy (battery) management systems and their operation.~~
6. ~~Location and content of required signage.~~
7. ~~Details on fire suppression, smoke or fire detection, thermal management, ventilation, exhaust and *deflagration* venting systems, if provided.~~
8. ~~Support arrangement associated with the installation, including any required seismic restraint.~~
9. ~~A commissioning plan complying with Section 1207.2.1.~~
10. ~~A decommissioning plan complying with Section 1207.2.3.~~
11. ~~A fire safety and evacuation plan in accordance with Section 404.~~

~~**1207.1.5.1 Utilities applicability .**~~
~~Plans and specifications associated with ESS owned and operated by electric utilities as a component of the electric grid that are considered critical infrastructure documents in accordance with the provisions of the North American Electric Reliability Corporation and other applicable governmental laws and regulations shall be made available to the *fire code official* for viewing based on the requirements of the applicable governmental laws and regulations. [material based on NFPA 855 (2023)]~~

~~**1207.1.6 Hazard mitigation analysis.**~~
~~A failure modes and effects analysis (FMEA) or other *approved* hazard mitigation analysis shall be provided in accordance with Section 104.2.2 under any of the following conditions:~~

1. ~~Where ESS technologies not specifically identified in Table 1207.1.3 are provided.~~
2. ~~More than one ESS technology is provided in a single fire area where there is a potential for adverse interaction between technologies.~~
3. ~~Where allowed as a basis for increasing maximum allowable quantities. See Section 1207.5.2.~~
4. ~~Where required by the *fire code official* to address a potential hazard with an ESS installation that is not addressed by existing requirements.~~

~~**1207.1.6.1 Fault condition.**~~

~~The hazard mitigation analysis shall evaluate the consequences of the following failure modes. Only single failure modes shall be considered.~~

1. ~~A thermal runaway condition in a single electrochemical ESS unit.~~
2. ~~A mechanical failure of a nonelectrochemical ESS unit.~~
3. ~~Failure of any battery (energy) management system or fire protection system within the ESS equipment that is not covered by the product listing failure mode effects analysis (FMEA).~~
4. ~~Failure of any required protection system external to the ESS, including but not limited to ventilation (HVAC), exhaust ventilation, smoke detection, fire detection, gas detection or fire suppression system. [material based on NFPA 855 (2023)]~~

~~**1207.1.6.2 Analysis approval.**~~

~~The *fire code official* is authorized to approve the hazardous mitigation analysis provided that the consequences of the hazard mitigation analysis demonstrate:~~

1. ~~Fires will be contained within unoccupied ESS rooms or areas for the minimum duration of the fire-resistance-rated separations identified in Section 1207.7.4.~~
2. ~~Fires involving the ESS will allow occupants or the general public to evacuate to a safe location. [material based on NFPA 855 (2023)]~~

~~**1207.1.6.3 Additional protection measures.**~~

~~Construction, equipment and systems that are required for the ESS to comply with the hazardous mitigation analysis, including but not limited to those specifically described in Section 1207, shall be installed, maintained and tested in accordance with nationally recognized standards and specified design parameters.~~

~~**1207.1.7 Large-scale fire test.**~~

~~Where required elsewhere in Section 1207, large-scale fire testing shall be conducted on a representative ESS in accordance with UL 9540A. The testing shall be conducted or witnessed and reported by an *approved* testing laboratory and show that a fire involving one ESS will not propagate to an adjacent ESS, and where installed within buildings, enclosed areas and walk-in units will be contained within the room, enclosed area or walk-in unit for the duration of the test. The test report shall be provided to the *fire code official* for review and approval in accordance with Section 104.2.2. [material based on NFPA 855 (2023)]~~

~~**1207.1.8 Fire remediation.** Where a fire or other event has damaged the ESS and ignition or re-ignition of the ESS is possible, the system *owner*, agent or lessee shall take the following actions, at their expense, to mitigate the hazard or remove damaged equipment from the premises to a safe location.~~

~~**1207.1.8.1 Fire mitigation personnel.**~~

~~Where, in the opinion of the *fire code official*, it is essential for public safety that trained personnel be on-site to respond to possible ignition or re-ignition of a damaged ESS, the system owner, agent or lessee shall dispatch within 15 minutes one or more fire mitigation personnel to the premise, as required and *approved*, at their expense. These personnel shall remain on duty continuously after the fire department leaves the premise until the damaged energy storage equipment is removed from the premises, or earlier if the *fire code official* indicates the public safety hazard has been abated. [material based on NFPA 855 (2023)]~~

~~**1207.1.8.2 Duties.**~~

~~On-duty fire mitigation personnel shall have the following responsibilities:~~

1. ~~Keep a diligent watch for fires, obstructions to *means of egress* and other hazards.~~

2. ~~Immediately contact the fire department if their assistance is needed to mitigate any hazards or extinguish fires.~~
3. ~~Take prompt measures for remediation of hazards in accordance with the decommissioning plan per Section 1207.2.3.~~
4. ~~Take prompt measures to assist in the evacuation of the public from the structures. [material based on NFPA 855 (2023)]~~

~~**1207.2 Commissioning, decommissioning, operation and maintenance.** Commissioning, decommissioning, operation and maintenance shall be conducted in accordance with this section.~~

~~**1207.2.1 Commissioning.**~~

~~Commissioning of newly installed ESS and existing ESS that have been retrofitted, replaced or previously decommissioned and are returning to service shall be conducted prior to the ESS being placed in service in accordance with a commissioning plan that has been *approved* prior to initiating commissioning. The commissioning plan shall include the following:~~

1. ~~A narrative description of the activities that will be accomplished during each phase of commissioning, including the personnel intended to accomplish each of the activities.~~
2. ~~A listing of the specific ESS and associated components, controls and safety-related devices to be tested, a description of the tests to be performed and the functions to be tested.~~
3. ~~Conditions under which all testing will be performed, which are representative of the conditions during normal operation of the system.~~
4. ~~Documentation of the owner's project requirements and the basis of design necessary to understand the installation and operation of the ESS.~~
5. ~~Verification that required equipment and systems are installed in accordance with the *approved* plans and specifications.~~
6. ~~Integrated testing for all fire and safety systems.~~
7. ~~Testing for any required thermal management, ventilation or exhaust systems associated with the ESS installation.~~
8. ~~Preparation and delivery of operation and maintenance documentation.~~
9. ~~Training of facility operating and maintenance staff.~~
10. ~~Identification and documentation of the requirements for maintaining system performance to meet the original design intent during the operation phase.~~
11. ~~Identification and documentation of personnel who are qualified to service, maintain and decommission the ESS, and respond to incidents involving the ESS, including documentation that such service has been contracted for./p>~~
12. ~~A decommissioning plan for removing the ESS from service, and from the facility in which it is located. The plan shall include details on providing a safe, orderly shutdown of energy storage and safety systems with notification to the code officials prior to the actual decommissioning of the system. The decommissioning plan shall include contingencies for removing an intact operational ESS from service, and for removing an ESS from service that has been damaged by a fire or other event.~~

~~**Exception s:**~~

1. ~~Commissioning shall not be required for lead-acid and nickel-cadmium battery systems at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC. A decommissioning plan shall be provided and maintained where required by the *fire code official*.~~
2. ~~Lead-acid and nickel-cadmium battery systems less than 50 VAC, 60 VDC that are in telecommunications facilities for installations of communications equipment under the exclusive control of communications utilities, and are located outdoors or in building spaces or walk-in units used exclusively for such installations that are in compliance with NFPA 76, shall be permitted to have a commissioning plan in compliance with recognized industry practices in lieu of complying with Section 1207.2.1.~~

3. ~~Lead-acid and nickel-cadmium battery systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utilities, and are located in building spaces or walk-in units used exclusively for such installations, shall be permitted to have a commissioning plan in compliance with applicable governmental laws and regulations in lieu of developing a commissioning plan in accordance with Section 1207.2.1. [material based on NFPA 855 (2023)]~~

~~**1207.2.1.1 Initial acceptance testing.** During the commissioning process an ESS shall be evaluated for proper operation in accordance with the manufacturer's instructions and the commissioning plan prior to final approval.~~

~~**1207.2.1.2 Commissioning report.**~~

~~A report describing the results of the system commissioning, including the results of the initial acceptance testing required in Section 1207.2.1.1, shall be provided to the *fire code official* prior to final inspection and approval and maintained at an *approved* on-site location. [material based on NFPA 855 (2023)]~~

~~**1207.2.2 Operation and maintenance.**~~

~~An operation and maintenance manual shall be provided to both the ESS *owner* or their authorized agent and the ESS operator before the ESS is put into operation and shall include the following:~~

1. ~~Manufacturer's operation manuals and maintenance manuals for the entire ESS, or for each component of the system requiring maintenance, that clearly identify the required routine maintenance actions.~~
2. ~~Name, address and phone number of a service agency that has been contracted to service the ESS and its associated safety systems.~~
3. ~~Maintenance and calibration information, including wiring diagrams, control drawings, schematics, system programming instructions and control sequence descriptions, for all energy storage control systems.~~
4. ~~Desired or field-determined control set points that are permanently recorded on control drawings at control devices or, for digital control systems, in system programming instructions.~~
5. ~~A schedule for inspecting and recalibrating all ESS controls.~~
6. ~~A service record log form that lists the schedule for all required servicing and maintenance actions and space for logging such actions that are completed over time and retained on-site.~~

~~The ESS shall be operated and maintained in accordance with the manual and a copy of the manual shall be retained at an approved on-site location.~~

~~**1207.2.2.1 Ongoing inspection and testing.** Systems that monitor and protect the ESS installation shall be inspected and tested in accordance with the manufacturer's instructions and the operation and maintenance manual. Inspection and testing records shall be maintained in the operation and maintenance manual.~~

~~**1207.2.3 Decommissioning.**~~

~~The code official shall be notified prior to the decommissioning of an ESS. Decommissioning shall be performed in accordance with the decommissioning plan that includes the following:~~

1. ~~A narrative description of the activities to be accomplished for removing the ESS from service, and from the facility in which it is located.~~
2. ~~A listing of any contingencies for removing an intact operational ESS from service, and for removing an ESS from service that has been damaged by a fire or other event. [material based on NFPA 855 (2023)]~~

~~1207.3 Equipment~~.

~~ESS equipment shall be in accordance with Sections 1207.3.1 through 1207.3.9.~~

~~1207.3.1 Energy storage system listings~~.

~~ESS shall be *listed* in accordance with UL 9540.~~

~~Exception s:~~

1. ~~Lead-acid and nickel-cadmium battery systems less than 50 VAC, 60 VDC in telecommunications facilities for installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations that are in compliance with NFPA 76.~~
2. ~~Lead-acid and nickel-cadmium battery systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.~~
3. ~~Lead-acid battery systems in uninterruptable power supplies listed and *labeled* in accordance with UL 1778 and utilized for standby power applications.~~

~~[material based on NFPA 855 (2023)]~~

~~1207.3.2 Equipment listing~~.

~~Chargers, inverters and energy storage management systems shall be covered as part of the UL 9540 listing or shall be *listed* separately.~~

~~1207.3.3 Utility interactive systems~~.

~~Inverters shall be *listed* and *labeled* in accordance with UL 1741. Only inverters *listed* and *labeled* for utility interactive system use and identified as interactive shall be allowed to operate in parallel with the electric utility power system to supply power to common loads.~~

~~1207.3.4 Energy storage management system~~.

~~Where required by the ESS listing, an *approved* energy storage management system that monitors and balances cell voltages, currents and temperatures within the manufacturer's specifications shall be provided . The system shall disconnect electrical connections to the ESS or otherwise place it in a safe condition if potentially hazardous temperatures or other conditions such as short circuits, over voltage or under voltage are detected. [material based on NFPA 855 (2023)]~~

~~1207.3.5 Enclosures~~.

~~Enclosures of ESS shall be of noncombustible construction. [material based on NFPA 855 (2023)]~~

~~1207.3.6 Repairs~~.

~~Repairs of ESS shall only be done by qualified personnel. Repairs with other than identical parts shall be considered retrofitting and comply with Section 1207.3.7. Repairs shall be documented in the service records log. [material based on NFPA 855 (2023)]~~

~~1207.3.7 Retrofits~~.

~~Retrofitting of an existing ESS shall comply with the following:~~

1. ~~A construction permit shall be obtained in accordance with Section 105.6.6.~~
2. ~~New batteries, battery modules, capacitors and similar ESS components shall be *listed*.~~
3. ~~Battery management and other monitoring systems shall be connected and installed in accordance with the manufacturer's instructions.~~

4. ~~The overall installation shall continue to comply with UL 9540 listing requirements, where applicable.~~
5. ~~Systems that have been retrofitted shall be commissioned in accordance with Section 1207.2.1.~~
6. ~~Retrofits shall be documented in the service records log. [material based on NFPA 855 (2023)]~~

~~1207.3.7.1 Retrofitting lead acid and nickel cadmium~~.

~~Changing out or retrofitting of lead-acid and nickel-cadmium batteries with other lead-acid and nickel-cadmium batteries in the following applications shall be considered repairs where there is no increase in system size or energy capacity greater than 10 percent of the original design.~~

1. ~~At facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.~~
2. ~~Battery systems used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.~~
3. ~~Batteries in uninterruptible power supplies *listed* and *labeled* in accordance with UL 1778 and used for standby power applications only.~~

~~[material based on NFPA 855 (2023)]~~

~~1207.3.8 Replacements~~.

~~Replacements of ESS shall be considered new ESS installations and shall comply with the provisions of Section 1207 as applicable to new ESS. The ESS being replaced shall be decommissioned in accordance with Section 1207.2.3. [material based on NFPA 855 (2023)]~~

~~1207.3.9 Reused and repurposed equipment~~.

~~Equipment and materials shall only be reused or reinstalled as permitted in Section 104.9.1. Storage batteries previously used in other applications, such as electric vehicle propulsion, shall not be reused in applications regulated by Chapter 12 unless *approved* by the *fire code official* and unless the equipment is refurbished by a battery refurbishing company *approved* in accordance with UL 1974. [material based on NFPA 855 (2023)]~~

~~1207.4 General installations requirements~~.

~~Stationary and mobile ESS shall comply with the requirements of Sections 1207.4.1 through 1207.4.12.~~

~~1207.4.1 Electrical disconnects~~.

~~Where the ESS disconnecting means is not within sight of the main electrical service disconnecting means, placards or directories shall be installed at the location of the main electrical service disconnecting means indicating the location of stationary storage battery system disconnecting means in accordance with NFPA 70.~~

> **~~Exception:~~** ~~Electrical disconnects for lead-acid and nickel-cadmium battery systems at facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC shall be permitted to have electrical disconnects signage in accordance with NFPA 76.~~

~~1207.4.2 Working clearances~~.

~~Access and working space shall be provided and maintained about all electrical equipment to permit ready and safe operation and maintenance of such equipment in accordance with NFPA 70 and the manufacturer's instructions.~~

~~1207.4.3 Fire-resistance-rated separations~~.

~~Rooms and other indoor areas containing ESS shall be separated from other areas of the building in accordance with Section 1207.7.4. ESS shall be permitted to be in the same room with the equipment they support.~~

~~1207.4.4 Seismic and structural design~~.

~~Stationary ESS shall comply with the seismic design requirements in Chapter 16 of the *International Building Code*, and shall not exceed the floor loading limitation of the building.~~

~~1207.4.6 Combustible storage~~.

~~Combustible materials shall not be stored in ESS rooms, areas or walk-in units. Combustible materials in occupied work centers covered by Section 1207.4.10 shall be stored at least 3 feet (914 mm) from ESS cabinets.~~

~~1207.4.7 Toxic and highly toxic gases~~.

~~ESS that have the potential to release toxic and highly toxic gas during charging, discharging and normal use conditions shall be provided with a hazardous exhaust system in accordance with Section 502.8 of the *International Mechanical Code*.~~

~~1207.4.8 Signage~~.

~~*Approved* signs shall be provided on or adjacent to all entry doors for ESS rooms or areas and on enclosures of ESS cabinets and walk-in units located outdoors, on rooftops or in open parking garages. Signs designed to meet both the requirements of this section and NFPA 70 shall be permitted. The signage shall include the following or equivalent:~~

1. ~~"ENERGY STORAGE SYSTEM," "BATTERY STORAGE SYSTEM," "CAPACITOR ENERGY STORAGE SYSTEM" or the equivalent.~~
2. ~~The identification of the electrochemical ESS technology present.~~
3. ~~"ENERGIZED ELECTRICAL CIRCUITS."~~
4. ~~Where water-reactive electrochemical ESS are present, the signage shall include "APPLY NO WATER."~~
5. ~~Current contact information, including phone number, for personnel authorized to service the equipment and for fire mitigation personnel required by Section 1207.1.8.1.~~

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~~**Exception:** Existing electrochemical ESS shall be permitted to include the signage required at the time they were installed. [material based on NFPA 855 (2023)]~~

~~1207.4.9 Security of installations~~.

~~Rooms, areas and walk-in units in which electrochemical ESS are located shall be secured against unauthorized entry and safeguarded in an *approved* manner. Security barriers, fences, landscaping and other enclosures shall not inhibit the required air flow to or exhaust from the el ectrochemical ESS and its components. [material based on NFPA 855 (2023)]~~

~~1207.4.10 Occupied work centers~~.

~~Electrochemical ESS located in rooms or areas occupied by personnel not directly involved with maintenance, service and testing of the systems shall comply with the following:~~

1. ~~Electrochemical ESS located in occupied work centers shall be housed in locked noncombustible cabinets or other enclosures to prevent access by unauthorized personnel.~~
2. ~~Where electrochemical ESS are contained in cabinets in occupied work centers, the cabinets shall be located within 10 feet (3048 mm) of the equipment that they support.~~

3. ~~Cabinets shall include signage complying with Section 1207.4.8. [material based on NFPA 855 (2023)]~~

~~**1207.4.11 Open rack installations.**~~
~~Where electrochemical ESS are installed in a separate equipment room and only authorized personnel have access to the room, they shall be permitted to be installed on an open rack for ease of maintenance. [material based on NFPA 855 (2023)]~~

~~**1207.4.12 Walk-in units.** Walk-in units shall be entered only for inspection, maintenance and repair of ESS units and ancillary equipment, and shall not be occupied for other purposes.~~

~~**1207.5 Electrochemical ESS protection.**~~
~~The protection of electrochemical ESS shall be in accordance with Sections 1207.5.1 through 1207.5.8 where required by Sections 1207.7 through 1207.10. [material based on NFPA 855 (2023)]~~

~~**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
Nickel-cadmium (Ni-Cd), nickel-metal hydride (NI-MH) and nickel zinc (Ni-Zn)	Unlimited
Sodium nickel chloride	600 kWh
Zinc-manganese dioxide ($Zn\text{-}MnO_2$)	Unlimited
Other battery technologies	200 kWh
CAPACITORS	
All types	20 kWh
OTHER ELECTROCHEMICAL ESS	
All types	20 kWh

~~For SI: 1 kilowatt hour = 3.6 megajoules.~~

a. ~~For electrochemical ESS units rated in amp-hours, kWh shall equal rated voltage times the amp-hour rating divided by 1,000.~~

b. ~~Shall include vanadium, zinc bromine, polysulfide-bromide and other flowing electrolyte-type technologies.~~

~~**1207.5.1 Size and separation.**~~
~~Electrochemical ESS shall be segregated into groups not exceeding 50 kWh (180 megajoules). Each group shall be separated a minimum of 3 feet (914 mm) from other groups and from walls in the storage room or area. The storage arrangements shall comply with Chapter 10.~~

~~**Exceptions:** [material based on NFPA 855 (2023)]~~

1. ~~Lead-acid and nickel-cadmium battery systems in facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.~~
2. ~~Lead-acid and nickel-cadmium systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.~~
3. ~~Lead-acid battery systems in uninterruptable power supplies *listed* and *labeled* in accordance with UL 1778, utilized for standby power applications, and limited to not more than 10 percent of the floor area on the floor on which the ESS is located.~~
4. ~~The *fire code official* is authorized to approve larger capacities or smaller separation distances based on large-scale fire testing complying with Section 1207.1.5.~~

~~**1207.5.2 Maximum allowable quantities.**~~
~~*Fire areas* within rooms, areas and walk-in units containing electrochemical ESS shall not exceed the maximum allowable quantities in Table 1207.5.~~

~~**Exceptions:** [material based on NFPA 855 (2023)]~~

1. ~~Where *approved* by the *fire code official*, rooms, areas and walk-in units containing electrochemical ESS that exceed the amounts in Table 1207.5 shall be permitted based on a hazardous mitigation analysis in accordance with Section 1207.1.6 and large-scale fire testing complying with Section 1207.1.7.~~
2. ~~Lead-acid and nickel-cadmium battery systems installed in facilities under the exclusive control of communications utilities, and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.~~
3. ~~Dedicated-use buildings in compliance with Section 1207.7.1.~~

~~**1207.5.2.1 Mixed electrochemical energy systems.** Where rooms, areas and walk-in units contain different types of electrochemical energy technologies, the total aggregate quantities of the systems shall be determined based on the sum of percentages of each technology type quantity divided by the maximum allowable quantity of each technology type. The sum of the percentages shall not exceed 100 percent of the maximum allowable quantity.~~

~~**1207.5.3 Elevation.**~~
~~Electrochemical ESS shall not be located in the following areas:~~

1. ~~Where the floor is located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.~~
2. ~~Where the floor is located below the lowest *level of exit discharge*.~~

~~**Exceptions:** [material based on NFPA 855 (2023)]~~

1. ~~Lead-acid and nickel-cadmium battery systems less than 50 VAC and 60 VDC installed in facilities under the exclusive control of communications utilities in accordance with NFPA 76.~~
2. ~~Lead-acid and nickel-cadmium systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.~~
3. ~~Lead-acid battery systems in uninterruptable power supplies *listed* and *labeled* in accordance with UL 1778, utilized for standby power applications, which is limited to not more than 10 percent of the floor area on the floor on which the ESS is located.~~
4. ~~Where *approved*, installations shall be permitted in underground vaults complying with NFPA 70, Article 450, Part III.~~
5. ~~Where *approved* by the *fire code official,* installations shall be permitted on higher and lower floors.~~

~~**1207.5.4 Fire detection**~~.

~~An *approved automatic smoke detection system* or radiant energy-sensing fire detection system complying with Section 907.2 shall be installed in rooms, indoor areas and walk-in units containing electrochemical ESS. An *approved* radiant energy-sensing fire detection system shall be installed to protect open parking garage and rooftop installations. Alarm signals from detection systems shall be transmitted to a central station, proprietary or remote station service in accordance with NFPA 72, or where *approved* to a constantly attended location.~~

> ~~**Exception:** Normally unoccupied, remote stand-alone telecommunications structures with a gross floor area of less than 1,500 square feet (139 m^2) utilizing lead-acid or nickel-cadmium batteries shall not be required to have a fire detection system installed. [material based on NFPA 855 (2023)]~~

~~**1207.5.4.1 System status**~~.

~~Lead-acid and nickel-cadmium battery systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations, shall be allowed to use the process control system to monitor the smoke or radiant energy-sensing fire detectors required in Section 1207.5.4. [material based on NFPA 855 (2023)]~~

~~**1207.5.5 Fire suppression systems.**~~

~~Rooms and areas within buildings and walk-in units containing electrochemical ESS shall be protected by an automatic fire suppression system designed and installed in accordance with one of the following:~~

1. ~~*Automatic sprinkler systems* designed and installed in accordance with Section 903.3.1.1 for ESS units (groups) with a maximum stored energy capacity of 50 kWh, as described in Section 1207.5.1, shall be designed with a minimum density of 0.3 gpm/ft^2 (1.14 L/min) based over the area of the room or 2,500 square-foot (232 m^2) design area, whichever is smaller, unless a lower density is approved based on large-scale fire testing in accordance with Section 1207.1.7.~~
2. ~~*Automatic sprinkler systems* designed and installed in accordance with Section 903.3.1.1 for ESS units (groups) exceeding 50 kWh shall use a density based on large-scale fire testing complying with Section 1207.1.7.~~
3. ~~The following alternative *automatic fire-extinguishing systems* designed and installed in accordance with Section 904, provided that the installation is *approved* by the *fire code official* based on large-scale fire testing complying with Section 1207.1.7:~~
   - ~~3.1. NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*.~~
   - ~~3.2. NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*.~~
   - ~~3.3. NFPA 750, *Standard on Water Mist Fire Protection Systems*.~~
   - ~~3.4. NFPA 2001, *Standard on Clean Agent Fire Extinguishing Systems*.~~
   - ~~3.5. NFPA 2010, *Standard for Fixed Aerosol Fire-Extinguishing Systems*.~~

~~**Exceptions:**~~

1. ~~Fire suppression systems for lead-acid and nickel-cadmium battery systems at facilities under the exclusive control of communications utilities that operate at less than 50 VAC and 60 VDC shall be provided where required by NFPA 76.~~
2. ~~Lead-acid and nickel-cadmium systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations, shall not be required to have a fire suppression system installed.~~
3. ~~Lead-acid battery systems in uninterruptable power supplies *listed* and *labeled* in accordance with UL 1778, utilized for standby power applications, which is limited to not more than 10 percent of the floor area on the floor on which the ESS is located, shall not be required to have a fire suppression system. [material based on NFPA 855 (2023)]~~

~~**1207.5.5.1 Water-reactive systems.**~~

~~Electrochemical ESS that utilize water-reactive materials shall be protected by an *approved* alternative *automatic fire-extinguishing system* in accordance with Section 904, where the installation is *approved* by the *fire code official* based on large-scale fire testing complying with Section 1207.1.7.~~

~~**1207.5.6 Maximum enclosure size.**~~

~~Outdoor walk-in units housing ESS shall not exceed 53 feet by 8 feet by 9.5 feet high (16 154 mm × 2438 mm × 2896 mm), not including bolt-on HVAC and related equipment, as *approved*. Outdoor walk-in units exceeding these limitations shall be considered indoor installations and comply with the requirements in Section 1207.7. [material based on NFPA 855 (2023)]~~

~~**1207.5.7 Vegetation control.**~~

~~Areas within 10 feet (3048 mm) on each side of outdoor ESS shall be cleared of combustible vegetation and other combustible growth. Single specimens of trees, shrubbery or cultivated ground cover such as green grass, ivy, succulents or similar plants used as ground cover shall be permitted to be exempt provided that they do not form a means of readily transmitting fire. [material based on NFPA 855 (2023)]~~

~~**1207.5.8 Means of egress separation.**~~

~~ESS located outdoors and in open parking garages shall be separated from any *means of egress* as required by the *fire code official* to ensure safe egress under fire conditions, but in no case less than 10 feet (3048 mm).~~

> ~~**Exception:** The *fire code official* is authorized to approve a reduced separation distance if large-scale fire testing complying with Section 1207.1.7 is provided that shows that a fire involving the ESS will not adversely impact occupant egress.~~

~~**1207.6 Electrochemical ESS technology-specific protection.**~~

~~Electrochemical ESS installations shall comply with the requirements of this section in accordance with the applicable requirements of Table 1207.6. [material based on NFPA 855 (2023)]~~

~~**TABLE 1207.6 ELECTROCHEMICAL ESS TECHNOLOGY-SPECIFIC REQUIREMENTS**~~

COMPLIANCE REQUIRED[b]		BATTERY TECHNOLOGY						OTHER ESS AND BATTERY TECHNOLOGIES[b]	CAPACITOR ESS[b]
Feature	Section	Lead-acid	Nickel cadmium (Ni-Cd) , nickel-metal hydride (Ni-MH) and nickel zinc (Ni-Zn)	Zinc-manganese dioxide ($Zn\text{-}MnO_2$)	Lithium-ion	Flow	Sodium nickel chloride		
Exhaust ventilation	1207.6.1	Yes	Yes	Yes	No	Yes	No	Yes	Yes
Explosion control	1207.6.3	Yes[a]	Yes[a]	Yes	Yes	No	Yes	Yes	Yes
Safety caps	1207.6.4	Yes	Yes	No	No	No	No	Yes	Yes
Spill control and neutralization	1207.6.2	Yes[c]	Yes[c]	Yes[f]	No	Yes	No	Yes	Yes
Thermal runaway	1207.6.5	Yes[d]	Yes	Yes[e]	Yes[e]	No	Yes	Yes[e]	Yes

~~a. Not required for lead-acid and nickel-cadmium batteries at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.~~

~~b. Protection shall be provided unless documentation acceptable to the fire code official is provided in accordance with Section 104.2.2 that provides justification why the protection is not necessary based on the technology used.~~

~~c. Applicable to vented-type (i.e., flooded) nickel-cadmium and lead-acid batteries.~~

~~d. Not required for vented-type (i.e., flooded) batteries.~~

~~e. The thermal runaway protection is permitted to be part of a battery management system that has been evaluated with the battery as part of the evaluation to UL 1973.~~

~~f. Not required for batteries with jelled electrolyte.~~

~~**1207.6.1 Exhaust ventilation.**~~

~~Where required by Table 1207.6 or elsewhere in this code, exhaust ventilation of rooms, areas and walk-in units containing electrochemical ESS shall be provided in accordance with the *International Mechanical Code* and Section 1207.6.1.1 or 1207.6.1.2.~~

~~**1207.6.1.1 Ventilation based on LFL.** The exhaust ventilation system shall be designed to limit the maximum concentration of *flammable gas* to 25 percent of the lower flammable limit (LFL) of the total volume of the room, area or walk-in unit during the worst-case event of simultaneous charging of batteries at the maximum charge rate, in accordance with nationally recognized standards.~~

~~**1207.6.1.2 Ventilation based on exhaust rate.**~~

~~Mechanical exhaust ventilation shall be provided at a rate of not less than 1 ft^3/min/ft^2 (5.1 L/sec/m^2) of floor area of the room, area or walk-in unit. The ventilation shall be either continuous or shall be activated by a *gas detection system* in accordance with Section 1207.6.1.2.4.~~

~~**1207.6.1.2.1 Standby power.**~~

~~Mechanical exhaust ventilation shall be provided with a minimum of 2 hours of standby power in accordance with Section 1203.2.5.~~

~~**1207.6.1.2.2 Installation instructions.**~~

~~Required mechanical exhaust ventilation systems shall be installed in accordance with the manufacturer's installation instructions and the *International Mechanical Code*.~~

~~**1207.6.1.2.3 Supervision.**~~

~~Required mechanical exhaust ventilation systems shall be supervised by an *approved* central station, proprietary or remote station service in accordance with NFPA 72, or shall initiate an audible and visible signal at an *approved* constantly attended on-site location.~~

~~**1207.6.1.2.4 Gas detection system.**~~

~~Where required by Section 1207.6.1.2, rooms, areas and walk-in units containing ESS shall be protected by an *approved* continuous *gas detection system* that complies with Section 916 and with the following:~~

~~1. The *gas detection system* shall be designed to activate the mechanical ventilation system when the level of *flammable gas* in the room, area or walk-in unit exceeds 25 percent of the LFL.~~

~~2. The mechanical ventilation system shall remain on until the *flammable gas* detected is less than 25 percent of the LFL.~~

3. ~~The *gas detection system* shall be provided with a minimum of 2 hours of standby power in accordance with Section 1203.2.5.~~
4. ~~Failure of the *gas detection system* shall annunciate a trouble signal at an *approved* central station, proprietary or remote station service in accordance with NFPA 72, or shall initiate an audible and visible trouble signal at an *approved* constantly attended on-site location. [material based on NFPA 855 (2023)]~~

~~1207.6.2 Spill control and neutralization.~~
~~Where required by Table 1207.6 or elsewhere in this code, areas containing free-flowing liquid electrolyte or hazardous materials shall be provided with spill control and neutralization in accordance with this section. [material based on NFPA 855 (2023)]~~

~~1207.6.2.1 Spill control.~~
~~Spill control shall be provided to prevent the flow of liquid electrolyte or hazardous materials to adjoining rooms or areas. The method shall be capable of containing a spill from the single largest battery or vessel. [material based on NFPA 855 (2023)]~~

~~1207.6.2.2 Neutralization.~~
~~An *approved* method that is capable of neutralizing spilled liquid electrolyte from the largest battery or vessel to a pH between 5.0 and 9.0 shall be provided. [material based on NFPA 855 (2023)]~~

~~1207.6.2.3 Communications utilities.~~
~~The requirements of Section 1207.6.2 shall apply only when the aggregate capacity of multiple vessels exceeds 1,000 gallons (3785 L) for lead-acid and nickel-cadmium battery systems operating at less than 50 VAC and 60 VDC that are located at facilities under the exclusive control of communications utilities, and those facilities comply with NFPA 76 in addition to applicable requirements of this code.~~

~~1207.6.4 Safety caps.~~
~~Where required by Table 1207.6 or elsewhere in this code, vented batteries and other ESS shall be provided with flame-arresting safety caps.~~

~~1207.6.5 Thermal runaway.~~
~~Where required by Table 1207.6 or elsewhere in this code, batteries and other ESS shall be provided with a *listed* device or other *approved* method to prevent, detect and minimize the impact of thermal runaway.~~

~~1207.7 Indoor installations.~~
~~Indoor ESS installations shall be in accordance with Sections 1207.7.1 through 1207.7.4. [material based on NFPA 855 (2023)]~~

~~TABLE 1207.7 INDOOR ESS INSTALLATIONS~~

COMPLIANCE REQUIRED		DEDICATED-USE BUILDINGS[a]	NONDEDICATED-USE BUILDINGS[b]
Feature	Section		
Dwelling units and sleeping units	1207.7.3	NA	Yes
Elevation	1207.5.3	Yes	Yes
Fire suppression systems	1207.5.5	Yes[c]	Yes

Fire-resistance-rated separations	1207.7.4	Yes	Yes
General installation requirements	1207.4	Yes	Yes
Maximum allowable quantities	1207.5.2	No	Yes
Size and separation	1207.5.1	Yes	Yes
Smoke and automatic fire detection[e]	1207.5.4	Yes[d]	Yes
Technology specific protection	1207.6	Yes	Yes

~~NA = Not Allowed.~~

a. ~~See Section 1207.7.1.~~

b. ~~See Section 1207.7.2.~~

c. ~~Where *approved* by the fire code official, fire suppression systems are permitted to be omitted in dedicated-use buildings located more than 100 feet (30.5 m) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high-piled stock and other exposure hazards.~~

d. ~~Where *approved* by the fire code official, alarm signals are not required to be transmitted to a central station, proprietary or remote station service in accordance with NFPA 72, or a constantly attended location where local fire alarm annunciation is provided and trained personnel are always present.~~

e. ~~Lead-acid and nickel-cadmium battery systems installed in Group U buildings and structures less than 1,500 square feet (139 m^2) under the exclusive control of communications utilities, and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76, are not required to have an *approved* automatic smoke or fire detection system.~~

~~1207.7.1 Dedicated-use buildings~~.
~~For the purpose of Table 1207.7, dedicated-use ESS buildings shall be classified as Group F-1 occupancies and comply with all the following:~~

1. ~~The building shall only be used for ESS, electrical energy generation and other electrical grid-related operations.~~
2. ~~Occupants in the rooms and areas containing ESS are limited to personnel that operate, maintain, service, test and repair the ESS and other energy systems.~~
3. ~~No other occupancy types shall be permitted in the building.~~
4. ~~Administrative and support personnel shall be permitted in areas within the buildings that do not contain ESS, provided that:~~
   4.1. ~~The areas do not occupy more than 10 percent of the *building area* of the story in which they are located.~~
   4.2. ~~A *means of egress* is provided from the incidental use areas to the *public way* that does not require occupants to traverse through areas containing ESS or other energy system equipment. [material based on NFPA 855 (2023)]~~

~~1207.7.2 Nondedicated-use buildings~~.
~~For the purpose of Table 1207.7, nondedicated-use buildings include all buildings that contain ESS and do not comply with Section 1207.7.1 dedicated-use building requirements. [material based on NFPA 855 (2023)]~~

~~1207.7.3 Dwelling units and sleeping units~~.
~~ESS shall not be installed in *sleeping units* or in *habitable spaces* of *dwelling units*. [material based on NFPA 855 (2023)]~~

~~**1207.7.4 Fire-resistance-rated separations.**~~

~~Rooms and areas containing ESS shall include *fire-resistance-rated* separations as follows:~~

1. ~~In dedicated-use buildings, rooms and areas containing ESS shall be separated from areas in which administrative and support personnel are located.~~
2. ~~In nondedicated-use buildings, rooms and areas containing ESS shall be separated from other areas in the building.~~

~~Separation shall be provided by 2-hour *fire barriers* constructed in accordance with Section 707 of the *International Building Code* and 2-hour *horizontal assemblies* constructed in accordance with Section 711 of the *International Building Code*, as appropriate. [material based on NFPA 855 (2023)]~~

~~**1207.8 Outdoor installations.**~~

~~Outdoor installations shall be in accordance with Sections 1207.8.1 through 1207.8.3. *Exterior wall* installations for individual ESS units not exceeding 20 kWh shall be in accordance with Section 1207.8.4. [material based on NFPA 855 (2023)]~~

~~**TABLE 1207.8 OUTDOOR ESS INSTALLATIONS[a]**~~

COMPLIANCE REQUIRED		REMOTE INSTALLATIONS[a]	INSTALLATIONS NEAR EXPOSURES[b]
Feature	Section		
All ESS installations	1207.4	Yes	Yes
Clearance to exposures	1207.8.3	Yes	Yes
Fire suppression systems	1207.5.5	Yes[c]	Yes
Maximum allowable quantities	1207.5.2	No	Yes
Maximum enclosure size	1207.5.6	Yes	Yes
Means of egress separation	1207.5.8	Yes	Yes
Size and separation	1207.5.1	No	Yes[d]
Smoke and automatic fire detection	1207.5.4	Yes	Yes
Technology-specific protection	1207.6	Yes	Yes
Vegetation control	1207.5.7	Yes	Yes

a. ~~See Section 1207.8.1.~~

b. ~~See Section 1207.8.2.~~

c. ~~Where approved by the fire code official, fire suppression systems are permitted to be omitted.~~

d. ~~In outdoor walk-in units, spacing is not required between ESS units and the walls of the enclosure.~~

~~**1207.8.1 Remote outdoor installations.**~~

~~For the purpose of Table 1207.8, remote outdoor installations include ESS located more than 100 feet (30 480 mm) from buildings, lot lines, public ways, stored combustible materials, hazardous materials, high-piled stock and other exposure hazards. [material based on NFPA 855 (2023)]~~

~~**1207.8.2 Installations near exposures.**~~

~~For the purpose of Table 1207.8, installations near exposures include all outdoor ESS installations that do not comply with Section 1207.8.1 remote outdoor location requirements. [material based on NFPA 855 (2023)]~~

~~**1207.8.3 Clearance to exposures.**~~

~~ESS located outdoors shall be separated by a minimum of 10 feet (3048 mm) from the following exposures:~~

1. ~~Lot lines.~~
2. ~~Public ways.~~
3. ~~Buildings.~~
4. ~~Stored combustible materials.~~
5. ~~Hazardous materials.~~
6. ~~High-piled stock.~~
7. ~~Other exposure hazards.~~

~~**Exceptions:** [material based on NFPA 855 (2023)]~~

1. ~~Clearances are permitted to be reduced to 3 feet (914 mm) where a 1-hour free-standing *fire barrier* suitable for exterior use and extending 5 feet (1524 mm) above and 5 feet (1524 mm) beyond the physical boundary of the ESS installation is provided to protect the exposure.~~
2. ~~Clearances to buildings are permitted to be reduced to 3 feet (914 mm) where noncombustible *exterior walls* with no openings or combustible overhangs are provided on the wall adjacent to the ESS and the *fire-resistance rating* of the *exterior wall* is a minimum of 2 hours.~~
3. ~~Clearances to buildings are permitted to be reduced to 3 feet (914 mm) where a weatherproof enclosure constructed of noncombustible materials is provided over the ESS, and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure based on large-scale fire testing complying with Section 1207.1.7.~~

~~**1207.8.4 Exterior wall installations.**~~

~~ESS shall be permitted to be installed outdoors on *exterior walls* of buildings when all of the following conditions are met:~~

1. ~~The maximum energy capacity of individual ESS units shall not exceed 20 kWh.~~
2. ~~The ESS shall comply with applicable requirements in Section 1207.~~
3. ~~The ESS shall be installed in accordance with the manufacturer's instructions and their listing.~~
4. ~~Individual ESS units shall be separated from each other by at least 3 feet (914 mm).~~
5. ~~The ESS shall be separated from doors, windows, operable openings into buildings or HVAC inlets by at least 5 feet (1524 mm).~~

~~**Exception:** Where *approved*, smaller separation distances in Items 4 and 5 shall be permitted based on large-scale fire testing complying with Section 1207.1.7. [material based on NFPA 855 (2023)]~~

~~**1207.9 Special installations.**~~

~~Rooftop and open parking garage ESS installations shall comply with Sections 1207.9.1 through 1207.9.6. [material based on NFPA 855 (2023)]~~

~~**TABLE 1207.9 SPECIAL ESS INSTALLATIONS**~~

COMPLIANCE REQUIRED		ROOFTOPS[a]	OPEN PARKING GARAGES[b]
Feature	Section		
All ESS installations	1207.4	Yes	Yes
Clearance to exposures	1207.9.3	Yes	Yes
Fire suppression systems	1207.9.4	Yes	Yes
Maximum allowable quantities	1207.5.2	Yes	Yes
Maximum enclosure size	1207.5.6	Yes	Yes
Means of egress separation	1207.5.8	Yes	Yes
Open parking garage installations	1207.9.6	No	Yes
Rooftop installations	1207.9.5	Yes	No
Size and separation	1207.5.1	Yes	Yes
Smoke and automatic fire detection	1207.5.4	Yes	Yes
Technology-specific protection	1207.6	Yes	Yes

a. ~~See Section 1207.9.1.~~

b. ~~See Section 1207.9.2.~~

~~1207.9.1 Rooftop installations~~.

~~For the purpose of Table 1207.9, rooftop ESS installations are those located on the roofs of buildings. [material based on NFPA 855 (2023)]~~

~~1207.9.2 Open parking garage installations~~.

~~For the purpose of Table 1207.9, open parking garage ESS installations are those located in a structure or portion of a structure that complies with Section 406.5 of the *International Building Code*. [material based on NFPA 855 (2023)]~~

~~1207.9.3 Clearance to exposures~~.

~~ESS located on rooftops and in open parking garages shall be separated by a minimum of 10 feet (3048 mm) from the following exposures:~~

1. ~~Buildings, except the building on which rooftop ESS is mounted.~~
2. ~~Any portion of the building on which a rooftop system is mounted that is elevated above the rooftop on which the system is installed.~~
3. ~~Lot lines.~~
4. ~~Public ways.~~
5. ~~Stored combustible materials.~~
6. ~~Locations where motor vehicles can be parked.~~
7. ~~Hazardous materials.~~
8. ~~Other exposure hazards.~~

~~**Exceptions:**~~

1. ~~Clearances are permitted to be reduced to 3 feet (914 mm) where a 1-hour free-standing *fire barrier* suitable for exterior use and extending 5 feet (1524 mm) above and 5 feet (1524 mm) beyond the physical boundary of the ESS installation is provided to protect the exposure.~~
2. ~~Clearances are permitted to be reduced to 3 feet (914 mm) where a weatherproof enclosure constructed of noncombustible materials is provided over the ESS, and it has been demonstrated that a fire within the enclosure will not ignite combustible materials outside the enclosure based on large-scale fire testing complying with Section 1207.1.7. [material based on NFPA 855 (2023)]~~

~~**1207.9.4 Fire suppression systems.**~~

~~ESS located in walk-in units on rooftops or in walk-in units in open parking garages shall be provided with automatic fire suppression systems within the ESS enclosure in accordance with Section 1207.5.5. Areas containing ESS other than walk-in units in open parking structures on levels not open above to the sky shall be provided with an automatic fire suppression system complying with Section 1207.5.5.~~

~~**Exception:** A fire suppression system is not required in open parking garages if large-scale fire testing complying with Section 1207.1.7 is provided that shows that a fire will not impact the exposures in Section 1207.9.3. [material based on NFPA 855 (2023)]~~

~~**1207.9.5 Rooftop installations.**~~

~~ESS and associated equipment that are located on rooftops and not enclosed by building construction shall comply with the following:~~

1. ~~Stairway access to the roof for emergency response and fire department personnel shall be provided either through a bulkhead from the interior of the building or a stairway on the exterior of the building.~~
2. ~~Service walkways at least 5 feet (1524 mm) in width shall be provided for service and emergency personnel from the point of access to the roof to the system.~~
3. ~~ESS and associated equipment shall be located from the edge of the roof a distance equal to at least the height of the system, equipment or component but not less than 5 feet (1524 mm).~~
4. ~~The roofing materials under and within 5 feet (1524 mm) horizontally from an ESS or associated equipment shall be noncombustible or shall have a Class A rating when tested in accordance with ASTM E108 or UL 790.~~
5. ~~A Class I standpipe outlet shall be installed at an *approved* location on the roof level of the building or in the stairway bulkhead at the top level.~~
6. ~~The ESS shall be the minimum of 10 feet (3048 mm) from the fire service access point on the rooftop. [material based on NFPA 855 (2023)]~~

~~**1207.9.6 Open parking garages.**~~

~~ESS and associated equipment that are located in open parking garages shall comply with all of the following:~~

1. ~~ESS shall not be located within 50 feet (15 240 mm) of air inlets for building HVAC systems.~~

   ~~**Exception:** This distance shall be permitted to be reduced to 25 feet (7620 mm) if the automatic *fire alarm system* monitoring the radiant-energy sensing detectors de-energizes the ventilation system connected to the air intakes upon detection of fire.~~
2. ~~ESS shall not be located within 25 feet (7620 mm) of *exits* leading from the attached building where located on a covered level of the parking structure not directly open to the sky above.~~
3. ~~An *approved* fence with a locked gate or other *approved* barrier shall be provided to keep the general public at least 5 feet (1524 mm) from the outer enclosure of the ESS. [material based on NFPA 855 (2023)]~~

~~**1207.10 Mobile ESS equipment and operations.**~~

~~Mobile ESS equipment and operations shall comply with Sections 1207.10.1 through 1207.10.7.7. [material based on NFPA 855 (2023)]~~

~~TABLE 1207.10 MOBILE ENERGY STORAGE SYSTEMS (ESS)~~

COMPLIANCE REQUIRED		DEPLOYMENT[a]
Feature	Section	
All ESS installations	1207.4	Yes[b]
Fire suppression systems	1207.5.5	Yes[c]
Maximum allowable quantities	1207.5.2	Yes
Maximum enclosure size	1207.5.6	Yes
Means of egress separation	1207.5.8	Yes
Size and separation	1207.5.1	Yes[d]
Smoke and automatic fire detection	1207.5.4	Yes[e]
Technology-specific protection	1207.6	Yes
Vegetation control	1207.5.7	Yes

a. ~~See Section 1207.10.2.~~

b. ~~Mobile operations on wheeled vehicles and trailers shall not be required to comply with Section 1207.4.4 seismic and structural load requirements.~~

c. ~~Fire suppression system connections to the water supply shall be permitted to use *approved* temporary connections.~~

d. ~~In walk-in units, spacing is not required between ESS units and the walls of the enclosure.~~

e. ~~Alarm signals are not required to be transmitted to an *approved* location for mobile ESS deployed 30 days or less.~~

~~1207.10.1 Charging and storage~~.
~~For the purpose of Section 1207.10, charging and storage covers the operation where mobile ESS are charged and stored so they are ready for deployment to another site, and where they are charged and stored after a deployment.~~

> **~~Exception:~~** ~~Mobile ESS used to temporarily provide power to lead-acid and nickel-cadmium systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations. [material based on NFPA 855 (2023)]~~

~~1207.10.2 Deployment~~.
~~For the purpose of Section 1207.10, deployment covers operations where mobile ESS are located at a site other than the charging and storage site and are being used to provide power.~~

> **~~Exception:~~** ~~Mobile ESS used to temporarily provide power to lead-acid and nickel-cadmium systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations. [material based on NFPA 855 (2023)]~~

~~1207.10.3 Permits~~.

~~Construction and operational permits shall be provided for charging and storage of mobile ESS and operational permits shall be provided for deployment of mobile ESS as required by Section 1207.1.4.~~

~~1207.10.4 Construction documents~~.
~~*Construction documents* complying with Section 1207.1.5 shall be provided with the construction permit application for mobile ESS charging and storage locations.~~

~~1207.10.4.1 Deployment documents.~~
~~The following information shall be provided with the operation permit applications for mobile ESS deployments:~~

1. ~~Relevant information for the mobile ESS equipment and protection measures in the *construction documents* required by Section 1207.1.5.~~
2. ~~Location and layout diagram of the area in which the mobile ESS is to be deployed, including a scale diagram of all nearby exposures.~~
3. ~~Location and content of signage, including no smoking signs.~~
4. ~~Description of fencing to be provided around the ESS, including locking methods.~~
5. ~~Details on fire suppression, smoke and automatic fire detection, system monitoring, thermal management, exhaust ventilation and explosion control, if provided.~~
6. ~~For deployment, the intended duration of operation, including anticipated connection and disconnection times and dates.~~
7. ~~Location and description of local staging stops during transit to the deployment site. See Section 1207.10.7.5.~~
8. ~~Description of the temporary wiring, including connection methods, conductor type and size, and circuit overcurrent protection to be provided.~~
9. ~~Description of how fire suppression system connections to water supplies or extinguishing agents are to be provided.~~
10. ~~Contact information for personnel who are responsible for maintaining and servicing the equipment, and responding to emergencies as required by Section 1207.1.8.1. [material based on NFPA 855 (2023)]~~

~~1207.10.5 Approved locations~~.
~~Locations where mobile ESS are charged, stored and deployed shall be restricted to the locations established on the construction and operational permits. [material based on NFPA 855 (2023)]~~

~~1207.10.6 Charging and storage~~.
~~Installations where mobile ESS are charged and stored shall be treated as permanent ESS indoor or outdoor installations, and shall comply with the following sections, as applicable:~~

1. ~~Indoor charging and storage shall comply with Section 1207.7.~~
2. ~~Outdoor charging and storage shall comply with Section 1207.8.~~
3. ~~Charging and storage on rooftops and in open parking garages shall comply with Section 1207.9.~~

~~Exceptions:~~

1. ~~Electrical connections shall be permitted to be made using temporary wiring complying with the manufacturer's instructions, the UL 9540 listing and NFPA 70.~~
2. ~~Fire suppression system connections to the water supply shall be permitted to use *approved* temporary connections. [material based on NFPA 855 (2023)]~~

~~**1207.10.7 Deployed mobile ESS requirements**~~**.**

~~Deployed mobile ESS equipment and operations shall comply with this section and Table 1207.10. [material based on NFPA 855 (2023)]~~

~~**1207.10.7.1 Duration**~~**.**

~~The duration of mobile ESS deployment shall not exceed 30 days.~~

~~**Exceptions:**~~

1. ~~Mobile ESS deployments that provide power for durations longer than 30 days shall comply with Section 1207.10.6.~~
2. ~~Mobile ESS deployments shall not exceed 180 days unless additional operational permits are obtained. [material based on NFPA 855 (2023)]~~

~~**1207.10.7.2 Restricted locations**~~**.**

~~Deployed mobile ESS operations shall not be located indoors, in covered parking garages, on rooftops, below grade or under building overhangs. [material based on NFPA 855 (2023)]~~

~~**1207.10.7.3 Clearance to exposures**~~**.**

~~Deployed mobile ESS shall be separated by a minimum of 10 feet (3048 mm) from the following exposures:~~

1. ~~Public ways.~~
2. ~~Buildings.~~
3. ~~Stored combustible materials.~~
4. ~~Hazardous materials.~~
5. ~~High-piled storage.~~
6. ~~Other exposure hazards.~~

~~Deployed mobile ESS shall be separated by a minimum of 50 feet (15 240 mm) from public seating areas and from tents, canopies and membrane structures with an *occupant load* of 30 or more. [material based on NFPA 855 (2023)]~~

~~**1207.10.7.4 Electrical connections**~~**.**

~~Electrical connections shall be made in accordance with the manufacturer's instructions and the UL 9540 listing. Temporary wiring for electrical power connections shall comply with NFPA 70. Fixed electrical wiring shall not be provided. [material based on NFPA 855 (2023)]~~

~~**1207.10.7.5 Local staging**~~**.**

~~Mobile ESS in transit from the charging and storage location to the deployment location and back shall not be parked within 100 feet (30 480 mm) of an occupied building for more than 1 hour during transit, unless specifically *approved* by the *fire code official* when the permit is issued. [material based on NFPA 855 (2023)]~~

~~**1207.10.7.6 Fencing**~~**.**

~~An *approved* fence with a locked gate or other *approved* barrier shall be provided to keep the general public at least 5 feet (1524 mm) from the outer enclosure of a deployed mobile ESS. [material based on NFPA 855 (2023)]~~

~~**1207.10.7.7 Smoking**~~**.**

~~Smoking shall be prohibited within 10 feet (3048 mm) of mobile ESS. Signs shall be posted in accordance with Section 310.~~

~~1207.11 ESS in Group R-3 and R-4 occupancies~~.

~~ESS in Group R-3 and R-4 occupancies shall be in accordance with Sections 1207.11.1 through 1207.11.9.~~

~~Exceptions:~~

1. ~~ESS *listed* and *labeled* in accordance with UL 9540 and marked "For use in residential dwelling units," where installed in accordance with the manufacturer's instructions and NFPA 70.~~
2. ~~ESS rated less than 1 kWh (3.6 megajoules).~~

~~1207.11.1 Equipment listings~~.

~~ESS shall be *listed* and *labeled* in accordance with UL 9540.~~

~~1207.11.2 Installation~~.

~~ESS shall be installed in accordance with the manufacturer's instructions and their listing. [material based on NFPA 855 (2023)]~~

~~1207.11.2.1 Spacing~~.

~~Individual ESS units shall be separated from each other by at least 3 feet (914 mm) except where smaller separation distances are documented to be adequate based on large-scale fire testing complying with Section 1207.1.7.~~

~~1207.11.3 Location~~.

~~ESS shall be installed only in the following locations:~~

1. ~~Detached garages and detached accessory structures.~~
2. ~~Attached garages separated from the *dwelling unit* living space and *sleeping units* in accordance with Section 406.3.2 of the *International Building Code*.~~
3. ~~Outdoors or on the exterior side of exterior walls located a minimum of 3 feet (914 mm) from doors and windows directly entering the *dwelling unit* .~~
4. ~~Enclosed utility closets, *basements* , and storage or utility spaces within *dwelling units* and *sleeping units* with finished or noncombustible walls and ceilings. Walls and ceilings of unfinished wood-framed construction shall be provided with not less than $^{5}/_{8}$-inch Type X gypsum wallboard.~~

~~ESS shall not be installed in sleeping rooms, or in closets or spaces opening directly into sleeping rooms. [material based on NFPA 855 (2023)]~~

~~1207.11.4 Energy ratings~~.

~~Individual ESS units shall have a maximum rating of 20 kWh. The aggregate rating of the ESS shall not exceed:~~

1. ~~40 kWh within utility closets, *basements* , and storage or utility spaces.~~
2. ~~80 kWh in attached or detached garages and detached accessory structures.~~
3. ~~80 kWh on *exterior walls*.~~
4. ~~80 kWh outdoors on the ground.~~

~~ESS installations exceeding the permitted individual or aggregate ratings shall be installed in accordance with Sections 1207.1 through~~

~~1207.9. [material based on NFPA 855 (2023)]~~

~~1207.11.5 Electrical installation~~.

~~ESS shall be installed in accordance with NFPA 70. Inverters shall be *listed* and *labeled* in accordance with UL 1741 or provided as part of the UL 9540 listing. Systems connected to the utility grid shall use inverters *listed* for utility interaction. [material based on NFPA 855 (2023)]~~

~~1207.11.6 Fire detection~~.

~~ESS installed in Group R-3 and R-4 occupancies shall comply with the following:~~

1. ~~Rooms and areas within *dwelling units*, *sleeping units*, *basements* and attached garages in which ESS are installed shall be protected by smoke alarms in accordance with Section 907.2.11.~~
2. ~~A *listed* heat alarm shall be installed in locations where smoke alarms cannot be installed based on their listing.~~

~~1207.11.7 Protection from impact~~.

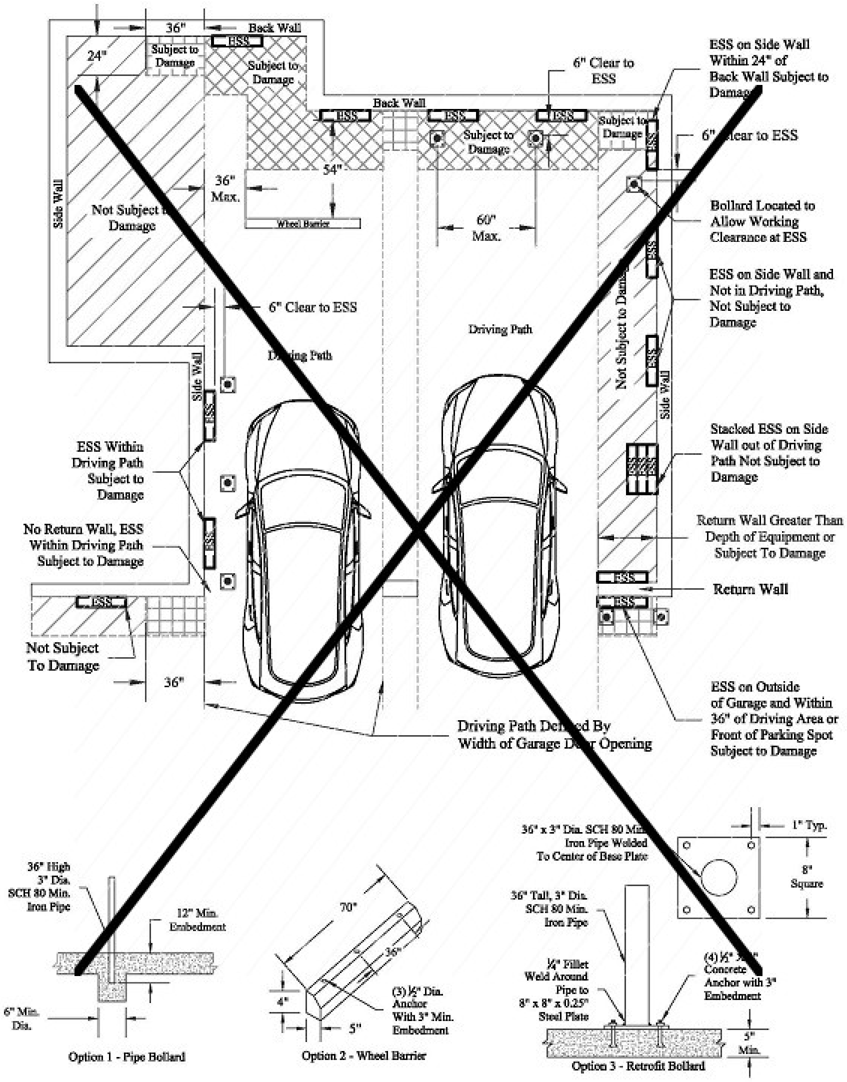
~~ESS installed in a location subject to vehicle damage in accordance with Section 1207.11.7.1 or 1207.11.7.2 shall be provided with impact protection in accordance with Section 1207.11.7.3. .~~

~~1207.11.7.1 Garages~~.

~~Where an ESS is installed in the normal driving path of vehicle travel within a garage, impact protection complying with Section 1207.11.3 shall be provided. The normal driving path is a space between the garage vehicle opening and the interior face of the back wall to a height of 48 inches (1219 mm) above the finished floor. The width of the normal driving path shall be equal to the width of the garage door opening. Impact protection shall also be provided for an ESS installed at either of the following locations (see Figure 1207.11.7.1):~~

1. ~~On the interior face of the back wall and located within 36 inches (914 mm) to the left or to the right of the normal driving path.~~
2. ~~On the interior face of a side wall and located within 24 inches (610 mm) of the back wall and 36 inches (914 mm) of the normal driving path.~~

~~Exception:~~ ~~Where the clear height of the vehicle garage opening is 7 feet 6 inches (2286 mm) or less, ESS installed not less than 36 inches (914 mm) above the finished floor are not subject to vehicle impact protection requirements.~~



~~**FIGURE 1207.11.7.1 ESS VEHICLE IMPACT PROTECTION**~~

~~**1207.11.7.2 Other locations subject to vehicle impact.**~~

~~Where an ESS is installed in a location other than as defined in Section 1207.11.7.1 and is subject to vehicle damage, impact protection shall be provided in accordance with Section 1207.11.7.3.~~

~~**1207.11.7.3 Impact protection options.**~~

~~Where ESS is required to be protected from impact in accordance with Section 1207.11.7.1 or 1207.11.7.2, such protection shall comply with one of the following:~~

1. ~~Bollards constructed in accordance with one of the following:~~
   1.1. ~~Minimum 48 inches (1219 mm) in length by 3 inches (76 mm) in diameter Schedule 80 steel pipe embedded in a concrete pier not less than 12 inches (304 mm) deep and 6 inches (152 mm) in diameter, with at least 36 inches (914 mm) of pipe exposed, filled with concrete and spaced at a maximum interval of 5 feet (1524 mm). Each bollard shall be located not less than 6 inches (152 mm) from an ESS.~~

   1.2. ~~Minimum 36 inches (914 mm) in height by 3 inches (76 mm) in diameter Schedule 80 steel pipe fully welded to a minimum 8 inches (203 mm) by ¼ inch (6.4 mm) thick steel plate and bolted to a concrete floor by means of four ½-inch (13 mm) concrete anchors with 3-inch (76 mm) minimum embedment. Spacing shall be not greater than 60 inches (1524 mm), and each bollard shall be located not less than 6 inches (152 mm) from the ESS.~~

   1.3. ~~Premanufactured steel pipe bollards shall be filled with concrete and anchored in accordance with the manufacturer's installation instructions, with spacing not greater than 60 inches (1524 mm). Each bollard shall be located not less than 6 inches (152 mm) from the ESS.~~

2. ~~Wheel barriers constructed in accordance with one of the following:~~
   2.1. ~~Four inches (102 mm) in height by 5 inches (127 mm) in width by 70 inches (1778 mm) in length wheel barrier made of concrete or polymer, anchored to the concrete floor not less than every 36 inches (914 mm) and located not less than 54 inches (1372 mm) from the ESS. Minimum 3½-inch (89 mm) diameter concrete anchors with 3-inch (76 mm) embedment per barrier shall be used. Spacing between barriers shall be not greater than 36 inches (914 mm).~~

   2.2. ~~Premanufactured wheel barriers shall be anchored in accordance with the manufacturer's installation instructions.~~

3. ~~*Approved* method designed to resist a 2,000-pound-force (8896 N) impact in the direction of travel at 24 inches (610 mm) above grade.~~

~~1207.11.8 Ventilation~~.
~~Indoor installations of ESS that include batteries that produce hydrogen or other *flammable gases* during charging shall be provided with exhaust ventilation in accordance with Section 304.5 of the *International Mechanical Code*. [material based on NFPA 855 (2023)]~~

~~1207.11.9 Electric vehicle use~~.
~~The temporary use of an *owner* or occupant's electric-powered vehicle to power a *dwelling unit* or *sleeping unit* while parked in an attached or detached garage or outdoors shall comply with the vehicle manufacturer's instructions and NFPA 70. [material based on NFPA 855 (2023)]~~

Revise as follows:

1203.2.5 <u>Mechanical</u> Exhaust ~~ventilation~~ <u>Systems</u>.
Standby power shall be provided for mechanical exhaust ~~ventilation~~ systems as required in Section ~~1207.6.1.2.1~~ <u>1207.9</u>. The system shall be capable of powering the required load for a duration of not less than 2 hours.

1203.2.7 Gas detection systems.
Emergency power shall be provided for *gas detection systems* where required by Sections 1203.2.10 ~~and~~ <u>,</u> 1203.2.17 <u>and 1207.10</u>. Standby power shall be provided for *gas detection systems* where required by Sections 916.5 ~~and 1207.6.1.2.4~~.

907.2.23 Energy storage systems.
An *automatic smoke detection system* , <u>thermal imaging detection system</u> or radiant-energy detection system shall be installed in rooms, areas and walk-in units containing energy storage systems as required in Section ~~1207.5.4~~ <u>1207.6</u>.

2024 International Building Code

Revise as follows:

[F] 907.2.23 Energy storage systems.
An *automatic smoke detection system* , thermal imaging detection system, or radiant-energy detection system shall be installed in rooms, areas and walk-in units containing energy storage systems as required in Section ~~1207.5.4~~ 1207.6 of the *International Fire Code*.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**.

The requirements for energy storage systems in the 2024 IFC are very similar and in many cases identical to the 2023 edition of NFPA 855. The requirements in the two documents are technically consistent. This proposal is intended to accomplish the following:

1. Delete the Section 1207 prescriptive requirements and replace the language with references to NFPA 855. Since the addition of the requirements to the 2018 I-Codes the testimony reflected an intent to delete language in favor of direct use of NFPA 855 once that document was established.
2. Retain cross references to protection requirements in the IFC, IBC, and IMC.
3. Correlates related references in the I-Codes to the new proposed IFC Section 1207.

Properly updating the current IFC language is complicated by the fact that the NFPA 855 process for the next edition has completed its first revision phase with only the formal ballot vote remaining, so the ideas, concepts and technical language necessary for updating the IFC language is already part of that documents process, and the submitters granted the rights to that language to NFPA. As a result, with NFPA 855 well established this cycle is the best time to make the transition to NFPA 855, much as we did with hydrogen technologies and the transition to NFPA 2.

An additional factor is that the IFC now contains a general reference to NFPA 855 in Section 1201.1.

"1201.1 Scope. The provisions of this chapter shall apply to the installation, operation, maintenance, repair, retrofitting, testing, commissioning and decommissioning of energy systems used for generating or storing energy, including but not limited to energy storage systems under the exclusive control of an electric utility or lawfully designated agency. It shall not apply to equipment associated with the generation, control, transformation, transmission, or distribution of energy installations that is under the exclusive control of an electric utility or lawfully designated agency. Energy storage systems regulated by Section 1207 shall comply with this chapter, as appropriate, and NFPA 855."

As a result, the code user must read Section 1207 line by line at the same time they do so with NFPA 855 to pick up on any nuances, eliminating the technical language other than linkage to relevant ICC sections elsewhere assists the designer, installer, and code official.

It is anticipated that others may submit changes to the IFC to reflect new ESS requirements related to the current provisions. The FCAC recommends that these be handled under separate proposals, and that any potential modifications to language addressed by this proposal be limited to IFC/NFPA 855 correlation issues only. During the second round of IFC proposals the FCAC will consider:

1. Potentially referencing the 2026 edition of NFPA 855, assuming it is published in time to be included as a referenced standard in the 2027 IFC. The current schedule for that document could be completed in 2025.
2. Making sure new ESS requirements accepted by the IFC and other committees in other proposals are correlated with this proposal.

The changes to Sections 1203.2.5, 1203.2.7, and 907.2.23 are correlation changes.

In recognition of the difficulty of digging thru the additions and strikeouts as involved as they are in this proposal, following is what Section 1207 would contain if this proposal is approved.

SECTION 1207

ELECTRICAL ENERGY STORAGE SYSTEMS (ESS)

1207.1 General. The provisions in this section are applicable to stationary, portable and mobile electrical energy storage systems (ESS).

1207.1.1 Scope. ESS having capacities exceeding the values shown in Table 1.3 of NFPA 855 shall comply with this section.

1207.2 Permits. Permits shall be obtained for ESS as follows:

1. Construction permits shall be obtained for stationary ESS installations and for mobile ESS charging and storage installations. Permits shall be obtained in accordance with Section 105.6.5.
2. Operational permits shall be obtained for stationary ESS installations and for mobile ESS deployment operations. Permits shall be obtained in accordance with Section 105.5.14.

1207.2.1 Communication utilities. Operational permits shall not be required for lead-acid and nickel-cadmium battery systems at facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 voltage alternating current (VAC) and 60 voltage direct current (VDC).

1207.2.2 Detached one- and two-family dwellings and townhouses. Operational permits shall not be required for ESS located at detached one- and two-family dwellings and townhouses, other than Group R-4.

1207.3 Installation. Stationary, mobile and portable electrical energy storage systems (ESS). shall be designed, constructed, installed, commissioned, operated, maintained, and decommissioned in accordance with NFPA 855, the required listings and the manufacturer's installation instructions, and the applicable requirements of this section.

1207.4 Fire safety and evacuation plan A fire safety and evacuation plan complying with NFPA 855 and Section 404 shall be provided for review and *approval*.

1207.5 Vehicle Impact protection. Where ESS are subject to impact by a motor vehicle, including forklifts, vehicle impact protection shall be provided in accordance with Section 312.

1207.6 Fire detection. Where fire detection is required by NFPA 855, fire detection shall be provided in accordance with Section 907.

1207.7 Fire suppression systems. Where automatic fire sprinkler system protection is required by NFPA 855, the automatic fire sprinkler system shall be installed in accordance with Chapter 9.

1207.8 Explosion control. Where explosion control is required by NFPA 855, an NFPA 69 explosion control system complying with Section 911 shall be provided for rooms, areas, ESS cabinets or ESS walk-in units containing the electromechanical ESS technologies. Where an ESS cabinet or ESS walk-in unit is installed within a room or building the design of the explosion control system shall include the cabinet, walk-in unit and the room it is installed within.

1207.9 Mechanical exhaust ventilation. Where required by NFPA 855, mechanical exhaust ventilation shall be provided in accordance with the International Mechanical Code.

1207.10 Gas detection system. Where a gas detection system is installed to comply with the requirements of NFPA 855, the gas detection system shall comply with Section 916.

1207.11 Fire-resistance-rated separations. Where fire-resistance-rated separation is required by NFPA 855, fire-resistance-rated separations shall be provided by fire barriers constructed in accordance with Section 707 of the International Building Code and horizontal assemblies constructed in accordance with Section 711 of the International Building Code.

1**207.12 Dedicated-use buildings**. Where ESS are installed within Dedicated-use ESS buildings shall be classified as Group F-1 occupancies.

1207.13 Fire apparatus access roads. Fire apparatus access roads shall be provided in accordance with Section 503.

1207.14 Fire protection water supplies. Fire protection water supplies shall be provided in accordance with Section 507.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal does not increase the cost of construction since the overall technical requirements of the IFC and NFPA 855 are similar. The proposal has the potential of reducing design and AHJ review costs by eliminating the need to compare the two documents line by line.

F170-24

IFC: 1207.1

Proponents: Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA) (joecainpe@gmail.com); Paul Armstrong, SEIA (paul@7arms.com)

2024 International Fire Code

Revise as follows:

1207.1 General.
The provisions in this section are applicable to stationary and mobile electrical energy storage systems (ESS).

~~**Exception**~~ **Exceptions:**

1. These requirements shall not apply to ESS in structures designed and constructed in accordance with the *International Residential Code*.
2. ESS in Group R-3 and R-4 occupancies shall only be required to comply with Section 1207.11 except where Section 1207.11.4 requires compliance with Sections 1207.1 through 1207.9.

Reason: This new Exception 1 for IFC Section 1207.1 is modeled after the precedent of Exception 1 in IFC Section 1205.2.1, and is consistent with that intent.

The exception for rooftop-mounted PV for IRC structures first appeared in 2015 IFC Section 605.11.1.2. The intent was to have the IFC cover PV systems for Group R-3 buildings constructed under the IBC, but to exclude PV systems for IRC one- and two-family dwellings and townhouses from the IFC scope. During this same cycle, under Group B, another proposal intended to include parallel provisions in the IRC, but this proposal was not successful for the 2015 IRC. This unfortunate outcome created a gap that was solved during the next development cycle by adding rooftop-mounted PV provisions in the 2018 IRC, as Section R324.6. For the 2018 I-codes and beyond, the IFC covers Group R-3 and the IRC covers one- and two-family dwellings and townhouses.

A similar approach is rational for the 2027 I-codes for ESS -- whether or not prescriptive requirements for ESS are removed from IFC 1207 that exist in NFPA 855. The past few development cycles have revealed that it is very difficult to correlate IFC provisions for residential ESS in Section 1207.11 (developed in Group A under the IFC Committee) correlated with residential ESS provisions in IRC R328 (developed in Group B under the IRC-General Committee).

For ESS in commercial buildings, the provisions in IFC and NFPA 855 are very complex, and similar provisions presently appear in both the IFC and NFPA 855. These very complex provisions are generally applied to a relatively small number of larger commercial projects.

For residential ESS, similar -- but different -- provisions are presently found in three different sources: IFC Section 1207.11, IRC Section R328, and NFPA 855 Chapter 15. Having similar but contradictory language in the IFC and IRC has made it difficult for installers of residential ESS to find consistent implementation, interpretation, and enforcement of the provisions. It seems each individual responsible for interpretation and enforcement of the provisions picks up their favorite code book and wants to apply it to the projects they encounter. For residential ESS, these simplified provisions are applied to a very large number of smaller projects, so consistency is critically important to safe and efficient deployment.

Residential ESS provisions have matured mostly within the IRC. Most plan reviewers and field inspectors have quick and easy access to the IRC. However, many AHJs across the U.S. have not yet even heard of NFPA 855, and some of the larger AHJs are still experiencing a learning curve with NFPA 855. Those of us in the code development community cannot expect AHJs across the U.S. -- especially AHJs outside the major urban areas -- to have quick and easy access to NFPA 855 for residential ESS projects in the immediate future. It is very important to have IRC provisions for ESS within easy access for AHJs.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal clarifies that ESS requirements in the IFC do not apply to IRC one- or two-family dwellings and townhouses or their accessory structures. It neither increases nor decreases the cost of construction.

F171-24

IFC: 1207.3.1, 1207.3.7.1, 1207.5.1, 1207.5.5, 1207.6.3

Proponents: Daniel Nichols, MTA Construction and Development, MTA Construction and Development (dnichols@mnr.org)

2024 International Fire Code

Revise as follows:

1207.3.1 Energy storage system listings.
ESS shall be *listed* in accordance with UL 9540.

Exceptions:

1. Lead-acid and nickel-cadmium battery systems less than 50 VAC, 60 VDC in telecommunications facilities for installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations that are in compliance with NFPA 76.
2. Lead-acid and nickel-cadmium battery systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.
3. Lead-acid battery systems in uninterruptable power supplies listed and *labeled* in accordance with UL 1778 and utilized for standby power applications.
4. <u>Lead-acid and nickel-cadmium battery systems that are used exclusively for fixed guideway transit or passenger rail systems for either the operation of rolling stock or for signaling and communication equipment, and are located outdoors or in building spaces used exclusively for such installations.</u>

[material based on NFPA 855 (2023)]

1207.3.7.1 Retrofitting lead acid and nickel cadmium.
Changing out or retrofitting of lead-acid and nickel-cadmium batteries with other lead-acid and nickel-cadmium batteries in the following applications shall be considered repairs where there is no increase in system size or energy capacity greater than 10 percent of the original design.

1. At facilities under the exclusive control of communications utilities that comply with NFPA 76 and operate at less than 50 VAC and 60 VDC.
2. Battery systems used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.
3. Batteries in uninterruptible power supplies *listed* and *labeled* in accordance with UL 1778 and used for standby power applications only.
4. <u>Lead-acid and nickel-cadmium battery systems that are used exclusively for fixed guideway transit or passenger rail systems for either the operation of rolling stock or for signaling and communication equipment, and are located outdoors or in building spaces used exclusively for such installations.</u>

[material based on NFPA 855 (2023)]

1207.5.1 Size and separation.
Electrochemical ESS shall be segregated into groups not exceeding 50 kWh (180 megajoules). Each group shall be separated a minimum of 3 feet (914 mm) from other groups and from walls in the storage room or area. The storage arrangements shall comply with Chapter 10.

Exceptions: [material based on NFPA 855 (2023)]

1. Lead-acid and nickel-cadmium battery systems in facilities under the exclusive control of communications utilities and operating at less than 50 VAC and 60 VDC in accordance with NFPA 76.

2. Lead-acid and nickel-cadmium systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations.

3. Lead-acid battery systems in uninterruptable power supplies *listed* and *labeled* in accordance with UL 1778, utilized for standby power applications, and limited to not more than 10 percent of the floor area on the floor on which the ESS is located.

4. The *fire code official* is authorized to approve larger capacities or smaller separation distances based on large-scale fire testing complying with Section 1207.1.5.

5. Lead-acid and nickel-cadmium battery systems that are used exclusively for fixed guideway transit or passenger rail systems for either the operation of rolling stock or for signaling and communication equipment, and are located outdoors or in building spaces used exclusively for such installations.

1207.5.5 Fire suppression systems.
Rooms and areas within buildings and walk-in units containing electrochemical ESS shall be protected by an automatic fire suppression system designed and installed in accordance with one of the following:

1. *Automatic sprinkler systems* designed and installed in accordance with Section 903.3.1.1 for ESS units (groups) with a maximum stored energy capacity of 50 kWh, as described in Section 1207.5.1, shall be designed with a minimum density of 0.3 gpm/ft^2 (1.14 L/min) based over the area of the room or 2,500 square-foot (232 m^2) design area, whichever is smaller, unless a lower density is approved based on large-scale fire testing in accordance with Section 1207.1.7.

2. *Automatic sprinkler systems* designed and installed in accordance with Section 903.3.1.1 for ESS units (groups) exceeding 50 kWh shall use a density based on large-scale fire testing complying with Section 1207.1.7.

3. The following alternative *automatic fire-extinguishing systems* designed and installed in accordance with Section 904, provided that the installation is *approved* by the *fire code official* based on large-scale fire testing complying with Section 1207.1.7:
   3.1. NFPA 12, *Standard on Carbon Dioxide Extinguishing Systems*.

   3.2. NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*.

   3.3. NFPA 750, *Standard on Water Mist Fire Protection Systems*.

   3.4. NFPA 2001, *Standard on Clean Agent Fire-Extinguishing Systems*.

   3.5. NFPA 2010, *Standard for Fixed Aerosol Fire-Extinguishing Systems*.

Exceptions:

1. Fire suppression systems for lead-acid and nickel-cadmium battery systems at facilities under the exclusive control of communications utilities that operate at less than 50 VAC and 60 VDC shall be provided where required by NFPA 76.

2. Lead-acid and nickel-cadmium systems that are used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, and located outdoors or in building spaces used exclusively for such installations, shall not be required to have a fire suppression system installed.

3. Lead-acid battery systems in uninterruptable power supplies *listed* and *labeled* in accordance with UL 1778, utilized for standby power applications, which is limited to not more than 10 percent of the floor area on the floor on which the ESS is located, shall not be required to have a fire suppression system. [material based on NFPA 855 (2023)]

4. Lead-acid and nickel-cadmium battery systems that are used exclusively for fixed guideway transit or passenger rail systems for either the operation of rolling stock or for signaling and communication equipment, and are located outdoors or in building spaces used exclusively for such installations.

1207.6.3 Explosion control.
Where required by Table 1207.6 or elsewhere in this code, explosion control complying with Section 911 shall be provided for rooms,

areas, ESS cabinets or ESS walk-in units containing electrochemical ESS technologies.

Exceptions: [material based on NFPA 855 (2023)]

1. Where *approved*, explosion control is permitted to be waived by the *fire code official* based on large-scale fire testing complying with Section 1207.1.7 that demonstrates that *flammable gases* are not liberated from electrochemical ESS cells or modules.
2. Where *approved*, explosion control is permitted to be waived by the *fire code official* based on documentation provided in accordance with Section 104.2.2 that demonstrates that the electrochemical ESS technology to be used does not have the potential to release *flammable gas* concentrations in excess of 25 percent of the LFL anywhere in the room, area, walk-in unit or structure under thermal runaway or other fault conditions.
3. Where *approved*, ESS cabinets that have no debris, shrapnel or enclosure pieces ejected during large-scale fire testing complying with Section 1207.1.5 shall be permitted in lieu of providing explosion control complying with Section 911.
4. Explosion control is not required for lead-acid and nickel-cadmium battery systems less than 50 VAC, 60 VDC in telecommunication facilities under the exclusive control of communications utilities located in building spaces or walk-in units used exclusively for such installations.
5. Explosion control is not required for lead-acid and nickel-cadmium systems used for DC power for control of substations and control or safe shutdown of generating stations under the exclusive control of the electric utility, located in building spaces or walk-in units used exclusively for such installations.
6. Explosion control is not required for lead-acid battery systems in uninterruptable power supplies *listed* and *labeled* in accordance with UL 1778, utilized for standby power applications, and housed in a single cabinet in a single *fire area* in buildings or walk-in units.
7. Lead-acid and nickel-cadmium battery systems that are used exclusively for fixed guideway transit or passenger rail systems for either the operation of rolling stock or for signaling and communication equipment, and are located outdoors or in building spaces used exclusively for such installations.

Reason: The proposal is to align the hazards that are similar to telecommunication buildings and substations when they are operated by a fixed guideway transit or passenger rail system ("subways", "railways", "railroads", etc.). Currently, the operators of telecommunication systems and public utilities are exempted from certain requirements of this section because of ownership. However, specific entities like transportation companies do not have a synonymous exemption for the same type of equipment. To further support this, NFPA 855- 2023 edition Annex A Section A.4.7.1 expands on the telecommunication exemption by saying "...are not covered by NFPA 70 and need not comply with the requirements of NFPA 70."

The exemption of NFPA 70 for telecommunication and substations is covered in NFPA 70- 90.2(D), items (4) and (5). However, 90.2(D) item (3) is for "Installation of railways for generation, transformation, transmission, energy storage, or distribution of power used exclusively for signaling and communication purposes."

This proposal stays synonymous with the restrictions of spaces and types of batteries that are within the 2024 IFC. It also uses the term fixed guideway transit and passenger rail systems to describe the system and match the undefined term in Chapter 4 of the IBC for such transportation systems.

The facilities that utilize these types of battery systems have operated without losses for many years, including lead-acid battery systems installed to earlier versions of the IFC that didn't require fire suppression.

Bibliography: NFPA 70- 2023 edition

NFPA 855- 2023 edition

Cost Impact: Decrease

Estimated Immediate Cost Impact:

The immediate cost impact will be the ability to not provide a fire suppression system (Latest cost on a 1,500 sf communication building was $82,000) and the ability to replace existing batteries without existing location upgrades (not a quantifable cost due to mutliple variables, but at least a fire suppression system).

Estimated Immediate Cost Impact Justification (methodology and variables):

Cost is from actual pricing for MTA locations within the last 36 months.

Estimated Life Cycle Cost Impact:

Current inspection rate is $550.00 from third-party vendor every 6 months, not including personnel costs for restricted access, service disruption costs, and $3,000 hydrostatic and filling costs every 5 years.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Actual costs for MTA locations within the last 36 months

F171-24

F172-24

IFC: 1207.3.2.1 (New), UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Add new text as follows:

1207.3.2.1 Electric vehicle charging equipment with integral ESS. In lieu of complying with the listing requirements in 1207.3.1, electric vehicle charging systems and supply equipment utilizing integral ESS shall be *listed* in accordance with UL 3202 or approved for use for both electric vehicle charging and for energy storage.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

3202-2024 Outline of Investigation for EV Charging Equipment Utilizing ESS

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Outline of Investigation for EV Charging Equipment Utilizing ESS (UL 3202-2024)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: An increasing number of EV chargers incorporate lithium-ion battery energy storage capability. Listing the ESS component of the equipment to only UL 9540, as required by 1207.3.1, does not address EV charging safety considerations. The UL 3202, Outline of Investigation for EV Charging Equipment Utilizing ESS addresses the safety aspects of both the EV charging and the energy storage.

The proposed terminology is consistent with the requirements in IBC:

IBC 406.2.7 Electric vehicle charging stations and systems. Where provided, electric vehicle charging systems shall be installed in accordance with NFPA 70. Electric vehicle charging system equipment shall be *listed* and *labeled* in accordance with UL 2202. Electric vehicle supply equipment shall be *listed* and *labeled* in accordance with UL 2594. Accessibility to *electric vehicle charging stations* shall be provided in accordance with Section 1107.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The cost for obtaining listed electric vehicle charging equipment with integral ESS equipment may or may not represent increased product costs over obtaining non-listed products that have not been independently investigated to applicable standards for determining product safety and performance.

Obtaining and maintaining a listing for electric vehicle charging equipment with integral ESS equipment involves both product investigation costs and costs for periodic inspection of production, as required by the definition of “listed”. However, the impact of any potential cost increase can be weighed by the code development committee against the user and code official safety benefits derived from requiring listed equipment, as well as the additional benefit of less effort needed to demonstrate or determine compliance.

F172-24

F173-24

IFC: 1207.11

Proponents: William Koffel, Koffel Associates, Inc., California Solar and Storage Association (CALSSA) (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

1207.11 ESS in Group R-3 and R-4 occupancies.
ESS in Group R-3 and R-4 occupancies shall be in accordance with Sections 1207.11.1 through 1207.11.9.

Exceptions:

1. ESS *listed* and *labeled* <u>for use in habitable spaces </u>in accordance with UL 9540~~, and marked "For use in residential dwelling units,"~~ <u>and </u>where installed in accordance with the manufacturer's <u>installation </u>instructions and NFPA 70.
2. <u>ESS installed in accordance with Section R328 of the International Residential Code in detached one- and two-family dwellings and townhouses not more than three stories above grade plane in height with a separate means of egress and their accessory structures not more than three stories above grade in height.</u>
3. <u>3.</u> ESS rated less than 1 kWh (3.6 megajoules).

Reason: The proposed changes to Exception No. 1 correlate the language in the IFC with language in the IRC by deleting "residential occupancies" and replacing it with "habitable spaces." This is consistent with the language in the current edition of UL 9540. Inserting "installation" is consistent with a proposed change to IRC being submitted by CALSSA and also revises the language to be consistent with the defined term.

Proposed Exception No. 2 eliminates confusion and conflicts that current exist between the IFC and the IRC. Section 1207.11 of the IFC and Section R328 of the IRC, although similar in nature, are not harmonized to have identical requirements, primarily related to fire detection requirements. Be sending the user of the IFC to the IRC, the requirements will be consistent. The language in Exception No. 2 intentionally does not include all Group R-3 and R-4 occupancies; but rather, is restricted to buildings that are within the scope of the IRC.

The two exceptions are not the same. Exception No. 1 permits the ESS to be installed in habitable spaces based upon a particular battery technology that should not result in thermal runaway. Exception No. 2 applies to battery technology that is commonly used but is not permitted to be installed in habitable spaces.

It is recognized that another proposal will revise the ESS requirements in the IFC to reference NFPA 855. Both the current requirements of the IRC and the requirements being proposed by CALSSA in a proposal to the IRC are not consistent with NFPA 855. Based upon where NFPA 855 is in the revision process, it is not possible to correlate Chapter 15 of NFPA 855 with either the current IRC requirements or the requirements in the CALSSA proposal to the IRC.

For informational purposes, the current draft of the CALSSA proposal to the IRC reads as follows:

R328.1 General.

Energy storage systems (ESS) shall comply with the provisions of this section.

Exceptions:

1. ESS listed and labeled for use in habitable spaces in accordance with UL 9540 and where installed in accordance with the listing, the manufacturer's <u>installation </u>instructions and NFPA 70.

2. ESS less than 1 kWh (3.6 megajoules).

R328.2 ~~Equipment~~ Energy Storage System Listings.

Energy storage systems (ESS) shall be listed ~~and labeled~~ in accordance with UL 9540.

Exception: Where approved, repurposed unlisted battery systems from electric vehicles are allowed to be installed outdoors or in detached sheds located not less than 5 feet (1524 mm) from exterior walls, property lines and public ways.

R328.3 Manufacturers Installation Instructions.

Energy Storage Systems (ESS) shall be installed in accordance with the manufacturer's installation instructions and the conditions of their listings.

R328.3.1 Unit Separation ~~Spacing~~.

Separation between individual ESS ~~Individual~~ units shall be ~~separated from each other by~~ not less than 3 feet (914 mm) except where ~~smaller~~ other separation distances are ~~documented to be adequate based on large-scale fire testing complying with Section 1207.1.5 of the International Fire Code~~ specified by the ESS listing and the manufacturer's installation instructions .

R328.3.2 Exposures.

Exterior installed Energy Storage Systems shall maintain a minimum separation of 3' from windows and doors directly entering the habitable space) except where other separation distances are specified by the ESS listing and the manufacturer's installation instructions.

R328.4

Remove:

~~**R328.4 Locations.**~~

~~ESS shall be installed only in the following locations:~~

~~1. Detached garages and detached accessory structures.~~

~~2. Attached garages separated from the dwelling unit living space in accordance with Section R302.6.~~

~~3. Outdoors or on the exterior side of exterior walls located not less than 3 feet (914 mm) from doors and windows directly entering the dwelling unit.~~

~~4. Enclosed utility closets, basements, storage or utility spaces within dwelling units with finished or noncombustible walls and ceilings. Walls and ceilings of unfinished wood-framed construction shall be provided with not less than 5/8 -inch (15.9 mm) Type X gypsum wallboard. Openings into the dwelling shall be equipped with solid wood doors not less than 1-3/8 inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1-3/8 inches (35 mm) thick, or door with a 20-minute fire protection rating. Doors shall be self-latching and equipped with a self-closing or automatic-closing device. Penetrations through the required gypsum wallboard into the dwelling shall be protected as required by Section R302.11, Item 4.~~

~~ESS shall not be installed in sleeping rooms, or closets or spaces opening directly into sleeping rooms.~~

~~**R328.5 Energy ratings.**~~

~~Individual ESS units shall have a maximum rating of 20 kWh. The aggregate rating of the ESS shall not exceed:~~

1. ~~40 kWh within utility closets, basements and storage or utility spaces.~~
2. ~~80 kWh in attached or detached garages and detached accessory structures.~~
3. ~~80 kWh on exterior walls.~~
4. ~~80 kWh outdoors on the ground.~~

~~ESS installations exceeding the permitted individual or aggregate ratings shall be installed in accordance with Section 1207 of the International Fire Code.~~

Replace:

R328.4 Allowable installation locations and allowable aggregate storage capacity

The *ratings* of the ESS *in each location* shall not exceed *the ratings in Table R328.4.* ~~:~~ *The total aggregate ratings of ESS on the property shall not exceed 600kWh.* Individual ESS units shall not exceed the conditions of its listing. ESS shall not be installed in sleeping rooms, or closets or spaces opening directly into sleeping rooms. ESS installations exceeding the permitted individual or aggregate ratings shall be installed in accordance with Section 1207 of the International Fire Code.

TABLE R328.4 MAXIMUM AGGREGATE RATINGS AND ALLOWABLE INSTALLATION LOCATIONS OF ESS

LOCATION	MAXIMUM AGGREGATE RATINGS (kWh)	INSTALLATION REQUIREMENTS
Within utility closets, basements, and storage or utility spaces located within dwellings	40	Walls and ceiling of unfinished wood-framed construction shall be provided with not less than 5/8-inch gypsum wall board. 5/8" Type X gypsum board required where not indicated otherwise in manufacturers installation instructions
In attached garages	100	Dwelling-Garage separation shall comply with Table R302.6
On or within 3 feet of exterior walls of dwellings and attached garages	100	
On or within 3 feet of exterior walls of dwellings and attached garages	200	Exterior walls and eaves are constructed with noncombustible surfaces [a]
In detached garages and detached accessory structures	200	
In detached garages and detached accessory structures	600	Detached garage or detached accessory structure is a minimum 10 feet away from property lines and dwellings.
Outdoors on the ground	200	ESS is a minimum 3 feet away from property lines and dwellings.
Outdoors on the ground	600	ESS is a minimum 10 feet away from property lines and dwellings.

R328.~~6~~5 ~~Electrical~~ Equipment installation.

ESS shall be installed in accordance with NFPA 70. ~~Inverters shall be listed and labeled in accordance with UL 1741 or provided as part of the UL 9540 listing. Systems connected to the utility grid shall use inverters listed for utility interaction.~~ Grid Interconnected systems shall be listed for such use.

R328.~~7~~6 ~~Fire~~ detection.

Where Energy Storage Systems are installed ~~Rooms and areas within~~ a dwelling unit ~~units~~, basements and attached garages, a heat alarm, heat detector or smoke alarm, complying with NFPA 72, shall be installed with interior annunciation outside all sleeping areas and each level of the dwelling unit. ~~in which ESS are installed shall be protected by smoke alarms in accordance with Section R314. A heat detector, listed and interconnected to the smoke alarms, shall be installed in locations within dwelling units and attached garages where smoke alarms cannot be installed based on their listing.~~

- Interconnection to interior annunciation devices shall comply with R314.4
- Power Source shall comply with R314.6

Dwellings shall have smoke alarms complying with NFPA 72 and Section R314

R328.~~8~~7 Protection from impact.

ESS installed in a location subject to vehicle damage shall be protected by approved barriers in accordance with Section R328.~~8~~7.1 or R328.~~8~~7.2.

R328.~~8~~7.1 Garages. Where an ESS is installed in the normal driving path of vehicle travel within a garage, impact protection complying with Section R32~~8~~7.3 shall be provided. The normal driving path is a space between the garage vehicle opening and the interior face of the back wall to a height of 48 inches (1219 mm) above the finished floor. The width of the normal driving path shall be equal to the width of the garage door opening. Impact protection shall also be provided for an ESS installed at either of the following locations (see Figure R32~~8~~7.1):

1. On the interior face of the back wall and located within 36 inches (914 mm) to the left or to the right of the normal driving path.2. On the

interior face of a side wall and located within 24 inches (610 mm) from the back wall and 36 inches (914 mm) of the normal driving path.

Exception: Where the clear height of the vehicle garage opening is 7 feet 6 inch (2286 mm) or less, ESS installed not less than 36 inches (914mm) above finished floor are not subject to vehicle impact protection requirements.

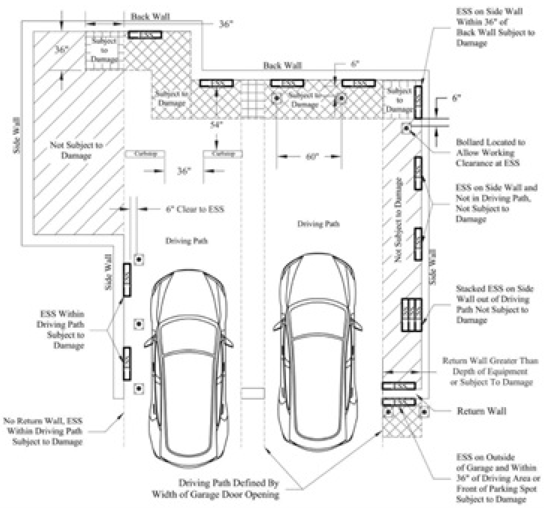


FIGURE R328.~~8~~7.1 ESS VEHICLE IMPACT PROTECTION

R328.~~8~~7.2 Other locations subject to vehicle impact. Where an ESS is installed in a location other than as defined in Section R328.8.1, and is subject to vehicle damage, impact protection shall be provided in accordance with Section R328.~~8~~7.3.

R328.~~8~~7.3 Impact protection options. ESS protection shall comply with one of the following:

1. Bollards constructed in accordance with one of the following:

1.1. Minimum 48 inches (1219 mm) in length by 3 inches (76 mm) in diameter schedule 80 steel pipe embedded in a concrete pier not less than 12 inches (304 mm) deep and 6 inches (152 mm) in diameter, with at least 36 inches (914 mm) of pipe exposed, filled with concrete, and spaced at a maximum interval of 5 feet (1524 mm). Each bollard shall be located not less than 6 inches (152 mm) from an ESS.

1.2. Minimum 36 inches (914 mm) in height by 3 inches (76 mm) in diameter schedule 80 steel pipe fully welded to a minimum 8 inches (203mm) by ¼ inch (6.4 mm) thick steel plate and bolted to a concrete floor by means of 4-1/2 inch (114 mm) concrete anchors with 3 inch (76 mm) minimum embedment. Spacing shall be not greater than 60 inches (1524 mm), and each bollard shall be located not less than 6 inches (152 mm) from the ESS.

1.3. Pre-manufactured steel pipe bollards filled with concrete and anchored in accordance with the manufacturer's installation instructions, with spacing not greater than 60 inches (1524 mm). Each bollard shall be located not less than 6 inches (152 mm) from the ESS.

2. Wheel barriers constructed in accordance with one of the following:

2.1. Four inches (102 mm) in height by 5 inches (127 mm) in width by 70 inches (1778 mm) in length wheel barrier made of concrete or polymer, anchored to the concrete floor not less than every 36 inches (914 mm) and located not less than 54 inches (1372 mm) from the ESS. Minimum 3– ½ inch (90 mm) diameter concrete anchors with 3 inch (76 mm) embedment per barrier shall be used. Spacing between barriers shall be no greater than 36 inches (914 mm).

2.2. Pre-manufactured wheel barriers shall be anchored in accordance with the manufacturer's installation instructions.

3. Approved method designed to resist a 2000 pounds per square foot (8899 Newtons) impact in the direction of travel at 24 inches (608 mm) above grade.

R328.~~9~~8 ~~Ventilation~~ Flammable Gases.

Where the ESS is installed indoors and the ESS ~~Indoor installations of ESS that~~ produces ~~hydrogen or other~~ flammable gases during normal operations mechanical ventilation ~~charging~~ shall be provided in accordance with Section M1307.4

R328.~~10~~9 Electric vehicle Power Export (EVPE)~~use~~.

An electric vehicle shall be permitted to provide ~~The~~ temporary ~~use of an owner or occupant's electric powered vehicle to~~ power to a dwelling unit where connected to listed equipment installed in accordance with Article 625 of ~~while parked in an attached or detached garage or outdoors shall comply with the vehicle manufacturer's instructions and~~ NFPA 70 and the vehicle's manufacturers instructions.

R328.1~~1~~0 Documentation and labeling.

The following information shall be provided:

1. A copy of the manufacturer's installation, operation, maintenance and decommissioning instructions shall be provided to the owner or placed in a conspicuous location near the ESS equipment.
2. A label on the installed system containing the contact information for the qualified maintenance and service providers.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal eliminates the confusion and conflicts between the IFC and IRC. In that respect, the proposal has the potential to decrease the cost of construction. The cost impact of the CALSSA proposal to the IRC will be addressed in that code change proposal in the Group B cycle.

F173-24

F174-24

IFC: 1207.11

Proponents: Joseph H. Cain, P.E., Solar Energy Industries Association (SEIA) (joecainpe@gmail.com); Paul Armstrong, SEIA (paul@7arms.com)

2024 International Fire Code

Revise as follows:

1207.11 ESS in Group R-3 and R-4 occupancies.
ESS in Group R-3 and R-4 occupancies shall be in accordance with Sections 1207.11.1 through 1207.11.9.

Exceptions:

1. ESS *listed* and *labeled* for use in habitable spaces in accordance with UL 9540 and ~~marked "For use in residential dwelling units,"~~ where installed in accordance with the *listing*, the manufacturer's instructions and NFPA 70.
2. ESS rated less than 1 kWh (3.6 megajoules).

Reason: This proposal correlates the exception language in the IFC with the corresponding language in 2024 IRC Section R328.1 for the same subject matter. The most-important change is to resolve issues when the marking language from the UL standard is included in quotation marks but then the language in the standard itself is modified, creating conflict. This proposal resolves that correlation conflict by removing the outdated marking language and by removing the quotation marks. That outdated language is then replaced with a clear requirement that listing and labeling must provide for installation within habitable spaces in order to use Exception 1.

See RB158-22 in the 2022 ICC Public Comment Agenda, which was Approved As Modified by Public Comment #1.

R328.1 General. Energy Storage Systems (ESS) shall comply with the provisions of this section.

Exceptions:

1. *ESS* listed and labeled for use in habitable spaces in accordance with UL 9540 and ~~marked "For use in residential dwelling units"~~ where installed in accordance with the listing, the manufacturer's instructions and NFPA 70.

2. ESS less than 1kWh (3.6 megajoules).

The language in the 2024 IBC was modified to resolve confusion caused by the previous language.

Following is text from the Reason Statement for RB158-22, which is still relevant for this correlating proposal for the IFC with minor adjustments since last cycle:

As background, the text for the product marking that is currently in the code is in the current edition of the product standard UL 9540. This was added in the code by Public Comment 1 to RB154-19. That Public Comment was a consensus of all the ESS stakeholders. As noted in the Reason Statement for that Public Comment, the marking proposed in Section R327.1 was intended to exempt a UL 9540 listed ESS that will not go into thermal runaway or produce flammable gas when subjected to the UL 9540A Cell Level Test (for further detail, please also see the reason statement for Proposal RB157-18).

There is currently a proposal to UL 9540 to change the text of that marking, as well as additional clarifications on the testing required for the ability to apply such marking on an ESS. The reason for the proposed change to UL 9540 is because there has been a lot of confusion in the field regarding the current markings in UL 9540A pertaining to residential systems that may or may not employ battery technologies that meet the cell level performance criteria of UL 9540A, which is that thermal runaway was not able to be initiated and there was no venting of flammable gas. This is a very severe criteria, but if met, it would suggest that the battery energy storage system (BESS) does not present any greater fire hazard than another electrical appliance and can be installed anywhere in a residence including the habitable spaces. As of this date, we are not aware of technologies that can meet these criteria. Further, this marking has created considerable confusion in the market.

The [Technical Committee] for UL 9540 is working on improving the markings to clarify what ESS products have been tested to appropriate requirements to determine suitability for use in habitable spaces. UL's Collaborative Standards Development System (CSDS) provides online access to review and submit proposals for UL's Standards development process. General access is available for information on [TC] meetings, submitting proposals, and access to free proposals. For more information, click here, or go to www.ul.com/standards. To address the confusion of the text of the marking currently identified in the IRC, this Public Comment is proposing to identify the intent, which is that this exception applies only where the ESS has been listed and labeled for specific use in habitable spaces, based on specific testing criteria in UL 9540.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is for correlation of IFC language with the corresponding language in the IRC for the same subject matter. The proposal does not increase nor decrease the cost of construction.

F174-24

F175-24

IFC: SECTION 202 (New), SECTION 1208 (New), 1208.1 (New), 1208.2 (New), 1208.3 (New), 1208.4 (New), UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Add new definition as follows:

ELECTRIC VEHICLE POWER EXPORT EQUIPMENT (EVPE). The electrical equipment, including the outlet on the vehicle, that is used to provide electrical power at voltages equal to or greater than 30 volts AC or 60 volts DC to an external load(s) from the vehicle, where the vehicle is the source of supply.

Add new text as follows:

SECTION 1208
ELECTRIC VEHICLE POWER EXPORT EQUIPMENT

1208.1 General. The use, operation and maintenance of *electric vehicle power export equipment* shall comply with this section.

1208.2 Listing. *Electric vehicle power export equipment* shall comply with one of the following:

1. *Electric vehicle power export equipment* that performs both functions of an inverter and an electric vehicle charger shall be *listed* and *labeled* in accordance with UL 9741.
2. *Electric vehicle power export equipment*, that monitors and oversees electric vehicles with onboard AC inverter/converters, shall be *listed* and *labeled* in accordance with UL 1741.

1208.3 Installation and use. *Electric vehicle power export equipment* shall be installed and used in accordance with their listing, the manufacturer's installation instructions, and NFPA 70.

1208.4 Utility interactive. *Electric vehicle power export equipment connected* to the electric utility grid shall use inverters listed for utility interaction.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

9741-2023 Electric Vehicle Power Export Equipment (EVPE)

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Electric Vehicle Power Export Equipment (EVPE) (UL 9741-2023)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: Electric vehicle power export equipment (EVPE) is a new trend to use an electric vehicle to provide power to the building. EVPE can be unidirectional or bidirectional. Unidirectional equipment exports power from the vehicle to an offboard load, such as a receptacle bank. Bidirectional equipment provides power to the vehicle for charging of the onboard battery, and exports power to the grid, premise or load, but export and charging do not occur at the same time. There are three manufacturers with listed equipment.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The cost for obtaining listed EV power export equipment may or may not represent increased product costs over obtaining non-listed equipment that have not been independently investigated to applicable standards for determining product safety and performance.

Obtaining and maintaining a listing for EV power export equipment involves both product investigation costs and costs for periodic inspection of production, as required by the definition of “listed”. However, the impact of any potential cost increase can be weighed by the code development committee against the user and code official safety benefits derived from requiring listed equipment, as well as the additional benefit of less effort needed to demonstrate or determine compliance.

F175-24

F176-24

IFC: SECTION 202 (New), 1208 (New), 1208.1 (New), 1208.2 (New), 1208.3 (New), UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Add new definition as follows:

PORTABLE POWER PACK. A moveable device that contains an integral or removable battery, or batteries, that when charged are intended to provide temporary power to various outputs of the device. This includes hand portable or wheeled devices. Portable power packs are not intended to include devices regulated as mobile or portable *Energy Storage Systems (ESS)*.

Add new text as follows:

1208
SECTION PORTABLE POWER PACKS

1208.1 General. The use, operation and maintenance of *portable power packs* with an energy capacity of 1 kWh or greater shall comply with this section.

Exception: Portable and mobile electrical energy storage systems (ESS) that are regulated by Section 1207

1208.2 Listing. *Portable power packs* shall be *listed* and *labeled* in accordance with UL 2743.

1208.3 Operation and maintenance. *Portable power packs* shall be used and maintained in accordance with the *listing* and the manufacturer's instructions. Units marked for "indoor use only" shall not be used outdoors.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

2743-2023	Portable Power Packs

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Portable Power Packs (UL 2743-2023)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: Portable power packs that typically utilize lithium-ion batteries are used to provide temporary and portable power in applications that often previously used fuel-fired portable generators. This proposal includes safety requirements intended to address hazards associated with the use of these devices. There are currently more than eight manufacturers with listed portable power packs. The threshold of 1 kWh would not impose requirements on small battery storage devices typically used to charge personal electronic devices.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The cost for obtaining listed portable power packs may or may not represent increased product costs over obtaining non-listed equipment that have not been independently investigated to applicable standards for determining product safety and performance.

Obtaining and maintaining a listing for portable power packs involves both product investigation costs and costs for periodic inspection of production, as required by the definition of "listed". However, the impact of any potential cost increase can be weighed by the code development committee against the user and code official safety benefits derived from requiring listed products, as well as the additional benefit of less effort needed to demonstrate or determine compliance.

F177-24

IFC: 2001.1, 2001.2, 2003.5, 2006.14.1, 2006.15

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

2001.1 Scope. Airports, heliports, helistops, seaplane bases, and aircraft hangars shall comply with ~~be in accordance with~~ this chapter.

2001.2 Regulations not covered. Regulations not specifically contained herein pertaining to airports, seaplane bases, aircraft maintenance, aircraft hangars and appurtenant operations shall be in accordance with nationally recognized standards.

2001.2 Regulations not covered. Regulations not specifically contained herein pertaining to airports, aircraft maintenance, aircraft hangars and appurtenant operations shall be in accordance with nationally recognized standards.

Revise as follows:

2003.5 Dispensing and storage of flammable and combustible liquids.
The dispensing, transferring and storage of *flammable* and *combustible liquids* shall be in accordance with this chapter and Chapter 57. Aircraft motor vehicle fuel-dispensing facilities shall be in accordance with Chapter 23. Seaplane fueling shall be in accordance with Section 2310.

2006.14.1 Other equipment. Electrical or other spark-producing equipment shall not be used within 10 feet (3048 mm) of fueling equipment or near any water surface in a seaplane fueling operation, aircraft fill or vent points, or spill areas unless that equipment is intrinsically safe and *approved* for use in an explosive atmosphere.

2006.15 Open flames. Open flames and open-flame devices are prohibited within 50 feet (15 240 mm) of any aircraft fuel-servicing operation or fueling equipment. Seaplane fueling shall comply with Section 2310.5.5.

Reason: The intent of the code was always to apply to seaplane facilities as well as land based plane facilities. The change clarifies the intent of the code.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal simply clarifies existing intent that seaplanes were intended to be regulated by this code.

F177-24

F178-24

IFC: 2003.8 (New), UL Chapter 80 (New)

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Add new text as follows:

2003.8 Battery powered aviation ground support equipment. Lithium battery-powered aviation ground support equipment shall be *listed* and *labeled* in accordance with CAN/UL 5840, and shall be operated and maintained in accordance with the listing and manufacturer's instructions.

Add new standard(s) as follows:

UL

Underwriters Laboratories LLC
333 Pfingsten Road
Northbrook, IL 60062

CAN/UL 5840-2022	Electrical Systems of Battery Powered Aviation Ground Support Equipment

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Electrical Systems of Battery Powered Aviation Ground Support Equipment (CAN/UL 5840-2022)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: CAN/UL 5840 was developed to address fire, shock and explosion risks associated with the electrical systems in aviation ground support equipment, including the battery, during charging and use (discharging) of the battery.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The cost for obtaining listed lithium battery-powered aviation ground support equipment may or may not represent increased product costs over obtaining non-listed products that have not been independently investigated to applicable standards for determining product safety and performance.

Obtaining and maintaining a listing for lithium battery-powered aviation ground support equipment involves both product investigation costs and costs for periodic inspection of production, as required by the definition of “listed”. However, the impact of any potential cost increase can be weighed by the code development committee against the user and code official safety benefits derived from requiring listed equipment, as well as the additional benefit of less effort needed to demonstrate or determine compliance.

F178-24

F179-24

IFC: 2005.4, 2006.11.4, 2006.11.5, 2006.13.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

2005.4 On aircraft fuel-servicing tank vehicles. Aircraft fuel-servicing tank vehicles shall be equipped with not less than two *listed* portable fire extinguishers complying with Section 906, each having a minimum rating of 20-B:C. A portable fire extinguisher shall be provided with *ready access* from either side of the vehicle. The engine exhaust on the fueling vehicle shall be directed away from the fueling operation.

2006.11.4 Fuel spill procedures. The fueling-system operator shall establish procedures to follow in the event of a fuel spill. These procedures shall be comprehensive and shall provide for all of the following:

1. Upon observation of a fuel spill, the aircraft-fueling operator shall immediately stop the delivery of fuel by releasing hand pressure from the fuel flow-control valve.
2. Failure of the fuel control valve to stop the continued spillage of fuel shall be cause for the activation of the appropriate emergency fuel shutoff device.
3. A supervisor for the fueling-system operator shall respond to the fuel spill area immediately.
4. Any fuel spill over 10 gallons (38 L) shall be reported to the fire department.
5. Unauthorized releases shall be reported in accordance with Section 5003.3.1.1.

Delete without substitution:

~~**2006.11.5 Notification of the fire department.** The fire department shall be notified of any fuel spill that is considered a hazard to people or property or which meets one or more of the following criteria:~~

1. ~~Any dimension of the spill is greater than 10 feet (3048 mm).~~
2. ~~The spill area is greater than 50 square feet (4.65 m^2).~~
3. ~~The fuel flow is continuous in nature.~~

Revise as follows:

2006.13.1 Overwing fueling. Vehicles or equipment shall not be allowed beneath the trailing edge and fuel tank vapor vent area ~~of the wing~~ when aircraft fueling takes place over the wing. ~~and the aircraft fuel-system vents are located on the upper surface of the wing.~~

Reason: This update recognizes spill reporting requirements and minor updates to other areas in this chapter that are consistent with safe practices.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The change clarifies existing language and better correlates with Chapter 50 and industry practice.

F179-24

F180-24

IFC: SECTION 202 (New), 105.5.48, 1103.6.2, 2001.1, 2002.1, SECTION 2007, 2007.1, 2007.2, 2007.3, 2007.5, 2007.6, 2007.7, 2007.8, NFPA Chapter 80 (New), DOTn Chapter 80 (New), ASTM Chapter 80 (New), 905.3.5; IBC: SECTION 202 (New), [F] 905.3.5, [F] 412.7, [F] 412.7.1, [F] 412.7.2, [BE] 412.7.3, [F] 412.7.4, NFPA Chapter 35 (New), DOTn Chapter 35 (New), ASTM Chapter 35 (New)

Proponents: Rex Alexander, Five-Alpha LLC, Self (rex@five-alpha.com)

2024 International Fire Code

Add new definition as follows:

EMERGENCY HELICOPER LANDING AREA (EHLF). A clear area at ground level or on the roof of a building capable of accommodating helicopters engaged in fire fighting and/or emergency evacuation operations.

VERTIPORT. A generic reference to the area of land, water, or structure used or intended to be used, for the landing and takeoff of vertical takeoff and landing (VTOL) aircraft, together with associated buildings and facilities.

VERTISTOP. A vertiport, where no refueling, recharging, maintenance, repairs, or storage of aircraft is permitted, except for unscheduled maintenance.

Revise as follows:

105.5.48 ~~Rooftop heliports~~ Heliports, helistops, EHLFs, vertiports, and vertistops. An operational permit is required for the operation of a ~~rooftop~~ heliport, helistop, EHLFs, vertiport, or vertistop.

1103.6.2 Existing ~~helistops and~~ heliports, helistops, EHLFs, vertiports, and vertistops.
Existing buildings with a rooftop ~~helistop or~~ heliport, helistop, EHLFs, vertiport, or vertistop located more than 30 feet (9144 mm) above the lowest level of fire department access to the roof level on which the ~~helistop or~~ heliport, helistop, EHLFs, vertiport, or vertistop is located shall be equipped with standpipes in accordance with Section 2007.5.

2001.1 Scope. Airports, heliports, helistops,EHLFs, vertiports, vertistops, and aircraft hangars shall be in accordance with this chapter.

2002.1 Definitions.
The following terms are defined in Chapter 2:

AIRCRAFT OPERATION AREA (AOA).

AIRPORT.

HELIPORT.

HELISTOP.

EMERGENCY HELICOPTER LANDING AREA (EHLF).

VERTIPORT.

VERTISTOP.

SECTION 2007
~~HELISTOPS AND~~ HELIPORTS, ~~AND~~ HELISTOPS, EHLF, VERTIPORTS, AND VERTISTOPS

2007.1 General.
~~Helistops and heliports,~~ Heliports, helistops, EHLFs, vertiports, and vertiports shall be maintained in accordance with Sections 2007.2 through 2007.8. ~~Helistops and heliports,~~ Heliports, helistops, EHLFs, vertiports, and vertistops ~~on buildings~~ shall be constructed in accordance with the *International Building Code*~~.~~, US DOT/FAA AC 150/5390-2D, US DOT/FAA Engineering Brief No. 105, and NFPA

418, ASTM F3423, as applicable.

2007.2 Clearances. ~~The touchdown area shall be surrounded on all sides by a clear area having minimum average width at roof level of 15 feet (4572 mm) and not less than 5 feet (1524 mm) at any point. The clear area shall be maintained.~~ Heliports, helistops, EHLFs, vertiports, and vertistops shall maintain the required clearances as specified in U.S DOT/FAA AC 150/5390-2D and U.S. DOT/FAA Engineering Brief No. 105.

2007.3 Flammable and Class II combustible liquid spillage. Landing areas on structures shall be maintained so as to confine *flammable* or Class II *combustible liquid* spillage to the landing area itself, and provisions shall be made to drain such spillage away from *exits* or *stairways* serving the ~~helicopter~~ aircraft landing area or from a structure housing such *exit* or *stairway*.

2007.5 Standpipe systems. A building with a rooftop ~~helistop or~~ heliport, helistop, EHLF, vertiport, or vertistop shall be provided with a Class I or III standpipe system extended to the roof level on which the ~~helistop or~~ heliport, helistop, EHLF, vertiport or vertistop is located. All portions of the ~~helistop and~~ heliport, helistop, EHLF, vertiport, or vertistop area shall be within 150 feet (45 720 mm) of a $2^1/_2$-inch (63.5 mm) outlet on the standpipe system.

2007.6 Foam protection.
Foam fire-protection capabilities shall be provided for rooftop ~~heliports~~ landing areas that accommodate aircraft with liquid fuel. Such systems shall be designed, installed and maintained in accordance with the applicable provisions of Sections 903, 904 and 905.

2007.7 Fire extinguishers.
~~Not less than one portable fire extinguisher having a minimum 80-B:C rating shall be provided for each permanent takeoff and landing area and for the aircraft parking areas. Installation, inspection and maintenance of these extinguishers shall be in accordance with Section 906.~~ Fire extinguishers at heliports, helistops, EHLFs, vertiports, vertistops, aircraft parking areas, refueling sites, and charging sites shall comply with NFPA 418 and NFPA 10.

2007.8 Federal approval. Before operating helicopters or VTOL aircraft from a ~~helistops and~~ heliport~~s~~, helistop, EHLFs, vertiport, or vertiport ~~approval shall be obtained~~ a favorable airspace determination shall be obtained from the Federal Aviation Administration.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

418-24	Standard for Heliports and Vertiports

DOTn

U.S. Department of Transportation
Office of Hazardous Material Safety 1200 New Jersey Avenue SE East Building 2nd Floor
Washington, DC 20590

U.S. DOT/FAA AC 150/5390-2D-2023	Heliport Design
US DOT/FAA Engineering Brief No. 105-2022	Vertiport Design

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959

F3423-23	Standard Specification for Vertiport Design

Revise as follows:

905.3.5 ~~Helistops, and heliports~~ Heliports, helistops, EHLF, vertiports, and vertistops.
Buildings with a rooftop ~~*helistop,*~~ *heliport, helistop,* EHLF, *vertiport, or vertistop* shall be equipped with a Class I or III standpipe system extended to the roof level on which the ~~*helistop or*~~ *heliport, helistop,* EHLF, *vertiport, or vertistop* is located in accordance with Section 2007.5.

2024 International Building Code

Add new definition as follows:

EMERGENCY HELICOPER LANDING AREA (EHLF). A clear area at ground level or on the roof of a building capable of accommodating helicopters engaged in fire fighting and/or emergency evacuation operations.

VERTIPORT. A generic reference to the area of land, water, or structure used or intended to be used, for the landing and takeoff of vertical takeoff and landing (VTOL) aircraft, together with associated buildings and facilities.

VERTISTOP. A vertiport, where no refueling, recharging, maintenance, repairs, or storage of aircraft is permitted, except for unscheduled maintenance.

Revise as follows:

[F] 905.3.5 ~~Helistops and heliports~~ Heliports, Helistops, EHLFs, Vertiports, and Vertistops.
Buildings with a rooftop ~~*helistop or*~~ *heliport* , *helistop*, EHLFs, *vertiport, or vertistop* shall be equipped with a Class I or III *standpipe system* extended to the roof level on which the ~~*helistop or*~~ *heliport* , *helistop*, EHLFs, *vertiport, or vertistop* is located in accordance with Section 2007.5 of the *International Fire Code.*

[F] 412.7 Heliports, ~~and~~ helistops, EHLF, vertiports, vertistops.
Heliports, ~~and~~ *helistops*, EHLFs, vertiports *and vertistops* shall be permitted to be erected on *buildings* or other locations where they are constructed in accordance with Sections 412.7.1 through 412.7.5.

[F] 412.7.1 ~~Size~~ Design.
~~The landing area for helicopters less than 3,500 pounds (1588 kg) shall be not less than 20 feet (6096 mm) in length and width. The landing area shall be surrounded on all sides by a clear area having an average width at roof level of 15 feet (4572 mm), and all widths shall be not less than 5 feet (1524 mm).~~Heliport, helistop, EHLF, vertiport, and vertistop landing areas shall be designed in accordance with U.S. DOT/FAA Heliport Design AC 150/5390-2D. Veriports and veristops shall comply with ASTM F3423-23.

[F] 412.7.2 ~~Design~~ Rooftop landing areas.
Helicopter and VTOL landing areas and the supports thereof on the roof of a *building* shall be noncombustible construction. Landing areas shall be designed to confine any *flammable liquid* spillage to the landing area itself and provisions shall be made to drain such spillage away from any *exit* or *stairway* serving the helicopter or VTOL landing area or from a *structure* housing such *exit* or *stairway*. For structural design requirements, see Section 1607.6.

[BE] 412.7.3 Means of egress.
The *means of egress* from *heliports* ~~and~~ , *helistops, EHLFs, vertiports and vertistops* shall comply with the provisions of Chapter 10. Landing areas located on *buildings* or *structures* shall have two or more *exits or access to exits*. For landing areas less than 60 feet (18 288 mm) in length or less than 2,000 square feet (186 m^2) in area, the second *means of egress* is permitted to be a fire escape, *alternating tread device* or ladder leading to the floor below.

[F] 412.7.4 ~~Rooftop heliports~~ Heliports, ~~and~~ helistops, EHLFs, vertiports and vertistops.
~~Rooftop~~ *Heliports*, ~~*heliports* and~~ *helistops*, *EHLFs, vertiports and vertistops* shall comply with NFPA 418, US DOT/FAA AC 150/5390-2D and FAA Engineering Brief No. 105, ASTM F3423, as applicable.

Add new standard(s) as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

418-24 Standard for Heliports and Vertiports

DOTn

U.S. Department of Transportation
Office of Hazardous Material Safety 1200 New Jersey Avenue, SE East Building, 2nd Floor
Washington, DC 20590

U.S. DOT/FAA AC 150/5390-2D-2023 Heliport Design

US DOT/FAA Engineering Brief No. 105-2022 Vertiport Design

ASTM

ASTM International
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428

F3423-23 Standard Specification for Vertiport Design

Staff Analysis: A review of the following standards proposed for inclusion in the code regarding some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024:

- ***Standard for Heliports and Vertiports (NFPA 418-24)***
- ***Heliport Design (U.S. DOT/FAAAC 150/390-2D-2023)***
- ***Vertiport Design (U.S. DOT/FAA Engineering Brief Number 105-2022)***
- ***Standard Specification for Vertiport Design (ASTM F3423-23)***

Attached Files

- **Heliport Accident Case Study NTSB No. WPR22LA018-c LLR.pdf**
  https://www.cdpaccess.com/proposal/10558/30568/files/download/4825/
- **F77 A Retrospective & Historical Analysis of Vertical Lift Infrastructure Accidents Final-c.pdf**
  https://www.cdpaccess.com/proposal/10558/30568/files/download/4784/

Reason: These recommended changes are to better align and harmonize the IFC and IBC with recognized U.S. Department of Transportation's Federal Aviation Administration (FAA) and the National Fire Protection Association (NFPA) design standards for heliports, helistops, vertiports, and vertistops.

Bibliography:

- U.S. DOT/FAA Heliport Design Advisory Circular, AC 150/5390-2D, 2023.
- NFPA-418, Standards for Heliports and Vertiports, 2024
- Bassey, R., 2022, FAA Engineering Brief No. 105, Vertiport Design.
- **Heliport Accident Case Study NTSB No. WPR22LA018-c LLR.pdf**

  https://www.cdpaccess.com/proposal/10558/30568/files/download/4825/
- **F77 A Retrospective & Historical Analysis of Vertical Lift Infrastructure Accidents Final-c.pdf**

  https://www.cdpaccess.com/proposal/10558/30568/files/download/4784

Cost Impact: Increase

Estimated Immediate Cost Impact:

Minimally $0.00 if currently complying. The cost impact justification provide more detail on possible costs.

Estimated Immediate Cost Impact Justification (methodology and variables):

To calculate the potential cost impact that these recommendations may have, it is first necessary to understand how the ICC references FAA and NFPA standards, then how the NFPA references FAA standards, how FAA referenced NFPA and ICC standards, and finally how long these references have been in place.

ICC 2021 Reference to NFPA-418:

IFC 2021:

2007.1 General. Helistops and heliports shall be maintained in accordance with Sections 2007.2 through 2007.8. Helistops and heliports on buildings **shall** be constructed in accordance with the International Building Code.

IBC 2021:

[F] 412.7.4 Rooftop heliports and helistops. Rooftop heliports and helistops **shall** comply with NFPA 418.

**Based on a review of past ICC standards the above language has not changed since at least the release of the 2012 revisions.*

NFPA-418, Reference to FAA Heliport Standards: *Listed by revision year.

NFPA*418 was first published in 1967.

NFPA-418 (2011):

4.2.2 The design of the heliport, including all the aeronautical components, shall be in accordance with FAA AC 150/5390-2B, Heliport Design Advisory Circular.

NFPA-418 (2016) & (2021): **Updated to reflect FAA AC revision 2C (2021)*

4.2.2 The design of the heliport, including all the aeronautical components, shall be in accordance with FAA AC 150/5390-2C, Heliport Design Advisory Circular.

NFPA-418 (2024): **Updated to reflect FAA AC revision 2D (2024), include the term "Helistop", and add reference to FAA Engineering Brief No. 105 and include the terms "Vertiport" & "Vertistop".*

6.2.2 The design of the heliport or helistop, including all the aeronautical components, shall be in accordance with FAA AC 150/5390-2D, Heliport Design Advisory Circular, or equivalent criteria.

6.2.3 The design of the vertiport or vertistop, including all aeronautical components, shall be in accordance with FAA Engineering Brief No. 105 for Vertiports, or equivalent design criteria.

FAA AC 150/5390 Reference to NFPA and ICC:

First published in 1959 the FAA Heliport Design Advisory Circular AC 150/5390 has referenced NFPA-418 and other NFPA standards since 1977. To date the FAA Heliport Advisory Circulars has not referenced any International Code Council documents. The following statement on code is made in FAA AC 2D (2024):

Applicability

"Other federal agencies, states, or other authorities having jurisdiction over the construction of heliports not funded with AIP, CARES Act, or PFC funds have discretion in establishing the extent to which these standards apply."

1.18 Local Role and Building Code.

"Some communities have enacted zoning laws, building codes, fire regulations, etc., that can affect heliport establishment and operation. Most municipalities have a formal process such as a "Conditional Use Permit" in place for the establishment of a heliport. Check with your local Planning and Zoning Commission for details. Some have or are in the process of developing codes or ordinances regulating environmental issues such as noise and air pollution. A few localities have enacted specific rules governing the establishment of a heliport. Therefore, make early contact with officials or agencies representing the local zoning board, the fire, police, or sheriff's department, and elected personnel who represent the area where the heliport is to be located."

Cost Impact to Rooftop Heliports, Helistops, Vertiports, and Vertistops

Due to current and past referencing, those states and/or municipalities who have adopted and follow ICC Building Code and Fire Code criteria, as written, should see little to no impact in the overall cost associated with rooftop heliports or helistops. Given that the FAA is using the same physical geometry and airspace criteria for vertiports and vertistops as used by heliports and helistops in the development of those standards, it is expected that the inclusion of vertiports and vertistops into the ICC will not have an impact on overall costs associated with these rooftop use cases as well.

Cost Impact to Ground Heliports, Helistops, Vertiports, and Vertistops

Dimensional Standard

The one significant change proposed to the ICC is in deleting the word "rooftop" therefore the standard will encompass ALL heliports, helistops, vertiports, and vertiports. In so doing, the following associated costs for ground-based sites may in fact increase.

The overall size of a heliport designed to FAA standards is based on the overall length of the largest helicopter expected to operate at that site. Current FAA standards dictate that the landing area known as the Touchdown and Liftoff (TLOF), i.e., *"A load-bearing (generally paved) area normally centered in the FATO, on which the helicopter performs a touchdown or liftoff"* should be designed to 0.83 X the overall length (OL) of the largest helicopter that will potentially land at that site. In those case where the heliport is associated with a hospital, which make up approximately 65% of all the heliports in the U.S., the minimum size for a TLOF is 40' X 40'.

Given the average size of a standard Helicopter Air Ambulance has a controlling dimensions between 39.2 feet (Bell-206B) and 45.1 feet (AS-365 Dauphin) respectively, the following cost increases would apply in those cases where the heliport would need to be increased. Provided that the current cost of poured concrete to the standard depth for a heliport range between $6.00./ sq ft to $10.00/ sq ft.

Heliport Size Increase Cost Analysis:

Aircraft	OL	Min TLOF (OL X 0.83)	TLOF ft^2	Increase to 40' X 40'	Est. Increased Cost at $6.00/ ft^2	Est. Increased Cost at $10/ ft^2
Bell-206B	39.2'	32.5'	1,056'	544 ft^2	$3,264	$5,440
AS-365	45.1	37.4'	1,399'	201 ft^2	$1,206	$2,010

At those location that support helicopters larger than those identified above, any cost increase would be based on how much larger the helicopter's overall length may be in comparison to the minimum 40' X 40' standard.

The largest non-military helicopter generally operated in the United States is currently the Sikorsky S-92 which has an overall length of 68.5 feet with a maximum takeoff weight of 26,500 lbs. For these larger helicopters additional consideration for weight capacity also needs to be considered, which will in turn increase cost. For this helicopter the minimum TLOF dimension would be 68.5' X 68.5' with an overall square footage of 4,692'.
Overall cost estimate at $20/ft^2 for the increased material would be approximately $93,840.

It should be pointed out that for both personal and public heliports may utilize a Turf surface, i.e., grass in lieu of concrete when deemed appropriate.

Potential Fire Safety Equipment Cost Increase

For ground-based heliports, NFPA-418 identifies the acceptable size and number of fire extinguishers that shall be required to meet the standard. With the deletion of the term "rooftop" all heliports, helistops, vertiports, and vertistop would be required to have a fire extinguisher of the appropriate size and category on site. The size of the fire extinguisher is dictated by the overall length of the largest helicopter, see applicable chart, that the heliport is required to accommodate. The category of fire extinguisher is dictated by NFPA-10, Standard for Portable Fire Extinguishers.

NFPA-418 Minimum Requirement. At least one portable fire extinguisher as specified in Table 11.2 shall be provided for each takeoff and landing area, parking area, and fuel storage area.

Fire Extinguisher Size Based on helicopters Overall Length

Helicopter Model	Overall Length (ft)	Overall Length (m)	Category
Brantly/Hynes B-2B	28.1	8.6	H-1
Robinson R-22 Beta	28.8	8.8	H-1
Sikorsky HU-269A/A-1/B, TH55A	29.0	8.8	H-1
Entrom F28F/ 280FX	29.3	8.9	H-1
Enstrom 480 / TH-28	30.1	9.2	H-1
MD500 E	30.8	9.4	H-1
Sikorsky 300C	30.8	9.4	H-1
Sikorsky 300CB / Cbi	30.8	9.4	H-1
Sikorsky 330 / 330SP /333	31.2	9.5	H-1
Sikorsky S-434	31.2	9.5	H-1
MD530 F	32.1	9.8	H-1
MD520 N	32.1	9.8	H-1
Brantly/Hynes 305	32.9	10.0	H-1
Eurocopter SA-316/319 Alouette	33.4	10.2	H-1
MD600 N	36.9	11.2	H-1
Eurocopter EC-120	37.8	11.5	H-1
Robinson R-44 Raven	38.3	11.7	H-1
Robinson R-66 Turbine	38.3	11.7	H-1
MDExplorer / 902	38.8	11.8	H-1
Eurocopter BO-105	38.9	11.9	H-1
Bell B206B-1,2,3	39.2	11.9	H-1
Eurocopter SA-341/342 Gazelle	39.3	12.0	H-1
EurocopterEC-135	40.0	12.2	H-1
Farchild-Hiller 360/UH-12/OH-23	40.8	12.4	H-1
Rgoerson-Hiller FH/RH-1100	41.3	12.6	H-1
Bell B407	41.4	12.6	H-1
Eurocopter EC-130	41.5	12.6	H-1
Eurocopter SA-315 Lama	42.3	12.9	H-1
Agusta Westland AW - 119 Ke	42.4	12.9	H-1
Bell B206L-1,3,4	42.4	12.9	H-1
Agusta Westland AW - 109S Grand	42.5	13.0	H-1
Eurocopter AS-350 A Star	42.5	13.0	H-1
Eurocopter AS-355 Twin Star	42.5	13.0	H-1
Bell B427VFR	42.6	13.0	H-1

Helicopter Model	Overall Length (ft)	Overall Length (m)	Category
Agusta WestlandA -119 Koala	42.7	13.0	H-1
Eurocopter BK-117	42.7	13.0	H-1
Eeurocopter C-145 / UH-72A	42.7	13.0	H-1
Agusta Westland A-109 A	42.8	13.0	H-1
Agusta Westland AW-109E Power	42.8	13.0	H-1
Bell B429	43.0	13.1	H-1
Eurocopter AS-360 Dauphin	43.3	13.2	H-1
Bell B47G	43.6	13.3	H-1
Eurocopter AS-365 DauphinH-65 Dolphin	45.1	13.7	H-1
Eurocopter EC-155	46.9	14.3	H-1
Bell B222B, UT	50.3	15.3	H-2
Bell B230	50.3	15.3	H-2
Bell B430	50.3	15.3	H-2
Kaman K-Max / K1200	52.0	15.8	H-2
Agusta Westland Westland WG30	52.2	15.9	H-2
Kaman SH-G Seasprite	52.5	16.0	H-2
Sikorsky S-76A/B/C/D	52.5	16.0	H-2
Agusta Westland AW - 139	54.7	16.7	H-2
Bell B412EP, SP, HP	56.2	17.1	H-2
Bell B212	57.3	17.5	H-2
Bell B205B, UH-1H, Huey II, 210	57.8	17.6	H-2
Eurocopter SA-330 Puma	59.6	18.2	H-2
Eurocopter SA/AS-332 Super Puma	61.3	18.7	H-2
Bell B214 ST	62.2	19.0	H-2
Sikorsky S-55 / H19	62.6	19.1	H-2
Eurocopter EC-224	64.0	19.5	H-2
Sikorsky S-70i/UH-60L Blackhawk	64.8	19.8	H-2
Sikorsky S-58 / H34	65.8	20.1	H-2
Sikorsky S-92	68.5	20.9	H-2
Sikorsky S-61 / H-3	72.8	22.2	H-2
Agusta Westland AW - 101	74.8	22.8	H-2
Boeing 107/CH-46E	84.3	25.7	H-3
Erickson S-64E Air Crane	88.5	27.0	H-3
Erickson S-64F Air Crane	88.5	27.0	H-3

Depending on the size and type of fire extinguisher required the cost can range from as little as $500.00 for a 30 lb. ABC fire extinguisher to upwards of $12,000 and above for a wheeled 250 lb. Purple K.

Cost Impact: Potential Cost Savings

INCLUSION OF EMERGENCY HELICOPTER LANDING FACILITY

By defining and including the term Emergency Helicopter Landing Facility (EHLF) it provides the Authority Having Jurisdiction the ability to apply those FAA standards in lieu of those for heliports, helistops, vertiports, and vertistops. This will in turn means that less stringent criteria can now be used and the cost associated will decrease.

ACCIDENT PREVENTION

Heliport Accident Research

In the Vertical Flight Society research paper entitled “A Retrospective & Historical Analysis of Vertical Lift Infrastructure Accidents for the Purpose of Operational Risk Identification and Accident Prevention”, published May 2021, see included material, it was found that 93% of all heliport accidents occurred at heliports that did not follow FAA standards.

Price of Human Life on a Helicopter

In 2011, the FAA reported that the U.S. Government equated each human life on board a helicopter to be worth approximately $6 million.

Link to quote: https://www.aviationlawmonitor.com/2011/01/airlines/faa-human-life-worth-6-million/

Based on standard inflation, in 2024 that same amount would equate to $8.1 million.

Heliport Accident Research

2021 Grand Canyon Accident Report

In a recent out of court settlement involving a helicopter accident in Peach Springs, Arizona (NTSB Accident Number WPR18MA087) where the heliport being utilized did not meet basic FAA standards, i.e., and approach departure path that avoids downwind operations, a jury awarded one of the familys involved $100 million dollars.

Link to review: https://aerossurance.com/safety-management/grand-canyon-air-tour-tailwind/

Link to Story: https://www.bbc.com/news/uk-england-sussex-55674015

Tucson Medical Center Heliport

Helicopter Accident at the Tucson Medical Center rooftop heliport in Tucson, Arizona, NTSB Accident Number WPR22LA018, helicopter hits incorrectly placed fire extinguisher while operating at substandard heliport. See included case study.

1. Link to Article: https://verticalmag.com/features/blind-spots-the-danger-of-inadequate-landing-infrastructure/

F180-24

F181-24

IFC: SECTION 202, CHAPTER 22

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

CHAPTER 2 DEFINITIONS

SECTION 202
GENERAL DEFINITIONS

Revise as follows:

COMBUSTIBLE DUST. Finely divided solid material which ~~is 420 microns or less in diameter and which~~, when dispersed in air <u>or oxidizing medium</u> in the proper proportions, could be ignited by a flame, spark or other source of ignition. ~~*Combustible dust* will pass through a US No. 40 standard sieve.~~

DEFLAGRATION. An exothermic reaction, such as the extremely rapid oxidation of a flammable dust or vapor in air <u>or oxidizing medium,</u> in which the reaction progresses through the unburned material at a rate less than the velocity of sound. A deflagration can have an explosive effect.

EXPLOSION. ~~An effect produced by the sudden violent expansion of gases, which may be accompanied by a shock wave or disruption, or both,~~ <u>The failure</u> of enclosing materials or structures <u>due to an increase in internal pressure from deflagration or detonation.</u> An explosion could result from any of the following:

1. Chemical changes such as rapid oxidation, *deflagration* or *detonation*, decomposition of molecules and runaway polymerization (usually *detonations*).
2. Physical changes such as pressure tank ruptures.
3. Atomic changes (nuclear fission or fusion).

Add new definition as follows:

<u>**FLASH FIRE**</u>**.**
<u>A fire that spreads by means of a flame front rapidly through a diffuse fuel, such as dust, gas, or the vapors of an ignitible liquid, without the production of damaging pressure.</u>

CHAPTER 22 COMBUSTIBLE DUST-PRODUCING OPERATIONS

SECTION 2201
GENERAL

Revise as follows:

2201.1 Scope. The <u>facilities,</u> equipment, processes and operations ~~involving~~ <u>in which combustible</u> dust explosion, deflagration<u>, fire or flash fire</u> hazards ~~and use or handling of *combustible dust*~~ <u>exist</u> shall comply with the provisions of this chapter.

Exceptions:

1. Storage and use of consumer materials in Group B or R occupancies.
2. Storage and use of commercially packaged materials in Group M occupancies.

3. Materials displayed in original packaging in Group M occupancies and intended as building materials or for personal or household use.
4. Storage of sealed containers of *combustible dust* at facilities not associated with an operation that uses, handles or generates *combustible dust*.
5. Materials stored or used in farm buildings or similar occupancies intended for on-premises agricultural purposes.
6. When the facility or use is outside the scope of NFPA 652.
7. Restaurants, retail bakeries, coffee shops, and similar occupancies that have limited use of flour, sugar, coffee grinds, and other finely divided combustible dust or particulate solid ingredients in preparation of foods, snacks, and similar.

2201.2 Permits.
Permits shall be required for *combustible dust*-producing operations as set forth in Section 105.5.

SECTION 2202 DEFINITIONS

Revise as follows:

2202.1 Definition.
The following terms are defined in Chapter 2:

COMBUSTIBLE DUST.

DUST COLLECTION SYSTEM.

FLASH FIRE.

SECTION 2203 DUST EXPLOSION ~~PREVENTION~~ CONTROL

2203.1 ~~Critical depth layer~~ Combustible Dust Hazard Identification.
~~The maximum dust layer on all surfaces, including but not limited to walls, ceilings, beams, equipment, furniture, pipes and ducts, shall not exceed the critical depth layer specified in Table 2203.1. The critical depth layer is permitted to be adjusted for explosion hazard where further evaluated in accordance with one of the following:~~

1. ~~Section 7.2.1.3 of NFPA 654.~~
2. ~~Section 4.1.3.3 of NFPA 664 for wood flour.~~

~~Accumulated *combustible dust* shall be collected by one of the methods listed in Section 2203.5.~~ Where the smallest dimension of the material is less than or equal to 500 µm, the owner/operator shall be responsible for determining whether the material is combustible or explosible. Where the combustibility of a dust or particulate solid is not determined by an *approved* source, the owner/operator shall test representative samples in accordance with NFPA 652. A copy of the test results shall be provided to the *fire code official* upon request.

Delete without substitution:

~~TABLE 2203.1 CRITICAL DEPTH LAYER~~

TYPE OF DUST	CRITICAL DEPTH LAYER (INCHES)
Wood flour	$^1/_8$

All other dusts	$^{1}/_{32}$

~~For SI: 1 inch = 25.4 mm.~~

Revise as follows:

2203.2 Dust Hazard Analysis ~~-producing and dust-handling equipment~~. ~~Dust-producing equipment and dust-handling equipment, including but not limited to vacuums, dust collection systems, dryers, mixers, blenders, separators, conveyors, storage containers, silos or other similar devices, shall be *listed* and shall be maintained in accordance with the manufacturer's recommended standards.~~ Where a dust is combustible or *explosible*, a dust hazard analysis (DHA) shall be performed and documented for new or existing facilities in accordance with NFPA 652. A copy of the DHA shall be provided to the *fire code official* upon request.

> **Exception:** Woodworking operations that occupy areas smaller than 5000 ft (465 m2), and where dust-producing equipment requires an aggregate dust collection flow rate less than 1500 ft3/min (2549 m3/hr) and the equipment is installed in accordance with the International Mechanical Code. (NFPA 664 1.1.2)

2203.3 Dust control and management system ~~-collection and dust-conveying systems~~.
~~Dust-collection and dust-conveying systems shall be in accordance with Sections 2203.3.1 through 2203.3.3.~~ Facilities where combustible dusts or powders are used, handled, generated shall have dust control, cleaning, training, operations procedures, and management procedures to prevent conditions, operations, or accumulations of combustible dusts that could pose a fire, flashfire, or explosion hazard.

2203.3.1 Housekeeping and cleaning ~~Dust-collection systems~~.
~~Dust-collection systems shall be designed to collect dust emissions from dust-producing equipment at the point of generation. Dust-collection systems shall be in accordance with Section 510 of the *International Mechanical Code*.~~

> ~~**Exception:** *Closed systems* using *listed* equipment and designed in accordance with manufacturer's recommendations and specifications, where cleanouts are provided in accordance with Section 2203.3.3.~~

~~Heating, ventilation, and air conditioning (HVAC) systems shall not be used as the means to collect dusts from localized sources.~~
Facilities where combustible dusts or powders are used, handled, generated shall have regular housekeeping and cleaning procedures to prevent accumulations of combustible dusts that could pose a fire, flash fire, or explosion hazard. Dust shall be maintained at 1/8" inch or less, or as otherwise required in standards listed in Table 2205.1

Delete without substitution:

~~2203.3.1.1 Location~~.
~~Dust collectors shall be located outside of buildings.~~

> ~~**Exceptions:**~~
> 1. ~~Dust collectors inside buildings complying with Section 510 of the *International Mechanical Code*.~~
> 2. ~~Wet-type dust collectors specifically *listed* for the type of dust conveyed shall be permitted inside buildings where in accordance with the manufacturer's instructions and specifications.~~
> 3. ~~Dust collectors designed to specific NFPA standards listed in Table 2205.1 for the specific type of dust conveyed.~~

~~2203.3.1.2 Minimum conveying velocities~~.
~~The minimum velocities within ducts used as part of the dust collection system shall be in accordance withTable 2203.3.1.2.~~

~~TABLE 2203.3.1.2 MINIMUM CONVEYING VELOCITIES~~

TYPE OF PRODUCT	FEET PER MINUTE
Fine light dust such as cotton, lint and wood flour (100 mesh and under)	2,000
Dry dust such as fine rubber molding powder	2,500
Average dust such as sawdust, grinding dust and coal dust	3,500
Heavy dust such as metal turnings, including aluminum and magnesium powder	4,000

~~For SI: 1 foot per minute = 0.00508 m/s.~~

~~**2203.3.2 Plastic ducts and conveying systems.**~~ ~~Plastic, fiberglass, other nonconductive ducts, duct liners or pipes shall not be used as part of ducts and conveying systems. Ductwork utilizing a combustible lining shall be permitted only in high-impact areas and where *approved*. Flexible hose shall be permitted if designed and installed in accordance with the following requirements:~~

1. ~~Manufactured of static dissipative construction.~~
2. ~~Used only for connections and isolation purposes.~~
3. ~~Limited to 18 inches (457 mm) in length.~~
4. ~~Properly grounded.~~

Add new text as follows:

2203.3.2 Management systems, training, and operation procedures. The owner / operator shall maintain management systems in accordance with Chapter 8 of NFPA 652 to ensure the facility and equipment is safely maintained and operated.

Delete without substitution:

~~**2203.3.3 Cleanouts**~~**.**

~~Openings in enclosed equipment and conveyors shall be provided to allow access to all parts of the equipment and conveyors to permit inspection, cleaning, maintenance and the effective use of portable fire extinguishers or hose streams. Cleanouts for ducts used as part of the dust collection system shall be in accordance with the *International Mechanical Code*.~~

Add new text as follows:

2203.3.3 Documentation. A copy of the required documentation shall be maintained in accordance with NFPA 652.

Revise as follows:

2203.4 Sources of ignition.

Sources of ignition shall be controlled in accordance with NFPA 652 and NFPA 70 ~~Sections 2203.4.1 through 2203.4.9.5~~.

Delete without substitution:

~~**2203.4.1 Classified electrical**~~**.**

~~Classified electrical shall be in accordance with NFPA 70. Electrical motors and electrical components of the equipment shall not be installed in the dust-laden airstream unless *listed* for Class II, Division 1, locations.~~

~~**2203.4.2 Static electricity.** Bonding and grounding is required to minimize accumulation of static electric charge in the following locations:~~

1. ~~Dust-producing equipment.~~
2. ~~Dust collection system.~~
3. ~~Pneumatic dust-conveying systems conveying *combustible dust* from one location to another, *combustible dust* conveyors, piping and conductive components. Conveying systems include transport modes such as railcars, hopper cars, boxcars, tank cars and trucks into which or from which commodities or products are pneumatically conveyed.~~
4. ~~Conveying systems using metallic piping.~~

~~**2203.4.3 Hot works.**~~

~~Hot work and similar spark-producing operations shall not be conducted in or adjacent to *combustible dust* producing areas unless precautions have been taken to provide safety. Hot work shall be permitted only in safe, designated areas in accordance with Chapter 35. Hot work is prohibited on equipment that is operating.~~

~~**2203.4.3.1 Signs.** Conspicuous signs with the following warning shall be posted in the vicinity of *combustible dust* producing areas or in the vicinity of *combustible dust* use:~~

~~NO WELDING. THE USE OF WELDING OR CUTTING EQUIPMENT IN OR NEAR THIS AREA IS DANGEROUS BECAUSE OF FIRE AND EXPLOSION HAZARDS.~~

~~WELDING AND CUTTING SHALL BE DONE ONLY UNDER THE SUPERVISION OF THE PERSON IN CHARGE.~~

~~**2203.4.4 Hot surfaces and hot equipment.**~~

~~In areas where a dust explosion hazard or dust flash fire hazard exists, the temperature (in degrees Celsius) of external surfaces shall be maintained below 80 percent of the lower of the dust surface ignition temperature or the dust cloud ignition temperature for worst-case dusts. External surfaces shall include but are not limited to:~~

1. ~~Compressors.~~
2. ~~Steam, water or process piping.~~
3. ~~Ducts.~~
4. ~~Conveyors.~~
5. ~~Process equipment.~~

~~Where steam pipes or hot surfaces occur in dust-producing or dust-handling areas, accumulation of dust on the surfaces shall be minimized by an *approved* method.~~

~~**Exception:** Drying apparatus *listed* for the intended use and installed in accordance with the manufacturer's instructions.~~

~~**2203.4.5 Powered industrial trucks.** Powered industrial trucks used in electrically classified areas shall be *listed* for such use.~~

~~**2203.4.6 Smoking prohibited.**~~

~~Smoking shall be prohibited in or adjacent to dust-producing or dust-handling areas. " No Smoking " signs complying with Section 310 shall be conspicuously posted in such areas. Smoking shall be permitted only in designated areas.~~

~~**2203.4.7 Spark-producing devices.** S park-producing devices shall not be located within 20 feet (6096 mm) of areas requiring classified electrical unless separated by a permanent partition.~~

~~**2203.4.8 Self-heating materials**~~**.**

~~Materials in silos and other large storage piles of particulates prone to self-heating shall be in accordance with Section 9.4.11 of NFPA 652.~~

~~**2203.4.9 Open flames and fuel-fired equipment**~~**.**

~~Open flames and fuel-fired equipment shall be in accordance with Sections 2203.4.9.1 through 2203.4.9.5.~~

~~**2203.4.9.1 Release ofairborne combustible dust.**~~ ~~Production, maintenance or repair activities that have the potential to release or force *combustible dust* to become airborne shall not be conducted within 35 feet (11 m) of an open flame or pilot flame.~~

~~**2203.4.9.2 Space heaters**~~**.** ~~Fuel-fired space heaters drawing local ambient air shall not be located within electrically classified areas. Space-heating appliances in dust producing or dust-handling areas shall be located where not subject to the accumulation of deposits of *combustible dust*.~~

~~**2203.4.9.3 Equipment listing.**~~ ~~Fuel-fired process equipment shall be *listed* for its intended use and shall be operated and maintained in accordance with the manufacturer's instructions.~~

~~**2203.4.9.4 Inspection and preventive maintenance.**~~ ~~Inspection and maintenance of fuel-fired process equipment shall include verification that significant *combustible dust* accumulations do not exist within or around the equipment.~~

~~**2203.4.9.5 Sources of combustion air**~~**.** ~~In Class II electrically classified locations, heating units shall be provided with a source of combustion air ducted directly from the building exterior or from an unclassified location.~~

~~**2203.5 Housekeeping**~~**.**

~~Accumulation of *combustible dust* on surfaces inside buildings shall be maintained below the critical depth layer in Section 2203.1. Pressurized air or similar methods shall not be used to remove dust from surfaces. Accumulated *combustible dust* shall be collected by one of the following methods:~~

1. ~~Portable vacuum cleaners *listed* for use in Class II, Group G, Division 1, atmospheres as defined in NFPA 70.~~
2. ~~Dust collection systems.~~
3. ~~Other *approved* means that will not place *combustible dust* into suspension in air.~~

~~**Exception:** Forced-air or similar methods shall be permitted to remove dust in accordance with NFPA 652, NFPA 654 or NFPA 664.~~

~~**2203.6 Standard operational procedures.**~~ ~~Dust-producing equipment and all associated equipment, including dust collection equipment, shall be maintained in accordance with the manufacturer's instructions and specifications and applicable codes. The inspection, testing and maintenance program shall include the following, as applicable:~~

1. ~~Fire and explosion protection and prevention equipment, as applicable, in accordance with the appropriate NFPA standards.~~
2. ~~Dust control equipment.~~
3. ~~Control of potential ignition sources.~~
4. ~~Electrical, process and mechanical equipment, including applicable process interlocks.~~
5. ~~Lubrication of bearings for dust collection, dust-handling and dust-producing equipment.~~
6. ~~Additional maintenance in accordance with the manufacturer's instructions and specifications for dust collection, dust-handling and dust-producing equipment.~~

~~Records shall be kept of maintenance and repairs performed. The standard operating procedures shall be submitted to the *fire code official* for review and approval. The written standard operating procedures shall be signed by the person responsible for facility~~

~~operations.~~

~~**2203.7 Emergency response plan.** A written emergency response plan shall be developed for preventing, preparing for and responding to work-related emergencies, including but not limited to fire and explosion. The following information shall be developed into the plan:~~

1. ~~Identification of dust hazards.~~
2. ~~Identification and location of all utilities to affected areas.~~
3. ~~Site plans or floor plans locating utility shutoff controls, including water, gas and power.~~
4. ~~The potential for explosion.~~
5. ~~Locations of fire-extinguishing equipment compatible with the hazards present.~~
6. ~~Any additional information required by the *fire code official* .~~

~~**2203.8 Training.**~~

~~The plans and procedures required in Sections 2203.5, 2203.6 and 2203.7 shall be *approved* by the *fire code official*. The plans and procedures shall be reviewed annually and updated as required by process changes. Initial and annual refresher training shall be provided to employees who are involved in operating, maintaining and supervising facilities that handle *combustible dust*. Initial and annual refresher training shall include:~~

1. ~~Workplace hazards.~~
2. ~~General orientation, plant diagrams and plant safety rules.~~
3. ~~Process description or flowchart.~~
4. ~~Equipment operation, safe startup and shutdown, and response to hazard conditions or an incident.~~
5. ~~The location and use of all related fire and explosion protection and prevention systems.~~
6. ~~Equipment maintenance requirements and practices, including visual inspections of conveyors and ducts.~~
7. ~~Housekeeping requirements, including the maintenance of the critical depth layer in Section 2203.1.~~
8. ~~Emergency response plans as required in Section 2203.7.~~

~~The employer shall maintain records of initial and annual training and review.~~

~~SECTION 2204~~
~~DUST EXPLOSION SCREENING TESTS~~

~~**2204.1 Combustibility and explosivity tests.**~~

~~Where combustibility or explosivity screening tests are required to analyze the *combustible dust* as part of compliance with Section 104.9 and Section 414.1.3 of the *International Building Code*, they shall be in accordance with Section 5.4 of NFPA 652.~~

~~**2204.2 Samples.**~~

~~Representative samples for the screening test shall be obtained in accordance with Section 5.5 of NFPA 652.~~

Add new text as follows:

SECTION 2204
FACILITIES, EQUIPMENT, AND OPERATIONS

2204.1 Facilities, equipment, and operations. Facilities, equipment and operations with combustible dust hazards shall be in accordance with Sections 2204.1 through 2204.4.

2204.1.1 Dust-producing and dust-handling equipment. Dust-producing equipment and dust-handling equipment, including but not limited to vacuums, dust collection systems, dryers, mixers, blenders, separators, conveyors, storage containers, silos or other similar devices, shall be designed, installed and maintained in accordance with the International Mechanical Code and applicable standards listed in Table 2205.1

2204.1.2 Dust-collection systems. Dust-collection systems shall be designed to collect dust emissions from dust-producing equipment at the point of generation. Dust-collection systems shall be in accordance with Section 511 of the *International Mechanical Code* and applicable standards listed in Table 2205.1.

2204.2 HVAC systems. Heating, ventilation, and air conditioning (HVAC) systems shall not be used as the means to collect dusts from localized sources.

Revise as follows:

~~2203.2.1~~ 2204.3 Signages and markings.
Signages and markings shall be provided in accordance with Sections 2204.3 and applicable standards listed in Table 2205.1 ~~2203.2.1.1 through 2203.2.1.3~~.

~~2203.2.1.1~~ 2204.3.1 Deflagration vent discharge area markings. Where dust collection systems and other equipment, systems or system components are provided with *deflagration* vents , the area within the *deflagration* vent's discharge area shall be marked in an *approved*manner.

~~2203.2.1.2~~ 2204.3.2 Caution signs. Signs that read as follows shall be posted near the dust-containing equipment with deflagration vents:
CAUTION: THIS EQUIPMENT CAN CONTAIN EXPLOSIVE DUST.
KEEP OUTSIDE THE MARKED AREA WHILE EQUIPMENT IS OPERATING.

~~2203.2.1.3~~ 2204.3.3 Warning signs. Where dust collection systems and other equipment, systems or system components are provided with deflagration vents, vent closures shall be clearly marked as follows:
WARNING: EXPLOSION RELIEF DEVICE. STAY CLEAR.

Add new text as follows:

2204.4 Exhaust system and ducts. Exhaust systems and ducts shall be designed, constructed and maintained in accordance with the International Mechanical Code and applicable standards listed in Table 2205.1.

SECTION 2205
STANDARDS

Revise as follows:

2205.1 Specific hazards standards. The owner/operator of a facility with a combustible dust hazard shall be responsible for following the ~~*fire code official* is authorized to enforce~~ additional industry- or material-specific provisions of the codes and standards listed in Table 2205.1 to prevent and control dust explosions, as applicable. Mission continuity requirements found in NFPA standards are not required by this code.

TABLE 2205.1 EXPLOSION PROTECTION STANDARDS

STANDARD	SUBJECT

STANDARD	SUBJECT
NFPA 61	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
NFPA 68	Standard on Explosion Protection by Deflagration Venting
NFPA 69	Standard on Explosion Prevention Systems
NFPA 70	National Electrical Code
NFPA 77	Recommended Practice on Static Electricity
NFPA 85	Boiler and Combustion System Hazards Code
NFPA 120	Standard for Fire Prevention and Control in Coal Mines
NFPA 484	Standard for Combustible Metals
NFPA 652	The Fundamentals of Combustible Dust
NFPA 654	Standard for Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids
NFPA 655	Standard for the Prevention of Sulfur Fires and Explosions
NFPA 664	Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities

2205.1.1 Dust hazard analysis.

If a dust hazard analysis (DHA) is required by the *fire code official* for new or existing facilities and operations, it shall be in accordance with NFPA 652. The DHA for existing facilities shall be in accordance with Section 7.1.1 of NFPA 652.

Reason: The chapter has been completely rewritten for consistency with updated NFPA standards, to ensure that correct standards are requirements are followed (as recommended by Chemical Safety Board and OSHA), and to provide users with an simple, organized approach for applying the correct provisions and standards. The proposed chapter is simpler and easier for users to follow and apply.

The new chapter follows the same basic recognized and methodical approach found in NFPA standards:

1) Identify whether dusts or particulates are combustible or explosible, including testing where necessary.

2) Perform a DHA if combustible or explosible dusts are present. The DHA identifies where dust hazards exist and how to safely prevent and mitigate incidents.

3) Ensure that dust control and management (housekeeping, training, management-of-change, etc.) systems are in place.

4) Ensure that facilities, equipment, and operations are designed in accordance with IMC, NFPA, and related reference standards.

Importantly, this proposal also includes the reference to NFPA 652 which was missing in the prior language.

The existing Chapter 22 language included a large number of isolated details specific applications, which was misleading for users, potentially resulting in dangerous conditions and lack of compliance with referenced standards. The safe use and handling of combustible dusts is extremely complicated, with hundreds of pages of material specific standards. It does not make sense to recreate hundreds or thousands of code sections in IFC that already exist in recognized standards. However, it was also not appropriate to only list some, while ignoring many more. Therefore, most detailed items were deleted – instead requiring a DHA to determine the specific requirements, which is how the NFPA and other related standards are intended to work.

Notes on specific sections:

Explosion definition: Revised for consistency with NFPA and to reflect the context of how it is used in this chapter and elsewhere in the code.

2203.2 Woodworking Exception: For the convenience of the user, and consistency with NFPA standards, the long standing NFPA 664 exception is specifically included. This is likely the most common application that AHJs and code users will encounter. It will save users time by highlighting this common exception.

2204.1.2 The exception did not make sense.

As some text was moved between sections, in CDPACCES it appears deleted in the original location and as new language in the new location. In truth it is often existing text moved. Below shows how the chapter will appear in approved.

SECTION 2201 GENERAL

2201.1 Scope. The facilities, equipment, processes and operations involving in which combustible dust explosion, deflagration, fire or flash fire hazards and use or handling of *combustible dust* may exist shall comply with the provisions of this chapter.

Exceptions:

1. Storage and use of consumer materials in Group B or R occupancies.
2. Storage and use of commercially packaged materials in Group M occupancies.
3. Materials displayed in original packaging in Group M occupancies and intended as building materials or for personal or household use.
4. Storage of sealed containers of combustible dust at facilities not associated with an operation that uses, handles or generates combustible dust.
5. Materials stored or used in farm buildings or similar occupancies intended for on-premises agricultural purposes.
6. When the facility or use is outside the scope of NFPA 652.
7. Restaurants, retail bakeries, coffee shops, and similar occupancies that have limited use of flour, sugar, coffee grinds, and other finely divided combustible dust or particulate solid ingredients in preparation of foods, snacks, and similar.

2201.2 Permits.

Permits shall be required for combustible dust-producing operations as set forth in Section 105.5.

SECTION 2202 DEFINITIONS

2202.1 Definition. The following terms are defined in Chapter 2:

COMBUSTIBLE DUST.

DUST COLLECTION SYSTEM.

FLASH FIRE

SECTION 2203 DUST EXPLOSION

PREVENTION CONTROL

2203.1. Combustible Dust Hazard Identification. Where the smallest dimension of the material is less than or equal to 500 µm, the owner/operator shall be responsible for determining whether the material is combustible or explosible. Where the combustibility of a dust or particulate solid is not determined by an *approved* source, the owner/operator shall test representative samples in accordance with NFPA 652. A copy of the test results shall be provided to the *fire code official* upon request.

2203.2 Dust hazard analysis. Where a dust is combustible or *explosible*, a dust hazard analysis (DHA) shall be performed and documented for new or existing facilities in accordance with NFPA 652. A copy of the DHA shall be provided to the fire code official upon request.

Exception: Woodworking operations that occupy areas smaller than 5000 ft (465 m2), and where dust-producing equipment requires an aggregate dust collection flow rate less than 1500 ft3/min (2549 m3/hr) and the equipment is installed in accordance with the International Mechanical Code. (NFPA 664 1.1.2)

2203.3 Dust Control and management Systems. Facilities where combustible dusts or powders are used, handled, generated shall have dust control, cleaning, training, operations procedures, and management procedures to prevent conditions, operations, or accumulations of combustible dusts that could pose a fire, flashfire, or explosion hazard.

2203.3.1. Housekeeping and cleaning. Facilities where combustible dusts or powders are used, handled, generated shall have regular housekeeping and cleaning procedures to prevent accumulations of combustible dusts that could pose a fire, flash fire, or explosion hazard. Dust shall be maintained at 1/8” inch or less, or as otherwise required in standards listed in Table 2205.1

2203.3..2 Management systems, training, and operating procedures. The owner / operator shall maintain management systems in accordance with Chapter 8 of NFPA 652 to ensure the facility and equipment is safely maintained and operated.

2203.3.3 Documentation. A copy of the required documentation shall be maintained in accordance with NFPA 652**.**

2203.4 Sources of ignition. Sources of ignition shall be controlled in accordance with NFPA 652 and NFPA 70.

SECTION 2204

DUST EXPLOSION SCREENING TESTS FACILITIES, EQUIPMENT AND OPERATIONS

2204.1 Facilities, equipment, and operations. Facilities, equipment and operations with combustible dust hazards shall be in accordance with Sections 2204.1 through 2204.4.

2204.1.1 Dust-producing and dust-handling equipment. Dust-producing equipment and dust-handling equipment, including but not limited to vacuums, dust collection systems, dryers, mixers, blenders, separators, conveyors, storage containers, silos or other similar devices, shall be *listed* and shall be maintained in accordance with the manufacturer's recommended standards. designed, installed and maintained in accordance with the International Mechanical Code and applicable standards listed in Table 2205.1

2204.1.2 Dust-collection systems. Dust-collection systems shall be designed to collect dust emissions from dust-producing equipment at the point of generation. Dust-collection systems shall be in accordance with Section 511 of the *International Mechanical Code* and applicable standards listed in Table 2205.1.

Exception: Closed systems using listed equipment and designed in accordance with manufacturer's recommendations and specifications, where cleanouts are provided in accordance with Section 2203.3.3.

2204.2 HVAC Systems. Heating, ventilation, and air conditioning (HVAC) systems shall not be used as the means to collect dusts from localized sources.

2204.3 Signages and markings. Signages and markings shall be provided in accordance with Sections 2203.2.1.1 through 2203.2.1.32204.3 and applicable standards listed in Table 2205.1.

2204.3.1 Deflagration vent discharge area markings. Where dust collection systems and other equipment, systems or system components are provided with deflagration vents, the area within the deflagration vent's discharge area shall be marked in an *approved* manner.

2204.3.2 Caution signs. Signs that read as follows shall be posted near the dust-containing equipment with deflagration vents:

CAUTION: THIS EQUIPMENT CAN CONTAIN EXPLOSIVE DUST.

KEEP OUTSIDE THE MARKED AREA WHILE EQUIPMENT IS OPERATING.

2204.3.3 Warning signs. Where dust collection systems and other equipment, systems or system components are provided with deflagration vents, vent closures shall be clearly marked as follows:

WARNING: EXPLOSION RELIEF DEVICE. STAY CLEAR.

2204.4 Exhaust Systems and ducts. Exhaust systems and ducts shall be designed, constructed and maintained in accordance with the International Mechanical Code and applicable standards listed in Table 2205.1.

Section 2205 Standards2205.1 Specific hazards standards.

The owner/operator of a facility with combustible dust hazards shall be responsible for following the *fire code official* is authorized to enforce additional industry- or material-specific provisions of the codes and standards listed in Table 2205.1 to prevent and control dust explosions, as applicable. Mission continuity requirements found in NFPA standards are not required by this code.

TABLE 2205.1 EXPLOSION PROTECTION STANDARDSSTANDARD SUBJECT

NFPA 61 Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities

NFPA 68 Standard on Explosion Protection by Deflagration Venting

NFPA 69 Standard on Explosion Prevention Systems

NFPA 70 National Electrical Code

NFPA 77 Recommended Practice on Static Electricity

NFPA 85 Boiler and Combustion System Hazards Code

NFPA 120 Standard for Fire Prevention and Control in Coal Mines

NFPA 484 Standard for Combustible Metals

NFPA 652 The Fundamentals of Combustible Dust

NFPA 654 Standard for Prevention of Fire and Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids

NFPA 655 Standard for the Prevention of Sulfur Fires and Explosions

NFPA 664 Standard for the Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The chapter has been completely rewritten for consistency with updated NFPA standards, to ensure that correct standards are requirements are followed as recommended by the Chemical Safety Board, and to provide users with an organized approach for applying the correct provisions.

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2024 International Fire Code

Revise as follows:

CHAPTER 23 MOTOR FUEL-DISPENSING ~~FACILITIES~~ AND REPAIR GARAGES

2301.1 Scope.
Automotive motor fuel-dispensing facilities, marine motor fuel-dispensing facilities, fleet vehicle motor fuel-dispensing facilities, aircraft motor-vehicle fuel-dispensing facilities, <u>and the d</u>~~D~~ispensing of motor fuels into fuel tanks of vehicles, <u>fuel containers</u> or special equipment and repair garages shall ~~be in accordance~~ <u>comply</u> with this chapter<u>,</u> ~~and~~ the *International Building Code*, *International Fuel Gas Code* and *International Mechanical Code*. ~~Such operations shall include both those that are open to the public and private operations.~~

2302.1 Definitions.
The following terms are defined in Chapter 2:

AIRCRAFT MOTOR-VEHICLE FUEL-DISPENSING FACILITY.

ALCOHOL-BLENDED FUELS.

AUTOMOTIVE MOTOR FUEL-DISPENSING FACILITY.

DISPENSING DEVICE, OVERHEAD TYPE.

FLEET VEHICLE MOTOR FUEL-DISPENSING FACILITY.

LIQUEFIED NATURAL GAS (LNG).

<u>MOBILE FUELING</u>

MARINE MOTOR FUEL-DISPENSING FACILITY.

REPAIR GARAGE.

SELF-SERVICE MOTOR FUEL-DISPENSING FACILITY.

Add new text as follows:

<u>2307</u>
<u>FLAMMABLE AND COMBUSTIBLE LIQUID FUEL-DISPENSING ON FARMS AND CONSTRUCTION SITES</u>

Revise as follows:

~~5706.2~~ <u>2307.1</u> Storage and dispensing of flammable and combustible liquids on farms and construction sites.
Permanent and temporary storage and dispensing of Class I and II liquids for private use on farms and rural areas and at construction sites, earth-moving projects, gravel pits or borrow pits shall be in accordance with Sections ~~5706.2.1~~ <u>2307.1</u> through ~~5706.2.8.1~~ <u>2307.1.8</u>.

> **Exception:** Storage and use of fuel oil and containers connected with oil-burning equipment regulated by Section 605 and the *International Mechanical Code*.

~~5706.2.1~~ <u>2307.1.1</u> Combustibles and open flames near tanks. Storage areas shall be kept free from weeds and extraneous combustible material. Open flames and smoking are prohibited in *flammable* or *combustible liquid* storage areas.

~~5706.2.2~~ <u>2307.1.2</u> Marking of tanks and containers. Tanks and containers for the storage of liquids above ground shall be conspicuously marked with the name of the product that they contain and the words: "FLAMMABLE—KEEP FIRE AND FLAME AWAY." Tanks shall bear the additional marking: "KEEP 50 FEET FROM BUILDINGS."

~~5706.2.3~~ <u>2307.1.3</u> Containers for storage and use.
Metal containers used for storage of Class I or II liquids shall be in accordance with DOTn requirements or shall be of an *approved* design.
Discharge devices shall be of a type that do not develop an internal pressure on the container. Pumping devices or *approved* self-closing faucets used for dispensing liquids shall not leak and shall be well-maintained. Individual containers shall not be interconnected and shall be kept closed when not in use.

Containers stored outside of buildings shall be in accordance with Section 5704 and the *International Building Code*.

~~5706.2.4~~ <u>2307.1.4</u> Permanent and temporary tanks.
The capacity of permanent above-ground tanks containing Class I or II liquids shall not exceed 1,100 gallons (4164 L). The capacity of temporary above-ground tanks containing Class I or II liquids shall not exceed 10,000 gallons (37 854 L). Tanks shall be of the single-compartment design.

> **Exception:** Permanent above-ground tanks of greater capacity that meet the requirements of Section 5704.2.

~~5706.2.4.1~~ <u>2307.1.4.1</u> Fill-opening security. Fill openings shall be equipped with a locking closure device. Fill openings shall be separate from vent openings.

~~5706.2.4.2~~ <u>2307.1.4.2</u> Vents.
Tanks shall be provided with a method of normal and emergency venting. Normal vents shall be in accordance with Section 5704.2.7.3. Emergency vents shall be in accordance with Section 5704.2.7.4. Emergency vents shall be arranged to discharge in a manner that prevents localized overheating or flame impingement on any part of the tank in the event that vapors from such vents are ignited.

~~5706.2.4.3~~ <u>2307.1.4.3</u> Location. Tanks containing Class I or II liquids shall be kept outside and not less than 50 feet (15 240 mm) from buildings and combustible storage. Additional distance shall be provided where necessary to ensure that vehicles, equipment and containers being filled directly from such tanks will not be less than 50 feet (15 240 mm) from structures, haystacks or other combustible storage.

~~5706.2.4.4~~ <u>2307.1.4.4</u> Locations where above-ground tanks are prohibited. The storage of Class I and II liquids in above-ground tanks is prohibited within the limits established by law as set forth in the fire code adoption ordinance or other regulation adopted by the jurisdiction .

~~5706.2.5~~ 2307.1.5 **Type of tank.** Tanks shall be provided with top openings only or shall be elevated for gravity discharge.

~~5706.2.5.1~~ 2307.1.5.1 **Tanks with top openings only.** Tanks with top openings shall be mounted in accordance with either of the following:

1. On well-constructed metal legs connected to shoes or runners designed so that the tank is stabilized and the entire tank and its supports can be moved as a unit.
2. For stationary tanks, on a stable base of timbers or blocks approximately 6 inches (152 mm) in height that prevents the tank from contacting the ground.

~~5706.2.5.1.1~~ 2307.1.5.1.1 **Pumps and fittings.** Tanks with top openings only shall be equipped with a tightly and permanently attached, *approved* pumping device having an *approved* hose of sufficient length for filling vehicles, equipment or containers to be served from the tank. Either the pump or the hose shall be equipped with a padlock to its hanger to prevent tampering. An effective antisiphoning device shall be included in the pump discharge unless a self-closing nozzle is provided. Siphons or internal pressure discharge devices shall not be used.

~~5706.2.5.2~~ 2307.1.5.2 **Tanks for gravity discharge.** Tanks with a connection in the bottom or the end for gravity-dispensing liquids shall be mounted and equipped as follows:

1. Supports to elevate the tank for gravity discharge shall be designed to carry all required loads and provide stability.
2. Bottom or end openings for gravity discharge shall be equipped with a valve located adjacent to the tank shell that will close automatically in the event of fire through the operation of an effective heat-activated releasing device. Where this valve cannot be operated manually, it shall be supplemented by a second, manually operated valve.

The gravity discharge outlet shall be provided with an *approved* hose equipped with a self-closing valve at the discharge end of a type that can be padlocked to its hanger.

~~5706.2.6~~ 2307.1.6 **Spill control drainage control and diking.**
Indoor storage and dispensing areas shall be provided with spill control and drainage control as set forth in Section 5703.4. Outdoor storage areas shall be provided with drainage control or diking as set forth in Section 5704.2.10.

~~5706.2.7~~ 2307.1.7 **Portable fire extinguishers.**
Portable fire extinguishers with a minimum rating of 20-B:C and complying with Section 906 shall be provided where required by the *fire code official*.

~~5706.2.8~~ 2307.1.8 **Dispensing from tank vehicles.**
Where *approved*, liquids used as fuels are allowed to be transferred from tank vehicles into the tanks of motor vehicles or special equipment, provided that:

1. The tank vehicle's specific function is that of supplying fuel to motor vehicle fuel tanks.
2. The dispensing hose does not exceed 100 feet (30 480 mm) in length.
3. The dispensing nozzle is an *approved* type.
4. The dispensing hose is properly placed on an *approved* reel or in a compartment provided before the tank vehicle is moved.
5. Signs prohibiting smoking or open flames within 25 feet (7620 mm) of the vehicle or the point of refueling are prominently posted on the tank vehicle.
6. Electrical devices and wiring in areas where fuel dispensing is conducted are in accordance with NFPA 70.
7. Tank vehicle-dispensing equipment is operated only by designated personnel who are trained to handle and dispense motor fuels.
8. Provisions are made for controlling and mitigating unauthorized discharges.
9. Dispensing from tank vehicles shall be conducted not less than 50 feet (15 240mm) from structures or combustible storage.

Add new text as follows:

<u>2308</u>
<u>FLAMMABLE AND COMBUSTIBLE LIQUID MOBILE FUEL-DISPENSING</u>

Delete without substitution:

~~**5706.2.8.1 Location.** Dispensing from tank vehicles shall be conducted not less than 50 feet (15 240 mm) from structures or combustible storage.~~

Add new text as follows:

<u>**2308.1** **Mobile fuel-dispensing.**. Liquids intended for use as motor fuels are allowed tobe transferred from tank vehicles and tank cars into the fuel tanks of motor vehicles and special equipment in accordance with Sections 2308.2 through 2308.6.6.6. Marine mobile fuel-dispensing operations shall be in accordance with Section 2313.</u>

Revise as follows:

~~5706.5.4.2~~ <u>2308.2</u> Emergency refueling.
Where *approved* by the *fire code official*, dispensing of motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles is allowed during emergencies. Dispensing from tank vehicles shall be in accordance with Sections ~~5706.2.8 and 5706.6.~~ <u>2308.6 and 5706.2.8</u>.

~~5706.5.4.3~~ <u>2308.3</u> Aircraft fueling.
Transfer of liquids from tank vehicles to the fuel tanks of aircraft shall be in accordance with Chapter 20.

~~5706.5.4.4~~ <u>2308.4</u> Fueling of vehicles at farms, construction sites and similar areas.
Transfer of liquid from tank vehicles to motor vehicles for private use on farms and rural areas and at construction sites, earth-moving projects, gravel pits and borrow pits is allowed in accordance with Section ~~5706.2.8~~<u>2307.1.8</u>.

~~5706.5.4.5~~ <u>2308.5</u> ~~Commercial, industrial, governmental or manufacturing~~ <u>Mobile fuel-dispensing for fleet vehicles.</u>.
Dispensing of Class I, II and III motor vehicle fuel from tank vehicles into the fuel tanks of <u>fleet</u> motor vehicles located at commercial, industrial, governmental or manufacturing establishments is allowed where *approved* , provided that such dispensing operations are conducted in accordance with the following:

1. Dispensing shall occur only at sites that have been issued a permit to conduct *mobile fueling*.
2. The *owner* of a *mobile fueling* operation shall provide to the jurisdiction a written response plan that demonstrates readiness to respond to a fuel spill and carry out appropriate mitigation measures, and describes the process to dispose properly of contaminated materials.
3. A detailed site plan shall be submitted with each application for a permit. The site plan shall indicate: all buildings, structures and appurtenances on site and their use or function; all uses adjacent to the *lot lines* of the site; the locations of all storm drain openings, adjacent waterways or wetlands; information regarding slope, natural drainage, curbing, impounding and how a spill will be retained on the site property; and the scale of the site plan.
   Provisions shall be made to prevent liquids spilled during dispensing operations from flowing into buildings or off-site. Acceptable methods include, but shall not be limited to, grading driveways, raising doorsills or other *approved* means.
4. The *fire code official* is allowed to impose limits on the times and days during which *mobile fueling* operations is allowed to take place, and specific locations on a site where fueling is permitted.
5. *Mobile fueling* operations shall be conducted in areas not open to the public or shall be limited to times when the public is not present.

6. *Mobile fueling* shall not take place within 15 feet (4572 mm) of buildings, property lines, combustible storage or storm drains.

   Exceptions:

   1. The distance to storm drains shall not apply where an *approved* storm drain cover or an *approved* equivalent that will prevent any fuel from reaching the drain is in place prior to fueling or a fueling hose being placed within 15 feet (4572 mm) of the drain. Where placement of a storm drain cover will cause the accumulation of excessive water or difficulty in conducting the fueling, such cover shall not be used and the fueling shall not take place within 15 feet (4572 mm) of a drain.
   2. The distance to storm drains shall not apply for drains that direct influent to *approved* oil interceptors.

7. The tank vehicle shall comply with the requirements of NFPA 385 and local, state and federal requirements. The tank vehicle's specific functions shall include that of supplying fuel to motor vehicle fuel tanks. The vehicle and all its equipment shall be maintained in good repair.
8. Signs prohibiting smoking or open flames within 25 feet (7620 mm) of the tank vehicle or the point of fueling shall be prominently posted on three sides of the vehicle including the back and both sides.
9. A portable fire extinguisher with a minimum rating of 40:BC shall be provided on the vehicle with signage clearly indicating its location.
10. The dispensing nozzles and hoses shall be of an *approved* and *listed* type.
11. The dispensing hose shall not be extended from the reel more than 100 feet (30 480 mm) in length.
12. Absorbent materials, nonwater-absorbent pads, a 10-foot-long (3048 mm) containment boom, an *approved* container with lid and a nonmetallic shovel shall be provided to mitigate a minimum 5-gallon (19 L) fuel spill.
13. Tank vehicles shall be equipped with a "fuel limit" switch such as a count-back switch, to limit the amount of a single fueling operation to not more than 500 gallons (1893 L) before resetting the limit switch.

    Exception: Tank vehicles where the operator carries and can utilize a remote emergency shutoff device that, when activated, immediately causes flow of fuel from the tank vehicle to cease.

14. Persons responsible for dispensing operations shall be trained in the appropriate mitigating actions in the event of a fire, leak or spill. Training records shall be maintained by the dispensing company.
15. Operators of tank vehicles used for *mobile fueling* operations shall have in their possession at all times an emergency communications device to notify the proper authorities in the event of an emergency.
16. The tank vehicle dispensing equipment shall be constantly attended and operated only by designated personnel who are trained to handle and dispense motor fuels.
17. Fuel dispensing shall be prohibited within 25 feet (7620 mm) of any source of ignition.
18. The engines of vehicles being fueled shall be shut off during dispensing operations.
19. Nighttime fueling operations shall only take place in adequately lighted areas.
20. The tank vehicle shall be positioned with respect to vehicles being fueled to prevent traffic from driving over the delivery hose.
21. During fueling operations, tank vehicle brakes shall be set, chock blocks shall be in place and warning lights shall be in operation.
22. Motor vehicle fuel tanks shall not be topped off.
23. The dispensing hose shall be properly placed on an *approved* reel or in an *approved* compartment prior to moving the tank vehicle.
24. The *fire code official* and other appropriate authorities shall be notified when a reportable spill or unauthorized discharge occurs.

25. Operators shall place a drip pan or an absorbent pillow under each fuel fill opening prior to and during dispensing operations. Drip pans shall be liquid-tight. The pan or absorbent pillow shall have a capacity of not less than 3 gallons (11.36 L). Spills retained in the drip pan or absorbent pillow need not be reported. Operators, when fueling, shall have on their person an absorbent pad capable of capturing diesel fuel overfills. Except during fueling, the nozzle shall face upward and an absorbent pad shall be kept under the nozzle to catch drips. Contaminated absorbent pads or pillows shall be disposed of regularly in accordance with local, state and federal requirements.

Delete without substitution:

~~SECTION 5707~~
~~ON-DEMAND MOBILE FUELING OPERATIONS~~

Revise as follows:

~~5707.1~~ 2308.6 ~~General~~ On-demand mobile fueling..
On-demand *mobile fueling* operations that dispense Class I, II and III liquids into the fuel tanks of motor vehicles shall comply with Sections ~~5707.1 through 5707.6.6.~~ 2308.6.1 through 2308.6.6.6.

Exception: Fueling from an *approved* portable container in cases of an emergency or for personal use.

~~5707.1.1~~ 2308.6.1 Approval required.
Mobile fueling operations shall not be conducted without first obtaining an operational permit in accordance with Section 105.5.18.

~~5707.1.2~~ 2308.6.1.1 Location.
Mobile fueling operations shall occur only at *approved* locations. The *fire code official* is authorized to approve individual locations or geographic areas where *mobile fueling* is allowed.

~~5707.2~~ 2308.6.2 Mobile fueling vehicle.
An on-demand *mobile fueling* vehicle shall be that which is utilized in on-demand fueling operations for the dispensing of Class I, II or III liquids into the fuel tanks of motor vehicles.

~~5707.2.1~~ 2308.6.2.1 Mobile fueling vehicle classifications.
An on-demand *mobile fueling* vehicle shall be characterized as one of the following:

1. **Tier 1 *mobile fueling* vehicle.** A tank vehicle that complies with NFPA 385 and that has chassis-mounted tanks where the aggregate capacity does not exceed 1,600 gallons (6057 L).
2. **Tier 2 *mobile fueling* vehicle.** A vehicle with one or more chassis-mounted tanks or containers that do not exceed 110 gallons (416 L) in capacity with an aggregate capacity that does not exceed 800 gallons (3028 L) or the weight capacity of the vehicle in accordance with DOTn.
3. **Tier 3 *mobile fueling* vehicle.** A vehicle that carries a maximum aggregate capacity of 60 gallons (227 L) of motor fuel in metal safety cans *listed* in accordance with UL 30 or other *approved* metal containers, each not to exceed 5 gallons (19 L) in capacity.

~~5707.2.2~~ 2308.6.2.2 Mobile fueling vehicle requirements.
Each *mobile fueling* vehicle shall comply with all local, state and federal requirements, as well as the following:

1. *Mobile fueling* vehicles with a chassis-mounted tank in excess of 110 gallons (416 L) shall also comply with the requirements of Section 5706.6 and NFPA 385.
2. The *mobile fueling* vehicle and its equipment shall be maintained in good repair.
3. Safety cans and *approved* metal containers shall be secured to the *mobile fueling* vehicle except when in use.
4. Fueling a motor vehicle from tanks or containers mounted in a trailer connected to a *mobile fueling* vehicle shall be prohibited.

~~5707.3~~ 2308.6.3 Required documents.

Documents developed to comply with Sections ~~5707.3.1~~ 2308.6.3.1 through ~~5707.3.3~~ 2308.6.3.3 shall be updated as necessary by the *owner* of the *mobile fueling* operation and shall be maintained in compliance with Section 110.3.

~~5707.3.1~~ 2308.6.3.1 Safety and emergency response plan. *Mobile fueling* operators shall have an *approved* written safety and emergency response plan that establishes policies and procedures for fire safety, spill prevention and control, personnel training and compliance with other applicable requirements of this code.

~~5707.3.2~~ 2308.6.3.2 Training records. *Mobile fueling* vehicles shall be operated only by designated personnel who are trained on proper fueling procedures and the safety and emergency response plan. Training records of operators shall be maintained.

~~5707.3.3~~ 2308.6.3.3 Site plan.

Where required by the *fire code official*, a site plan shall be developed for each location or area at which *mobile fueling* occurs. The site plan shall be in sufficient detail to indicate the following:

1. All buildings and structures.
2. *Lot lines* or property lines.
3. Electric car chargers.
4. Solar photovoltaic parking lot canopies.
5. Appurtenances on-site and their use or function.
6. All uses adjacent to the *lot lines* of the site.
7. Fueling locations.
8. Locations of all storm drain openings and adjacent waterways or wetlands.
9. Information regarding slope, natural drainage, curbing and impounding.
10. How a spill will be kept on the site property.
11. Scale of the site plan.

~~5707.4~~ 2308.6.4 Mobile fueling areas. During fueling, the *mobile fueling* vehicle and point of connection to the vehicle shall not be located on public streets, *public ways* or inside *buildings*. Fueling on the roof level of parking structures or other *buildings* is prohibited.

~~5707.4.1~~ 2308.6.4.1 Separation.

During fueling, the point of connection to the vehicle being fueled shall not take place within 25 feet (7620 mm) of buildings, *lot lines*, property lines or combustible storage. *Mobile fueling* vehicles shall not park within 10 feet (3048 mm) of buildings, *lot lines*, property lines or combustible storage.

Exceptions:

1. The *fire code official* shall be authorized to decrease the separation distance for dispensing from metal safety cans or other *approved* metal containers in accordance with Section ~~5707.2~~ 2308.6.2.
2. The point of fueling shall not take place within 10 feet (3048 mm) of buildings, *lot lines*, property lines or combustible storage where the *mobile fueling* vehicle has an *approved* vapor recovery system or is servicing vehicles with onboard refueling vapor recovery.

Where dispensing operations occur within 15 feet (4572 mm) of a storm drain, an *approved* storm drain cover or an *approved* equivalent method that will prevent any fuel from reaching the drain shall be used.

~~5707.4.2~~ 2308.6.4.2 Sources of ignition. Smoking, open flames and other sources of ignition shall be prohibited within 25 feet (7620 mm) of fuel dispensing activities. Signs prohibiting smoking or open flames within 25 feet (7620 mm) of the vehicle or the point of fueling shall be prominently posted on the *mobile fueling* vehicle. The engines of vehicles being fueled shall be shut off during fueling.

~~5707.4.3~~ 2308.6.4.3 Electrical equipment.

Mobile fueling shall not occur within 20 feet (6096 mm) of electrical equipment located within 18 inches (457 mm) of the ground unless such electrical equipment is rated for Class I, Division 2, hazardous locations in accordance with NFPA 70.

~~5707.5~~ 2308.6.5 Equipment.
Mobile fueling equipment shall comply with Sections ~~5707.5.1~~ 2308.6.5.1 through ~~5707.5.5~~ 2308.6.5.5.

~~5707.5.1~~ 2308.6.5.1 Dispensing hoses and nozzles. Where equipped, the dispensing hose shall not exceed 50 feet (15 240 mm) in length. The dispensing nozzles and hoses shall be of an *approved* and *listed* type. Where metal-to-metal contact cannot be made between the nozzle and the fuel fill opening, a means for bonding the *mobile fueling* vehicle to the motor vehicle shall be provided and employed during fueling operations.

~~5707.5.2~~ 2308.6.5.2 Breakaway device.
A *listed* breakaway device shall be provided at the nozzle.

> **Exception:** *Mobile fueling* vehicles equipped with an *approved* brake interlock tied to the nozzle holder that prohibits movement of the *mobile fueling* vehicle when the nozzle is removed from its holder or tied to the delivery of fuel that prevents activation of the pumping system.

~~5707.5.3~~ 2308.6.5.3 Shutoff valve and fuel limit. *Mobile fueling* vehicles shall be equipped with a *listed* shutoff valve assembly and a fuel limit switch set to a maximum of 30 gallons (116 L).

~~5707.5.4~~ 2308.6.5.4 Fire extinguisher.
An *approved* portable fire extinguisher complying with Section 906 with a minimum rating of4-A:80-B:C shall be provided on the *mobile fueling* vehicle with signage clearly indicating its location.

~~5707.5.5~~ 2308.6.5.5 Spill kit. *Mobile fueling* vehicles shall contain a minimum 5-gallon (19 L) spill kit of an *approved* type.

~~5707.6~~ 2308.6.6 Operations. *Mobile fueling* vehicles shall be constantly attended during fueling operations with brakes set and warning lights in operation. *Mobile fueling* vehicles shall not obstruct emergency vehicle access roads.

~~5707.6.1~~ 2308.6.6.1 Dispensing hose. Where equipped, *mobile fueling* vehicles shall be positioned in a manner to preclude traffic from driving over the dispensing hose. The dispensing hose shall be properly placed on an *approved* reel or in an *approved* compartment prior to moving the *mobile fueling* vehicle.

~~5707.6.2~~ 2308.6.6.2 Drip control. Operators shall place a drip pan or an absorbent pillow under the nozzle and each fuel fill opening prior to and during dispensing operations to catch drips.

~~5707.6.3~~ 2308.6.6.3 Safety cones. Safety cones or other visual barriers shall be employed as warning devices to highlight the vehicle fueling area.

~~5707.6.4~~ 2308.6.6.4 Vehicle lights. The *mobile fueling* vehicle flasher lights shall be in operation while dispensing operations are in progress.

~~5707.6.5~~ 2308.6.6.5 Nighttime deliveries. Nighttime deliveries shall be made only in areas deemed adequately lighted by the *fire code official.*

~~5707.6.6~~ 2308.6.6.6 Spill reporting.
Spills shall be reported in accordance with Section 5003.3.1.

SECTION ~~2307~~ 2309
LIQUEFIED PETROLEUM GAS MOTOR FUEL-DISPENSING FACILITIES

~~2307.1~~ 2309.1 General.
Motor fuel-dispensing facilities for liquefied petroleum gas (LP-gas) fuel shall be in accordance with this section and Chapter 61.

~~2307.2~~ 2309.2 Approvals.
Storage vessels and equipment used for the storage or dispensing of LP-gas shall be *approved* or *listed* in accordance with Sections ~~2307.2.1~~ 2309.2.1 and ~~2307.2.2~~ 2309.2.2.

~~2307.2.1~~ 2309.2.1 Approved equipment. Containers, pressure relief devices (including pressure relief valves), pressure regulators and piping for LP-gas shall be *approved*.

~~2307.2.2~~ 2309.2.2 Listed equipment. Hoses, hose connections, vehicle fuel connections, dispensers, LP-gas pumps and electrical equipment used for LP-gas shall be *listed*.

~~2307.3~~ 2309.3 Attendants.
Motor fuel-dispensing operations for LP-gas shall be conducted by qualified attendants or in accordance with Section ~~2307.7~~ 2309.7 by persons trained in the proper handling of LP-gas.

~~2307.4~~ 2309.4 Location of dispensing operations and equipment.
The point of transfer for LP-gas dispensing operations shall be separated from buildings and other exposures in accordance with the following:

1. Not less than 25 feet (7620 mm) from buildings where the *exterior wall* is not part of a *fire-resistance-rated* assembly having a rating of 1 hour or greater.
2. Not less than 25 feet (7620 mm) from combustible overhangs on buildings, measured from a vertical line dropped from the face of the overhang at a point nearest the point of transfer.
3. Not less than 25 feet (7620 mm) from the *lot line* of property that can be built on.
4. Not less than 25 feet (7620 mm) from the centerline of the nearest mainline railroad track.
5. Not less than 10 feet (3048 mm) from public streets, highways, thoroughfares, sidewalks and driveways.
6. Not less than 10 feet (3048 mm) from buildings where the *exterior wall* is part of a *fire-resistance-rated* assembly having a rating of 1 hour or greater.

Exception: The point of transfer for LP-gas dispensing operations need not be separated from canopies that are constructed in accordance with the International Building Code and that provide weather protection for the dispensing equipment.

LP-gas containers shall be located in accordance with Chapter 61. LP-gas storage and dispensing equipment shall be located outdoors.

~~2307.5~~ 2309.5 Additional requirements for LP-gas dispensers and equipment.
LP-gas dispensers and related equipment shall comply with the following provisions:

1. Pumps shall be fixed in place and shall be designed to allow control of the flow and to prevent leakage and accidental discharge.
2. Dispensing devices installed within 10 feet (3048 mm) of where vehicle traffic occurs shall be protected against physical damage by mounting on a concrete island 6 inches (152 mm) or more in height, or shall be protected in accordance with Section 312.
3. Dispensing devices shall be securely fastened to their mounting surface in accordance with the dispenser manufacturer's instructions.

~~2307.6~~ 2309.6 Installation of LP-gas dispensing devices and equipment.
The installation and operation of LP-gas dispensing systems shall be in accordance with Sections ~~2307.6.1~~ 2309.6.1 through ~~2307.6.4~~ 2309.6.4 and Chapter 61. LP-gas dispensers and dispensing stations shall be installed in accordance with the manufacturer's specifications and their listing.

~~2307.6.1~~ 2309.6.1 Product control valves. The dispenser system piping shall be protected from uncontrolled discharge in accordance with the following:

1. Where mounted on a concrete base, a means shall be provided and installed within $^{1}/_{2}$ inch (12.7 mm) of the top of the concrete base that will prevent flow from the supply piping in the event that the dispenser is displaced from its mounting.
2. A manual shutoff valve and an excess flow-control check valve shall be located in the liquid line between the pump and the dispenser inlet where the dispensing device is installed at a remote location and is not part of a complete storage and dispensing unit mounted on a common base.
3. An excess flow-control check valve or an emergency shutoff valve shall be installed in or on the dispenser at the point at which the dispenser hose is connected to the liquid piping.
4. A *listed* automatic-closing type hose nozzle valve with or without a latch-open device shall be provided on island-type dispensers.

~~**2307.6.2**~~ **2309.6.2 Hoses.** Hoses and piping for the dispensing of LP-gas shall be provided with hydrostatic relief valves. The hose length shall not exceed 18 feet (5486 mm). An *approved* method shall be provided to protect the hose against mechanical damage.

~~**2307.6.3**~~ **2309.6.3 Emergency breakaway devices.** Dispenser hoses shall be equipped with a *listed* emergency breakaway device designed to retain liquid on both sides of the breakaway point. Where hoses are attached to hose-retrieving mechanisms, the emergency breakaway device shall be located such that the breakaway device activates to protect the dispenser from being displaced.

~~**2307.6.4**~~ **2309.6.4 Vehicle impact protection.**
Where installed within 10 feet of vehicle traffic, LP-gas storage containers, pumps and dispensers shall be protected in accordance with Section 2309.5, Item 2.

~~**2307.7**~~ **2309.7 Public fueling of motor vehicles.**
Self-service LP-gas dispensing systems, including key, code and card lock dispensing systems, shall be limited to the filling of permanently mounted containers providing fuel to the LP-gas powered vehicle.
The requirements for self-service LP-gas dispensing systems shall be in accordance with the following:

1. The arrangement and operation of the transfer of product into a vehicle shall be in accordance with this section and Chapter 61.
2. The system shall be provided with an emergency shutoff switch located within 100 feet (30 480 mm) of, but not less than 20 feet (6096 mm) from, dispensers.
3. The *owner* of the LP-gas motor fuel-dispensing facility or the *owner's* designee shall provide for the safe operation of the system and the training of users.
4. The dispenser and hose-end valve shall release not more than $^{1}/_{8}$ fluid ounce (4 cc) of liquid to the atmosphere upon breaking the connection with the fill valve on the vehicle.
5. Portable fire extinguishers shall be provided in accordance with Section 2305.5.
6. Warning signs shall be provided in accordance with Section 2305.6.
7. The area around the dispenser shall be maintained in accordance with Section 2305.7.

~~**2307.8**~~ **2309.8 Overfilling.** LP-gas containers shall not be filled with LP-gas in excess of the volume determined using the fixed maximum liquid level gauge installed on the container, the volume determined by the overfilling prevention device installed on the container or the weight determined by the required percentage of the water capacity marked on the container.

SECTION ~~2308~~ 2310
COMPRESSED NATURAL GAS MOTOR FUEL-DISPENSING FACILITIES

~~**2308.1**~~ **2310.1 General.**
Motor fuel-dispensing facilities for compressed natural gas (CNG) fuel shall be in accordance with this section, Chapter 53 and Section 413 of the *International Fuel Gas Code*.

~~2308.2~~ <u>2310.2</u> **Approvals.**
Storage vessels and equipment used for the storage, compression or dispensing of CNG shall be *approved* or *listed* in accordance with Sections ~~2308.2~~ <u>2310.2.1</u> through ~~2308.2.4~~ <u>2310.2.4</u>.

~~2308.2.1~~ <u>2310.2.1</u> Approved equipment. Containers, compressors, pressure relief devices (including pressure relief valves), and pressure regulators and piping used for CNG shall be *approved*.

~~2308.2.2~~ <u>2310.2.2</u> Listed equipment. Hoses, hose connections, dispensers and electrical equipment used for CNG shall be *listed*. Vehicle-fueling connections shall be *listed* and *labeled*.

~~2308.2.3~~ <u>2310.2.3</u> Residential fueling appliance (RFA).
Residential fueling appliances shall be *listed*and installed in accordance with the installation requirements of CSA/ANSI NGV 5.1, manufacturer's installation instructions and Section 413 of the *International Fuel Gas Code*. The capacity of an RFA shall not exceed 5 cubic feet per minute (0.14 m^3/min) of natural gas.

~~2308.2.4~~ <u>2310.2.4</u> Vehicle fueling appliance (VFA).
Nonresidential fueling appliances shall be *listed*and installed in accordance with the installation requirements of CSA/ANSI NGV 5.2, manufacturer's installation instructions and the requirements of Section 413 of the *International Fuel Gas Code* for VFAs. The capacity of the VFA shall not exceed 10 cubic feet per minute (0.28 m^3/min) of natural gas.

~~2308.3~~ <u>2310.3</u> Location of dispensing operations and equipment.
Compression, storage and dispensing equipment shall be located above ground, outdoors.

Exceptions:

1. Compression, storage or dispensing equipment shall be allowed in buildings of noncombustible construction, as set forth in the *International Building Code*, that are unenclosed for three-quarters or more of the perimeter.
2. Compression, storage and dispensing equipment shall be allowed indoors or in vaults in accordance with Chapter 53.

~~2308.3.1~~ <u>2310.3.1</u> Location on property.
In addition to the requirements of Section 2303.1, compression, storage and dispensing equipment not located in vaults complying with Chapter 53 shall be installed as follows:

1. Not beneath power lines.
2. Ten feet (3048 mm) or more from the nearest building or *lot line* that could be built on, public street, sidewalk or source of ignition.

   Exception: Dispensing equipment need not be separated from canopies that are constructed in accordance with the *International Building Code* and that provide weather protection for the dispensing equipment.
3. Twenty-five feet (7620 mm) or more from the nearest rail of any railroad track and 50 feet (15 240 mm) or more from the nearest rail of any railroad main track or any railroad or transit line where power for train propulsion is provided by an outside electrical source, such as third rail or overhead catenary.
4. Fifty feet (15 240 mm) or more from the vertical plane below the nearest overhead wire of a trolley bus line.

~~2308.4~~ <u>2310.4</u> Private fueling of motor vehicles.
Self-service CNG-dispensing systems, including key, code and card lock dispensing systems, shall be limited to the filling of permanently mounted fuel containers on CNG-powered vehicles.
In addition to the requirements in Section 2305, the *owner*of a self-service CNG motor fuel-dispensing facility shall ensure the safe operation of the system and the training of users.

~~2308.5~~ <u>2310.5</u> Pressure regulators. Pressure regulators shall be designed and installed or protected so that their operation will not be affected by the elements (freezing rain, sleet, snow or ice), mud or debris. The protection is allowed to be an integral part of the regulator.

~~2308.6~~ <u>2310.6</u> Valves. Gas piping to equipment shall be provided with a remote, manual shutoff valve that is provided with *ready access*.

~~2308.7~~ 2310.7 **Emergency shutdown control.** An emergency shutdown control shall be located within 75 feet (22 860 mm) of, but not less than 25 feet (7620 mm) from, dispensers and shall be provided in the compressor area. Upon activation, the emergency shutdown system shall automatically shut off the power supply to the compressor and close valves between the main gas supply and the compressor and between the storage containers and dispensers.

~~2308.8~~ 2310.8 Discharge of CNG from motor vehicle fuel storage containers.

The discharge of CNG from motor vehicle fuel cylinders for the purposes of maintenance, cylinder certification, calibration of dispensers or other activities shall be in accordance with Sections ~~2308.8.1~~ 2310.8.1 through ~~2308.8.1.2.6~~ 2310.8.1.2.6.

~~2308.8.1~~ 2310.8.1 Methods of discharge.

The discharge of CNG from motor vehicle fuel cylinders shall be accomplished through a closed transfer system in accordance with Section ~~2308.8.1.1~~ 2310.8.1.1 or an *approved* method of atmospheric venting in accordance with Section ~~2308.8.1.2~~ 2310.8.1.2.

~~2308.8.1.1~~ 2310.8.1.1 Closed transfer system. A documented procedure that explains the logical sequence for discharging the cylinder shall be provided to the *fire code official* for review and approval. The procedure shall include what actions the operator will take in the event of a low-pressure or high-pressure natural gas release during the discharging activity. A drawing illustrating the arrangement of piping, regulators and equipment settings shall be provided to the *fire code official* for review and approval. The drawing shall illustrate the piping and regulator arrangement and shall be shown in spatial relation to the location of the compressor, storage vessels and emergency shutdown devices.

~~2308.8.1.2~~ 2310.8.1.2 Atmospheric venting.

Atmospheric venting of CNG shall comply with Sections ~~2308.8.1.2.1~~ 2310.8.1.2.1 through ~~2308.8.1.2.6~~ 2310.8.1.2.6.

~~2308.8.1.2.1~~ 2310.8.1.2.1 Plans and specifications. A drawing illustrating the location of the vessel support, piping, the method of grounding and bonding, and other requirements specified herein shall be provided to the *fire code official* for review and approval.

~~2308.8.1.2.2~~ 2310.8.1.2.2 Cylinder stability. A method of rigidly supporting the vessel during the venting of CNG shall be provided. The selected method shall provide not less than two points of support and shall prevent the horizontal and lateral movement of the vessel. The system shall be designed to prevent the movement of the vessel based on the highest gas-release velocity through valve orifices at the vessel's rated pressure and volume. The structure or appurtenance shall be constructed of noncombustible materials.

~~2308.8.1.2.3~~ 2310.8.1.2.3 Separation.

The structure or appurtenance used for stabilizing the cylinder shall be separated from the site equipment, features and exposures and shall be located in accordance with Table ~~2308.8.1.2.3~~ 2310.8.1.2.3.

TABLE ~~2308.8.1.2.3~~ 2310.8.1.2.3 SEPARATION DISTANCE FOR ATMOSPHERIC VENTING OF CNG

EQUIPMENT OR FEATURE	MINIMUM SEPARATION (feet)
Buildings	25
Building openings	25
CNG compressor and storage vessels	25
CNG dispensers	25
Lot lines	15
Public ways	15
Vehicles	25

For SI: 1 foot = 304.8 mm.

~~2308.8.1.2.4~~ 2310.8.1.2.4 Grounding and bonding.

The structure or appurtenance used for supporting the cylinder shall be grounded in accordance with NFPA 70. The cylinder valve shall be bonded prior to the commencement of venting operations.

~~2308.8.1.2.5~~ 2310.8.1.2.5 Vent tube.

A vent tube that will divert the gas flow to the atmosphere shall be installed on the cylinder prior to commencement of the venting and purging operation. The vent tube shall be constructed of pipe or tubing materials *approved* for use with CNG in accordance with Chapter

53.
The vent tube shall be capable of dispersing the gas not less than 10 feet (3048 mm) above grade level. The vent tube shall not be provided with a rain cap or other feature that would limit or obstruct the gas flow.

At the connection fitting of the vent tube and the CNG cylinder, a *listed* bidirectional *detonation* flame arrester shall be provided.

~~2308.8.1.2.6~~ 2310.8.1.2.6 Signage.
Approved “No Smoking” signs complying with Section 310 shall be posted within 10 feet (3048 mm) of the cylinder support structure or appurtenance. *Approved* “Cylinder Shall Be Bonded” signs shall be posted on the cylinder support structure or appurtenance.

SECTION ~~2309~~ 2311
HYDROGEN MOTOR FUEL-DISPENSING AND GENERATION FACILITIES

~~2309.1~~ 2311.1 General.
Hydrogen motor fuel-dispensing and generation facilities shall be in accordance with this section, Chapter 58 and NFPA 2. Where a fuel-dispensing facility includes a repair garage, the repair operation shall comply with Section ~~2311~~ 2314.

~~2309.2~~ 2311.2 Equipment.
Equipment used for the generation, compression, storage or dispensing of hydrogen shall be designed for the specific application in accordance with Sections ~~2309.2.1~~ 2311.2.1 through ~~2309.2.3~~ 2311.2.3.

~~2309.2.1~~ 2311.2.1 Approved equipment.
Cylinders, containers and tanks; pressure relief devices, including pressure valves; hydrogen vaporizers; pressure regulators; and piping used for gaseous hydrogen systems shall be designed and constructed in accordance with Chapters 53, 55 and 58.

~~2309.2.2~~ 2311.2.2 Listed or approved equipment. Hoses, hose connections, compressors, hydrogen generators, dispensers, motor-fueling connections and electrical equipment used for hydrogen shall be *listed* or *approved* for use with hydrogen.

~~2309.2.3~~ 2311.2.3 Electrical equipment.
Electrical installations shall be in accordance with NFPA 70.

~~2309.3~~ 2311.3 Location on property.
In addition to the requirements of Section 2303.1, dispensing equipment shall be located in accordance with Sections ~~2309.3.1~~ 2311.3.1 through Section ~~2309.3.2~~ 2311.3.2.

~~2309.3.1~~ 2311.3.1 Location of operations and equipment.
Generation, compression, storage and dispensing equipment shall be located in accordance with Sections ~~2309.3.1.1~~ 2311.3.1.1 through ~~2309.3.1.5.5~~ 2311.3.1.5.5.

~~2309.3.1.1~~ 2311.3.1.1 Outdoors.
Generation, compression or storage equipment shall be allowed outdoors in accordance with Chapter 58 and NFPA 2.

~~2309.3.1.2~~ 2311.3.1.2 Indoors.
Generation, compression, storage and dispensing equipment shall be located in indoor rooms or areas constructed in accordance with the requirements of the *International Building Code*, the *International Fuel Gas Code*, the *International Mechanical Code* and NFPA 2.

~~2309.3.1.2.1~~ 2311.3.1.2.1 Maintenance. Gaseous hydrogen systems and detection devices shall be maintained in accordance with the manufacturer’s instructions.

~~2309.3.1.2.2~~ 2311.3.1.2.2 Smoking. Smoking shall be prohibited in hydrogen cutoff rooms. “No Smoking” signs shall be provided at all entrances to hydrogen fuel gas rooms.

~~2309.3.1.2.3~~ 2311.3.1.2.3 Ignition source control.
Open flames, flame-producing devices and other sources of ignition shall be controlled in accordance with Chapter 58.

~~2309.3.1.2.4~~ 2311.3.1.2.4 Housekeeping. Hydrogen fuel gas rooms shall be kept free from combustible debris and storage.

~~2309.3.1.3~~ 2311.3.1.3 Gaseous hydrogen storage.
Storage of gaseous hydrogen shall be in accordance with Chapters 53 and 58.

~~2309.3.1.4~~ 2311.3.1.4 Liquefied hydrogen storage.
Storage of liquefied hydrogen shall be in accordance with Chapters 55 and 58.

~~2309.3.1.5~~ 2311.3.1.5 Canopy tops.
Gaseous hydrogen compression and storage equipment located on top of motor fuel-dispensing facility canopies shall be in accordance with Sections ~~2309.3.1.5.1~~ 2311.3.1.5.1 through ~~2309.3.1.5.5~~ 2311.3.1.5.5, Chapters 53 and 58, and the *International Fuel Gas Code*.

~~2309.3.1.5.1~~ 2311.3.1.5.1 Construction.
Canopies shall be constructed in accordance with the motor fuel-dispensing facility canopy requirements of Section 406.7 of the International Building Code.

~~2309.3.1.5.2~~ 2311.3.1.5.2 Fire-extinguishing systems.
Fuel-dispensing areas under canopies shall be equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1. The design of the sprinkler system shall be not less than that required for Extra Hazard Group 2 occupancies. Operation of the sprinkler system shall activate the emergency functions of Sections ~~2309.3.1.5.3~~ 2311.3.1.5.3 and ~~2309.3.1.5.4~~ 2311.3.1.5.4.

~~2309.3.1.5.3~~ 2311.3.1.5.3 Emergency discharge. Operation of the *automatic sprinkler system* shall activate an automatic emergency discharge system, which will discharge the hydrogen gas from the equipment on the canopy top through the vent pipe system.

~~2309.3.1.5.4~~ 2311.3.1.5.4 Emergency shutdown control.
Operation of the *automatic sprinkler system* shall activate the emergency shutdown control required by Section ~~2309.5.3~~ 2311.5.3.

~~2309.3.1.5.5~~ 2311.3.1.5.5 Signage. *Approved* signage having 2-inch (51 mm) block letters shall be affixed at *approved* locations on the exterior of the canopy structure stating: “CANOPY TOP HYDROGEN STORAGE.”

~~2309.3.2~~ 2311.3.2 Canopies.
Dispensing equipment need not be separated from canopies of Type I or II construction that are constructed in a manner that prevents the accumulation of hydrogen gas and in accordance with Section 406.7 of the International Building Code.

~~2309.4~~ 2311.4 Dispensing into motor vehicles at hydrogen motor fuel-dispensing facilities.
Hydrogen motor fuel-dispensing systems, including key, code and card lock dispensing systems, shall be limited to the filling of permanently mounted motor vehicle fuel tanks on hydrogen-powered vehicles.
In addition to the requirements in Section ~~2311~~ 2314, the *owner* of a hydrogen motor fuel-dispensing facility shall provide for the safe operation of the system by complying with this code and the fueling protocols in NFPA 2 and through the institution of a fire safety plan submitted in accordance with Section 404, the training of employees and operators who use and maintain the system in accordance with Section 406, and provisions for hazard communication in accordance with Section 407.

> **Exception:** Filling of nonpermanently mounted storage containers or tanks for motor fuel-dispensing system testing purposes is permitted.

~~2309.4.1~~ 2311.4.1 Dispensing systems. Dispensing systems shall be equipped with an overpressure protection device set at not greater than 140 percent of the service pressure of the fueling nozzle it supplies.

~~2309.5~~ 2311.5 Safety precautions.

Safety precautions at hydrogen motor fuel-dispensing and generation facilities shall be in accordance with Sections ~~2309.5.1~~ 2311.5.1 through ~~2309.5.3.1~~ 2311.5.3.1.

~~2309.5.1~~ 2311.5.1 Protection from vehicles.
Guard posts or other *approved* means shall be provided to protect hydrogen storage systems and use areas subject to vehicular damage in accordance with Section 312.

~~2309.5.1.1~~ 2311.5.1.1 Vehicle fueling pad.
The vehicle shall be fueled on noncoated concrete or other *approved* paving material having a resistance not exceeding 1 megohm as determined by the methodology specified in EN 1081.

~~2309.5.2~~ 2311.5.2 Emergency shutoff valves. A manual emergency shutoff valve shall be provided to shut down the flow of gas from the hydrogen supply to the piping system.

~~2309.5.2.1~~ 2311.5.2.1 Identification. Manual emergency shutoff valves shall be identified and the location shall be clearly visible, have access and be indicated by means of a sign.

~~2309.5.3~~ 2311.5.3 Emergency shutdown controls.
In addition to the manual emergency shutoff valve required by Section ~~2309.5.2~~ 2311.5.2, a remotely located, manually activated emergency shutdown control shall be provided. An emergency shutdown control shall be located within 75 feet (22 860 mm) of, but not less than 25 feet (7620 mm) from, dispensers and hydrogen generators.

~~2309.5.3.1~~ 2311.5.3.1 System requirements. Activation of the emergency shutdown control shall automatically shut off the power supply to all hydrogen storage, compression and dispensing equipment; shut off natural gas or other fuel supply to the hydrogen generator; and close valves between the main supply and the compressor and between the storage containers and dispensing equipment.

~~2309.6~~ 2311.6 Repairs, purging, defueling and discharge.
The repair, purging, defueling or discharge activities associated with hydrogen motor fuel-dispensing and generation systems, storage tanks and the installation of the systems shall be in accordance with Chapters 53 and 58 and NFPA 2.

> **Exception:** The motor vehicle fuel tank and the fuel supply piping from the motor vehicle fuel tank to the engine compartment on a motor vehicle or forklift unless the fuel tank is required to be defueled in accordance with Section ~~2311.8.11~~ 2314.8.1.

~~2309.6.1~~ 2311.6.1 Documented procedure. A documented procedure that explains the logic sequence for defueling or discharging operations shall be maintained on-site and shall be provided to the *fire code official* upon request. The procedure shall include what actions the operator is required to take in the event of a low-pressure or high-pressure hydrogen release during discharging activity. Schematic design documents shall be maintained on-site, illustrating the arrangement of piping, regulators and equipment settings. The schematic shall illustrate the piping and regulator arrangement and shall be shown in spatial relation to the location of the vehicle being defueled and, if applicable, to the compressor, storage vessels and emergency shutdown devices.

SECTION ~~5809~~2312
~~ON-DEMAND HYDROGEN MOBILE FUELING OPERATIONS~~MOBILE FUEL-DISPENSING OF HYDROGEN

~~5809.1~~2312.1 General.
On-demand *hydrogen mobile fueling* operations that dispense gaseous hydrogen into the fuel tanks of motor vehicles shall comply with Sections ~~5809.1~~2312.1 through ~~5809.6.5~~2312.7.7.

~~5809.1.1~~2312.2 Approval required.
Hydrogen mobile fueling operations shall not be conducted without first obtaining a permit and approval from the *fire code official*. *Hydrogen mobile fueling* operations shall occur only at *approved* locations. The *fire code official* is authorized to approve individual locations or geographic areas where *mobile fueling* is allowed.

~~5809.2~~2312.3 Hydrogen mobile fueling vehicle or trailer.
An on-demand *hydrogen mobile fueling* vehicle or *mobile fueling* trailer shall be that which is utilized in on-demand fueling operations for the dispensing of gaseous hydrogen into the fuel tanks of motor vehicles.

~~5809.2.1~~2312.3.1 Hydrogen mobile fueling vehicle requirements.
Each *hydrogen mobile fueling* vehicle or *mobile fueling* trailer shall comply with all local, state and federal requirements, as well as the following:

1. The *hydrogen mobile fueling* vehicle or *mobile fueling* trailer and its equipment shall be in compliance with the appropriate requirements of NFPA 2.
2. *Hydrogen mobile fueling* vehicles or *mobile fueling* trailers shall only contain and dispense gaseous hydrogen.
3. The *hydrogen mobile fueling* vehicle or *mobile fueling* trailer and its equipment shall be maintained in good repair.
4. Fueling a hydrogen motor vehicle shall be from tanks or containers mounted on a *mobile fueling* trailer or from tanks or containers mounted on a *mobile fueling* vehicle. A *mobile fueling* operation shall not combine a *mobile fueling* vehicle with a *mobile fueling* trailer.
5. *Mobile fueling* vehicles and trailers shall be provided with at least one minimum 10-pound ABC dry-chemical portable fire extinguisher with an agent discharge rate of 1 pound per second (0.454 kg/s) or greater.

~~5809.3~~2312.4 Required documents.
Documents developed to comply with Sections ~~5809.3.1~~2312.4.1 through ~~5809.3.3~~2312.4.3 shall be updated as necessary by the owner of the *mobile fueling* operation and shall be maintained in compliance with Section 110.3.

~~5809.3.1~~2312.4.1 Safety and emergency response plan.
Hydrogen mobile fueling operators shall have an *approved* written safety and emergency response plan that establishes policies and procedures for fire safety, release and control, personnel training and compliance with other applicable requirements of this code.

~~5809.3.2~~2312.4.2 Training records.
Hydrogen mobile fueling vehicles or *mobile fueling* trailers shall be operated only by designated personnel who are trained on proper fueling procedures and the safety and emergency response plan. Training records of operators shall be maintained.

~~5809.3.3~~2312.4.3 Site plan.
Where required by the *fire code official*, a site plan shall be developed for each location at which *hydrogen mobile fueling* occurs. The site plan shall be of sufficient detail to indicate the following:

1. All buildings and structures.
2. Lot lines or property lines.
3. Solar photovoltaic parking lot canopies.
4. Appurtenances on-site and their use or function.
5. All uses adjacent to the lot lines of the site.
6. Hydrogen fueling locations.
7. Scale of the site plan.

~~5809.4~~2312.5 Hydrogen mobile fueling areas.
Hydrogen mobile fueling shall not occur on public streets, in public ways or inside buildings. Fueling on the roof level of parking structures or other buildings is prohibited unless access to the roof level is available without entering the structure or building.

~~5809.4.1~~2312.5.1 Separation.
The point of connection of the vehicle being fueled shall not take place within the distances specified by NFPA 2 Table 7.2.2.3.2 based on the maximum rated capacity of the *hydrogen mobile fueling* vehicle.

~~5809.4.2~~2312.5.2 Sources of ignition.
Smoking, open flames and other sources of ignition shall be prohibited within 25 feet (7620 mm) of fuel-dispensing activities. Signs prohibiting smoking or open flames within 25 feet (7620 mm) of the vehicle or the point of fueling shall be prominently posted on the *hydrogen mobile fueling* vehicle. The fuel cell of vehicles being fueled shall be shut off during fueling.

~~5809.5~~2312.6 Equipment.
Hydrogen mobile fueling equipment shall comply with Sections ~~5809.5.1~~2312.6.1 and ~~5809.5.2~~2312.6.2.

~~5809.5.1~~2312.6.1 Dispensing hoses, nozzles and equipment.
Dispensing hoses, nozzles and equipment shall comply with NFPA 2.

~~5809.5.2~~2312.6.2 Fire extinguisher.
An *approved* portable fire extinguisher complying with Section 906 with a minimum rating of 4-A:80-B:C shall be provided on the *hydrogen mobile fueling* vehicle with signage clearly indicating its location.

~~5809.6~~2312.7 Operations.
Hydrogen mobile fueling vehicles or *mobile fueling* trailers shall be operated in accordance with this section and NFPA 2.

~~5809.6.1~~2312.7.1 Attendant.
Hydrogen mobile fueling vehicles or *mobile fueling* trailers shall be attended at all times during fueling operations, with brakes set and warning lights in operation.

~~5809.6.2~~2312.7.2 Emergency access roads.
Hydrogen mobile fueling vehicles shall not obstruct emergency vehicle access roads.

~~5809.6.3~~2312.7.3 Dispensing hose.
Where equipped, *hydrogen mobile fueling* vehicles or *mobile fueling* trailers shall be positioned in a manner to preclude traffic from driving over the dispensing hose. The dispensing hose shall be properly placed on an *approved* reel or in an *approved* compartment prior to moving the *mobile fueling* vehicle.

~~5809.6.4~~2312.7.4 Safety cones.
Safety cones or other visual barriers shall be employed as warning devices to highlight the vehicle fueling area.

~~5809.6.5~~2312.7.5 Vehicle lights.
The *hydrogen mobile fueling* vehicle or *mobile fueling* trailer flasher lights shall be in operation while dispensing operations are in progress.

~~5809.6.6~~2312.7.6 Nighttime deliveries.
Nighttime deliveries shall be made only in areas deemed adequately lighted by the *fire code official*.

~~5809.6.7~~2312.7.7 Spill reporting.
Releases shall be reported where required by Section 5003.3.1.

SECTION ~~2310~~2313
MARINE MOTOR FUEL-DISPENSING ~~FACILITIES~~

~~2310.1~~2313.1 General.
The construction of marine motor fuel-dispensing facilities shall be in accordance with the *International Building Code* and NFPA 30A. The storage of Class I, II or IIIA liquids at marine motor fuel-dispensing facilities shall be in accordance with this chapter and Chapter 57.

~~2310.2~~2313.2 Storage and handling.

The storage and handling of Class I, II or IIIA liquids at marine motor fuel-dispensing facilities shall be in accordance with Sections ~~2310.2.1~~2313.2.1 through ~~2310.2.3~~2313.2.3.

~~2310.2.1~~2313.2.1 Class I, II or IIIA liquid storage.
Class I, II or IIIA liquids stored inside buildings used for marine motor fuel-dispensing facilities shall be stored in *approved* containers or portable tanks. Storage of Class I liquids shall not exceed 10 gallons (38 L).

Exception: Storage in liquid storage rooms in accordance with Section 5704.3.7.

~~2310.2.2~~2313.2.2 Class II or IIIA liquid storage and dispensing. Class II or IIIA liquids stored or dispensed inside buildings used for marine motor fuel-dispensing facilities shall be stored in and dispensed from *approved* containers or portable tanks. Storage of Class II and IIIA liquids shall not exceed 120 gallons (454 L).

~~2310.2.3~~2313.2.3 Heating equipment.
Heating equipment installed in Class I, II or IIIA liquid storage or dispensing areas shall comply with Section 2301.6.

~~2310.3~~2313.3 Dispensing.
The dispensing of liquid fuels at marine motor fuel-dispensing facilities shall comply with Sections ~~2310.3.1~~2313.3.1 through ~~2310.3.5~~ 2313.3.5.

~~2310.3.1~~2313.3.1 General. Wharves, piers or floats at marine motor fuel-dispensing facilities shall be used exclusively for the dispensing or transfer of petroleum products to or from marine craft, except that transfer of essential ship stores is allowed.

~~2310.3.2~~2313.3.2 Supervision. Marine motor fuel-dispensing facilities shall have an attendant or supervisor who is fully aware of the operation, mechanics and hazards inherent to fueling of boats on duty whenever the facility is open for business. The attendant's primary function shall be to supervise, observe and control the dispensing of Class I, II or IIIA liquids or *flammable gases*.

~~2310.3.3~~2313.3.3 Hoses and nozzles. Dispensing of Class I, II or IIIA liquids into the fuel tanks of marine craft shall be by means of an *approved*-type hose equipped with a *listed* automatic-closing nozzle without a latch-open device.
Hoses used for dispensing or transferring Class I, II or IIIA liquids, when not in use, shall be reeled, racked or otherwise protected from mechanical damage.

~~2310.3.4~~2313.3.4 Portable containers.
Dispensing of Class I, II or IIIA liquids into containers, other than fuel tanks, shall be in accordance with Section 2304.4.1.

~~2310.3.5~~2313.3.5 Liquefied petroleum gas.
Liquefied petroleum gas cylinders shall not be filled at *marine motor fuel-dispensing facilities* unless *approved*. *Approved* storage facilities for LP-gas cylinders shall be provided. See also Section ~~2307~~2309.

~~2310.4~~2313.4 Fueling of marine vehicles ~~at other than approved marine motor fuel-dispensing facilities~~ from tank vehicles..
Fueling of floating marine craft at other than a marine motor fuel-dispensing facility shall comply with Sections ~~2310.4.1~~2313.4.1 and ~~2310.4.2~~2313.4.2.

~~2310.4.1~~2313.4.1 Class I liquid fuels. Fueling of floating marine craft with Class I fuels at other than a marine motor fuel-dispensing facility is prohibited.

~~2310.4.2~~2313.4.2 Class II or III liquid fuels.
Fueling of floating marine craft with Class II or III fuels at other than a marine motor fuel-dispensing facility shall be in accordance with all of the following:

1. The premises and operations shall be *approved* by the *fire code official*.
~~2. Tank vehicles and fueling operations shall comply with Section 5706.6.~~
~~3~~ 2. The dispensing nozzle shall be of the *listed* automatic-closing type without a latch-open device.

~~4~~ 3. Nighttime deliveries shall be made only in lighted areas.

~~5~~ 4 . The tank vehicle flasher lights shall be in operation while dispensing.

~~6~~ 5. Fuel expansion space shall be left in each fuel tank to prevent overflow in the event of temperature increase.

6. The tank vehicle's specific function is that of supplying fuel to fuel tanks.

7. The operation is not performed where the public has access or where there is unusual exposure to life and property.

8. The dispensing line does not exceed 50 feet (15 240 mm) in length.

~~2310.5~~2313.5 Fire prevention regulations.
General fire safety regulations for marine motor fuel-dispensing facilities shall comply with Sections ~~2310.5.1~~2313.5.1 through ~~2310.5.7~~ 2313.5.7.

~~2310.5.1~~2313.5.1 Housekeeping. Marine motor fuel-dispensing facilities shall be maintained in a neat and orderly manner. Accumulations of rubbish or waste oils in excessive amounts shall be prohibited.

~~2310.5.2~~2313.5.2 Spills. Spills of Class I, II or IIIA liquids at or on the water shall be reported immediately to the fire department and jurisdictional authorities.

~~2310.5.3~~2313.5.3 Rubbish containers.
Containers with tight-fitting or self-closing lids shall be provided for temporary storage of combustible debris, rubbish and waste material. The rubbish containers shall be constructed entirely of materials that comply with any one of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

~~2310.5.4~~2313.5.4 Marine vessels and craft. Vessels or craft shall not be made fast to fuel docks serving other vessels or craft occupying a berth at a marine motor fuel-dispensing facility.

~~2310.5.5~~2313.5.5 Sources of ignition. Construction, maintenance, repair and reconditioning work involving the use of open flames, arcs or spark-producing devices shall not be performed at marine motor fuel-dispensing facilities or within 50 feet (15 240 mm) of the dispensing facilities, including piers, wharves or floats, except for emergency repair work *approved* in writing by the *fire code official*. Fueling shall not be conducted at the pier, wharf or float during the course of such emergency repairs.

~~2310.5.5.1~~2313.5.5.1 Smoking.
Smoking or open flames shall be prohibited within 50 feet (15 240 mm) of fueling operations. "No Smoking" signs complying with Section 310 shall be posted conspicuously about the premises. Such signs shall have letters not less than 4 inches (102 mm) in height on a background of contrasting color.

~~2310.5.6~~2313.5.6 Preparation of tanks for fueling. Boat *owners* and operators shall not offer their craft for fueling unless the tanks being filled are properly vented to dissipate fumes to the outside atmosphere.

~~2310.5.7~~2313.5.7 Warning signs.
Warning signs shall be prominently displayed at the face of each wharf, pier or float at such elevation as to be clearly visible from the decks of marine craft being fueled. Such signs shall have letters not less than 3 inches (76 mm) in height on a background of contrasting color bearing the following or *approved* equivalent wording:

WARNING
NO SMOKING—STOP ENGINE WHILE FUELING,
SHUT OFF ELECTRICITY

DO NOT START ENGINE UNTIL AFTER BELOW
DECK SPACES ARE VENTILATED.

~~2310.6~~2313.6 Fire protection.
Fire protection features for marine motor fuel-dispensing facilities shall comply with Sections ~~2310.6.1~~2313.6.1 through ~~2310.6.4~~2313.6.4
.

~~2310.6.1~~2313.6.1 Standpipe hose stations. Fire hose, where provided, shall be enclosed within a cabinet, and hose stations shall be labeled: “FIRE HOSE—EMERGENCY USE ONLY.”

~~2310.6.2~~2313.6.2 Obstruction of fire protection equipment. Materials shall not be placed on a pier in such a manner as to obstruct access to firefighting equipment or piping system control valves.

~~2310.6.3~~2313.6.3 Access. Where the pier is designed for vehicular traffic, an unobstructed roadway to the shore end of the wharf shall be maintained for access by fire apparatus.

~~2310.6.4~~2313.6.4 Portable fire extinguishers. Portable fire extinguishers in accordance with Section 906, each having a minimum rating of 20-B:C, shall be provided as follows:

1. One on each float.
2. One on the pier or wharf within 25 feet (7620 mm) of the head of the gangway to the float, unless the office is within 25 feet (7620 mm) of the gangway or is on the float and an extinguisher is provided thereon.

SECTION ~~2311~~2314
REPAIR GARAGES

~~2311.1~~2314.1 General.
Repair garages shall comply with this section and the *International Building Code*. Repair garages for vehicles that use more than one type of fuel shall comply with the applicable provisions of this section for each type of fuel used.
Where a repair garage includes a motor fuel-dispensing facility, the fuel-dispensing operation shall comply with the requirements of this chapter for motor fuel-dispensing facilities.

~~2311.2~~2314.2 Storage and use of flammable and combustible liquids.
The storage and use of *flammable* and *combustible liquids* in repair garages shall comply with Chapter 57 and Sections ~~2311.2.1~~ 2314.2.1 through ~~2311.2.4~~2314.2.4.

~~2311.2.1~~2314.2.1 Cleaning of parts.
Cleaning of parts shall be conducted in *listed* and *approved* parts-cleaning machines in accordance with Chapter 57.

~~2311.2.2~~2314.2.2 Waste oil, motor oil and other Class IIIB liquids. Waste oil, motor oil and other Class IIIB liquids shall be stored in *approved* tanks or containers, which are allowed to be stored and dispensed from inside repair garages.

~~2311.2.2.1~~2314.2.2.1 Tank location. Tanks storing Class IIIB liquids in *repair garages* are allowed to be located at, below or above grade, provided that adequate drainage or containment is provided.

~~2311.2.2.2~~2314.2.2.2 Liquid classification. Crankcase drainings shall be classified as Class IIIB liquids unless otherwise determined by testing.

~~2311.2.3~~2314.2.3 Drainage and disposal of liquids and oil-soaked waste.
Garage floor drains, where provided, shall drain to *approved* oil separators or traps discharging to a sewer in accordance with the

International Plumbing Code. Contents of oil separators, traps and floor drainage systems shall be collected at sufficiently frequent intervals and removed from the premises to prevent oil from being carried into the sewers.

~~2311.2.3.1~~2314.2.3.1 Disposal of liquids.
Crankcase drainings and liquids shall not be dumped into sewers, streams or on the ground, but shall be stored in *approved* tanks or containers in accordance with Chapter 57 until removed from the premises.

~~2311.2.3.2~~2314.2.3.2 Disposal of oily waste. Self-closing metal cans shall be used for oily waste.

~~2311.2.4~~2314.2.4 Spray finishing.
Spray finishing with *flammable* or *combustible liquids* shall comply with Chapter 24.

~~2311.3~~2314.3 Sources of ignition.
Sources of ignition shall not be located within 18 inches (457 mm) of the floor and shall comply with Chapters 3 and 35.

~~2311.3.1~~2314.3.1 Equipment.
Appliances and equipment installed in a repair garage shall comply with the provisions of the *International Building Code*, the *International Mechanical Code* and NFPA 70.

~~2311.3.2~~2314.3.2 Smoking. Smoking shall not be allowed in repair garages except in *approved* locations.

~~2311.4~~2314.4 Below-grade areas.
Pits and below-grade work areas in repair garages shall comply with Sections ~~2311.4.1~~2314.4.1 through ~~2311.4.3~~2314.4.3.

~~2311.4.1~~2314.4.1 Construction.
Pits and below-grade work areas shall be constructed in accordance with the *International Building Code*.

~~2311.4.2~~2314.4.2 Means of egress.
Pits and below-grade work areas shall be provided with *means of egress* in accordance with Chapter 10.

~~2311.4.3~~2314.4.3 Ventilation.
Where Class I liquids or LP-gas are stored or used within a building having a *basement* or pit wherein flammable vapors could accumulate, the*basement* or pit shall be provided with mechanical ventilation in accordance with the *International Mechanical Code*, at a minimum rate of $1^1/_2$ cubic feet per minute per square foot (cfm/ft^2) [0.008 m^3/(s × m^2)] to prevent the accumulation of flammable vapors.

~~2311.5~~2314.5 Vehicles powered by liquefied petroleum gas (LP-gas).
Vehicles powered by LP-gas and the servicing of vehicles powered by LP-gas shall be in compliance with this chapter, Chapter 61 and NFPA 58.

~~2311.6~~2314.6 Vehicles powered by liquefied natural gas (LNG) and compressed natural gas (CNG).
LNG vehicles and CNG vehicles shall comply with Sections ~~2311.6.1~~2314.6.1 and ~~2311.6.2~~2314.6.2, as applicable.

~~2311.6.1~~2314.6.1 Liquefied natural gas (LNG). LNG vehicle fuel system pressure shall be measured and recorded prior to entering the repair facility. The maximum allowable system pressure shall be not more than 170 psig (1172 kPa). Pressure greater than 170 psig (1172 kPa) shall be reduced by operating the vehicle or limited venting outdoors, as required.

~~2311.6.2~~2314.6.2 Compressed natural gas (CNG).
CNG vehicle fuel system pressure and the ambient temperature shall be measured and recorded prior to entering the repair facility. Pressure greater than the indicated maximum pressure in accordance with Table ~~2311.6.2~~ 2314.6.2shall be reduced by defueling the vehicle.

TABLE ~~2311.6.2~~2314.6.2 TEMPERATURE COMPENSATED CYLINDER PRESSURE TABLE[a]

GAS TEMPERATURE °F	PRESSURE IN FULL 3,600 PSI CNG CONTAINER, psig
123.6	4,500
120	4,455
110	4,272
100	4,105
90	3,936
80	3,768
70	3,600
60	3,432
50	3,263
40	3,094
30	2,926
20	2,757
10	2,589
0	2,421
-10	2,253
-20	2,086
-30	1,919
-40	1,753

For SI: °C = (°F – 32)/1.8, 1 psig = 6.895 kPa.

a. 3,600 psi service pressure calculated from the standard gas composition used to create the gasoline gallon equivalent (GGE).

~~2311.7~~2314.7 Fire extinguishers.
Fire extinguishers shall be provided in accordance with Section 906.

~~2311.8~~2314.8 Repair garages for vehicles fueled by lighter-than-air fuels. The room, motor vehicle repair booth or motor vehicle repair space containing repair garage activities for the conversion or repair of vehicles that use CNG, LNG, hydrogen or other lighter-than-air motor fuels shall be in accordance with Sections ~~2311.8~~2314.8 through ~~2311.8.11~~2314.8.11 in addition to the other requirements of Section ~~2311~~2314. Repair garages for the repair of vehicles that use hydrogen fuel shall be in accordance with this code and NFPA 2.

Exceptions:

1. Repair garages where work is conducted only on vehicles where the motor vehicle fuel tank and system have been defueled and the motor vehicle fuel tank has been purged with nitrogen gas, and where standard operating procedures to document and maintain the fueling status throughout repair operations are *approved*.
2. Repair garages where work is not performed on the fuel system and is limited to exchange of parts and maintenance not requiring open flame or welding on the CNG-, LNG-, hydrogen- or other lighter-than-air-fueled motor vehicle. Movement of a subassembly on which the motor vehicle fuel tank remains mounted to allow access to other parts of the vehicle that are not a portion of the fuel system shall be permitted.
3. Repair garages for hydrogen-fueled vehicles where work is not performed on the motor vehicle fuel tank and is limited to the exchange of parts and maintenance not requiring open flame or welding on the hydrogen-fueled vehicle. During the work, the entire hydrogen fuel system shall contain less than 400 cubic feet (11.3 m^3) of hydrogen.
4. Repair garages for natural-gas-fueled vehicles where work is not being performed on the motor vehicle fuel tank, and is limited to the exchange of parts and maintenance not requiring open flame or welding on the natural-gas-fueled vehicle. During the work, the natural gas in the motor vehicle fuel tank shall contain a pressure of not more than 250 psi at 70°F (1724 kPa at 21°C).

~~2311.8.1~~2314.8.1 Preparation of vehicles for repair. For vehicles powered by gaseous fuels, the fuel shutoff valves shall be closed prior to repairing any portion of the vehicle fuel system.
Vehicles powered by gaseous fuels in which the fuel system has been damaged shall be inspected and evaluated for fuel system integrity prior to being brought into the repair garage. The inspection shall include testing of the entire fuel delivery system for leakage.

~~2311.8.2~~2314.8.2 Repair garages used for the repair of hydrogen-fueled vehicles.
Repair garages used for the repair of hydrogen-fueled vehicles shall be provided with an *approved* exhaust ventilation system in

accordance with the *International Mechanical Code* and Chapter 6 of NFPA 2.

~~2311.8.3~~2314.8.3 Motor vehicle repair rooms.
Motor vehicle repair rooms shall be enclosed with not less than 1-hour *fire barriers* constructed in accordance with Section 707 of the International Building Code, or *horizontal assemblies* constructed in accordance with Section 711 of the International Building Code, or both, with 1-hour-rated opening protectives.

~~2311.8.4~~2314.8.4 Motor vehicle repair booths.
The design and construction of motor vehicle repair booths shall be in accordance with Sections ~~2311.8.4.1~~2314.8.4.1 through ~~2311.8.4.4~~2314.8.4.4.

~~2311.8.4.1~~2314.8.4.1 Construction. Motor vehicle repair booths shall be constructed of *approved*noncombustible materials. Where walls or ceiling assemblies are constructed of sheet metal, single-skin assemblies shall be not thinner than 0.0478 inch (18 gage) (1.2 mm) and each sheet of double-skin assemblies shall be not thinner than 0.0359 inch (20 gage) (0.9 mm). Structural sections of motor vehicle repair booths shall be sealed in an *approved* manner.

~~2311.8.4.2~~2314.8.4.2 Surfaces. The interior surfaces of motor vehicle repair booths shall be constructed to permit the free passage of exhaust air from all parts of the interior.

~~2311.8.4.3~~2314.8.4.3 Means of egress.
Means of egress shall be provided in accordance with Chapter 10.

Exception: *Means of egress* doors from premanufactured motor vehicle repair booths shall be not less than 30 inches (762 mm) in width by 80 inches (2032 mm) in height.

~~2311.8.4.4~~2314.8.4.4 Clear space. Motor vehicle repair booths shall be installed so that all parts of the booth be provided with *ready access* for cleaning. A clear area of not less than 3 feet (914 mm) wide shall be maintained on all sides of the motor vehicle repair booth. This clear area shall be kept free of any storage or combustible construction.

Exceptions:

1. This requirement shall not prohibit locating a motor vehicle repair booth closer than 3 feet (914 mm) to or directly against an interior partition, wall or floor/ceiling assembly that has a *fire-resistance rating* of not less than 1 hour, provided that the motor vehicle repair booth can be adequately maintained and cleaned.
2. This requirement shall not prohibit locating a motor vehicle repair booth closer than 3 feet (914 mm) to an *exterior wall* or a roof assembly, provided that the wall or roof is constructed of noncombustible material and the motor vehicle repair booth can be adequately maintained and cleaned.

~~2311.8.5~~2314.8.5 Motor vehicle repair spaces. Where such spaces are not separately enclosed, noncombustible spray curtains shall be provided to restrict the spread of *flammable gases*.

~~2311.8.6~~2314.8.6 Fire protection. Motor vehicle repair booths or spaces installed in a room or area protected by an *automatic sprinkler system* shall have the protection extended to include the inside of the motor vehicle repair booth or space.

~~2311.8.7~~2314.8.7 Fire extinguishers.
Portable fire extinguishers complying with Section 906 shall be provided for motor vehicle repair rooms, motor vehicle repair booths or motor vehicle repair spaces.

~~2311.8.8~~2314.8.8 Exhaust ventilation system. Repair garages used for the repair of CNG, LNG, or other lighter-than-air motor fuels other than hydrogen shall be provided with an *approved* mechanical ventilation system. The mechanical exhaust ventilation system shall be in accordance with the *International Mechanical Code* and Sections ~~2311.8.8.1~~ 2314.8.8.1 and ~~2311.8.8.2~~2314.8.8.2.

Exception: Where *approved* by the *fire code official*, natural ventilation shall be permitted in lieu of mechanical exhaust ventilation.

~~2311.8.8.1~~2314.8.8.1 Design. For indoor locations, air supply inlets and exhaust outlets for mechanical ventilation shall be arranged to

provide uniformly distributed air movement with inlets uniformly arranged on walls near floor level and outlets at the high point of the room in walls or the roof.
Failure of the ventilation system shall cause the fueling system to shut down.

The exhaust ventilation rate shall be not less than 1 cubic foot per minute (0.03 m^3/minute) per 12 cubic feet (34 m^3) of room volume.

~~2311.8.8.2~~2314.8.8.2 Operation.
The mechanical exhaust ventilation system shall operate continuously.

Exceptions:

1. Mechanical exhaust ventilation systems that are interlocked with a *gas detection system* designed in accordance with Sections ~~2311.8.9~~2314.8.9 through ~~2311.8.9.2~~2314.8.9.2.
2. Mechanical exhaust ventilation systems in repair garages that are used only for repair of vehicles fueled by liquid fuels or odorized gases, such as CNG, where the ventilation system is electrically interlocked with the lighting circuit.

~~2311.8.9~~2314.8.9 Gas detection system.
Repair garages used for repair of vehicles fueled by nonodorized gases, including, but not limited to, hydrogen and nonodorized LNG, shall be provided with a *gas detection system* that complies with Section 916. The *gas detection system* shall be designed to detect leakage of nonodorized gaseous fuel. Where lubrication or chassis service pits are provided in garages used for repairing nonodorized LNG-fueled vehicles, gas sensors shall be provided in such pits.

~~2311.8.9.1~~2314.8.9.1 System activation. Activation of the gas detection alarm shall result in all of the following:

1. Initiation of local audible and visual alarms in *approved* locations.
2. Deactivation of heating systems located in the repair garage.
3. Activation of the mechanical exhaust ventilation system, where the ventilation system is interlocked with gas detection.

~~2311.8.9.2~~2314.8.9.2 Failure of the gas detection system. Failure of the *gas detection system* shall automatically deactivate the heating system, activate the mechanical exhaust ventilation system where the system is interlocked with the *gas detection system* and cause a trouble signal to sound in an *approved* location.

~~2311.8.10~~2314.8.10 Classified electrical area.
Areas within 18 inches (450 mm) of a ceiling within a motor vehicle repair room or motor vehicle repair booth shall be designed and installed in accordance with the requirements for Class I, Division 2, classified locations, as set forth in NFPA 70.

Exceptions:

1. Rooms with exhaust ventilation of not less than 1 cubic foot per minute per square foot (0.3 m^3/ min/m^2) of floor area, with suction taken from a point within 18 inches (450 mm) of the highest point in the ceiling in repair garages for vehicles that use CNG, liquefied natural gas (LNG) or other lighter-than-air motor fuels.
2. Rooms used for the repair of hydrogen-fueled vehicles that have an *approved* exhaust ventilation system in accordance with the *International Mechanical Code* and NFPA 2.

~~2311.8.11~~2314.8.11 Defueling equipment required at vehicle maintenance and repair facilities.
Facilities for repairing or replacing hydrogen fuel tanks on hydrogen-fueled vehicles shall have equipment to defuel vehicle storage tanks. Where work must be performed on a motor vehicle's fuel tank for the purpose of maintenance, repair or cylinder certification, defueling and purging shall be conducted in accordance with Section ~~2309.6~~2311.6 and NFPA 2.

Reason: This proposal creates a comprehensive fueling chapter by moving fueling operations from Chapters 57 and 58 into Chapter 23. Chapter 23 is renumbered to allow for these additions. There are no changes in requirements or application. All of these revisions are editorial and the majority of the changes are simply renumbering the sections to fit the relocated items from other chapters.

New sections in Chapter 23 will be:

- 2307 FLAMMABLE AND COMBUSTIBLE LIQUID MOTOR FUEL-DISPENSING ON FARMS AND CONSTRUCTION SITES (was

5706.2)

- 2308 MOBILE FUEL-DISPENSING OF FLAMMABLE AND COMBUSTIBLE LIQUIDS (was 5706.5.4)
- 2312 MOBILE FUEL-DISPENSING OF HYDROGEN (was 5809)

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This change is simply moving everything fueling into the same chapter and will not have a cost impact.
Changes proposed are entirely editorial. The reformatting and editorial clarifications make no changes to the requirements or their application.

F182-24

F183-24

IFC: CHAPTER 23, SECTION 2301, 2301.1, SECTION 2302, 2302.1, SECTION 2309, 2309.6, SECTION 2311, CHAPTER 43 (New), 2311.1, SECTION 4302 (New), 4302.1 (New), 4303.1 (New), 2311.2, 2311.2.1, 2311.2.2, 2311.2.2.1, 2311.2.2.2, 2311.2.3, 2311.2.3.1, 2311.2.3.2, 2311.2.4, 2311.3, 2311.3.1, 2311.3.2, 2311.4, 2311.4.1, 2311.4.2, 2311.4.3, 2311.5, 2311.6, 2311.6.1, 2311.6.2, TABLE 2311.6.2, 2311.7, 2311.8, 2311.8.1, 2311.8.2, 2311.8.3, 2311.8.4, 2311.8.4.1, 2311.8.4.2, 2311.8.4.3, 2311.8.4.4, 2311.8.5, 2311.8.6, 2311.8.7, 2311.8.8, 2311.8.8.1, 2311.8.8.2, 2311.8.9, 2311.8.9.1, 2311.8.9.2, 2311.8.10, 2311.8.11, 4303.8.11.1 (New)

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2024 International Fire Code

CHAPTER 23 MOTOR FUEL-DISPENSING FACILITIES AND REPAIR GARAGES

SECTION 2301
GENERAL

Revise as follows:

2301.1 Scope.
Automotive motor fuel-dispensing facilities, marine motor fuel-dispensing facilities, fleet vehicle motor fuel-dispensing facilities, aircraft motor-vehicle fuel-dispensing facilities ~~and repair garages~~ shall be in accordance with this chapter and the *International Building Code*, *International Fuel Gas Code* and *International Mechanical Code*. Such operations shall include both those that are open to the public and private operations.

SECTION 2302
DEFINITIONS

Revise as follows:

2302.1 Definitions.
The following terms are defined in Chapter 2:

AIRCRAFT MOTOR-VEHICLE FUEL-DISPENSING FACILITY.

ALCOHOL-BLENDED FUELS.

AUTOMOTIVE MOTOR FUEL-DISPENSING FACILITY.

DISPENSING DEVICE, OVERHEAD TYPE.

FLEET VEHICLE MOTOR FUEL-DISPENSING FACILITY.

LIQUEFIED NATURAL GAS (LNG).

MARINE MOTOR FUEL-DISPENSING FACILITY.

~~**REPAIR GARAGE.**~~

SELF-SERVICE MOTOR FUEL-DISPENSING FACILITY.

SECTION 2309
HYDROGEN MOTOR FUEL-DISPENSING AND GENERATION FACILITIES

Revise as follows:

2309.6 Repairs, purging, defueling and discharge.
The repair, purging, defueling or discharge activities associated with hydrogen motor fuel-dispensing and generation systems, storage tanks and the installation of the systems shall be in accordance with Chapters 53 and 58 and NFPA 2.

> ~~**Exception:** The motor vehicle fuel tank and the fuel supply piping from the motor vehicle fuel tank to the engine compartment on a motor vehicle or forklift unless the fuel tank is required to be defueled in accordance with Section 2311.8.11.~~

Delete without substitution:

~~SECTION 2311~~
~~REPAIR GARAGES~~

Add new text as follows:

CHAPTER 43 REPAIR GARAGES

Revise as follows:

~~2311.1~~ 4301.1 ~~General~~ Scope..
Motor vehicle, marine motor craft, aircraft, industrial power truck and off-road vehicle ~~R~~ repair garages shall comply with this ~~section~~ Chapter, ~~and~~ the *International Building Code* , and *the International Mechanical Code*. ~~Repair garages for vehicles that use more than one type of fuel shall comply with the applicable provisions of this section for each type of fuel used.~~ Where a repair garage includes a motor fuel-dispensing facility, the fuel-dispensing operation shall comply with the requirements of ~~this c~~ Chapter 23 for motor fuel-dispensing facilities.

Add new text as follows:

SECTION 4302 DEFINITIONS

4302.1 Definitions.. The following terms are defined in Chapter 2.
REPAIR GARAGE.

4303.1 General.. Repair garages shall comply with the applicable sections of this chapter for the type of fuel powering the vehicle that is being serviced or repaired.

Revise as follows:

~~2311.2~~ 4303.2 Storage and use of flammable and combustible liquids.
The storage and use of *flammable* and *combustible liquids* in repair garages shall comply with Chapter 57 and Sections ~~2311.2.1~~ 4303.2.1 through ~~2311.2.4~~ 4303.2.4.

~~2311.2.1~~ 4303.2.1 Cleaning of parts.
Cleaning of parts shall be conducted in *listed* and *approved* parts-cleaning machines in accordance with Chapter 57.

~~2311.2.2~~ 4303.2.2 Waste oil, motor oil and other Class IIIB liquids. Waste oil, motor oil and other Class IIIB liquids shall be stored in *approved* tanks or containers, which are allowed to be stored and dispensed from inside repair garages.

~~2311.2.2.1~~ 4303.2.2.1 Tank location. Tanks storing Class IIIB liquids in *repair garages* are allowed to be located at, below or above grade, provided that adequate drainage or containment is provided.

~~2311.2.2.2~~ 4303.2.2.2 Liquid classification. Crankcase drainings shall be classified as Class IIIB liquids unless otherwise determined by testing.

~~2311.2.3~~ 4303.2.3 **Drainage and disposal of liquids and oil-soaked waste.**
Garage floor drains, where provided, shall drain to *approved* oil separators or traps discharging to a sewer in accordance with the *International Plumbing Code*. Contents of oil separators, traps and floor drainage systems shall be collected at sufficiently frequent intervals and removed from the premises to prevent oil from being carried into the sewers.

~~2311.2.3.1~~ 4303.2.3.1 **Disposal of liquids.**
Crankcase drainings and liquids shall not be dumped into sewers, streams or on the ground, but shall be stored in *approved* tanks or containers in accordance with Chapter 57 until removed from the premises.

~~2311.2.3.2~~ 4303.2.3.2 **Disposal of oily waste.** Self-closing metal cans shall be used for oily waste.

~~2311.2.4~~ 4303.2.4 **Spray finishing.**
Spray finishing with *flammable* or *combustible liquids* shall comply with Chapter 24.

~~2311.3~~ 4303.3 **Sources of ignition.**
Sources of ignition shall not be located within 18 inches (457 mm) of the floor and shall comply with Chapters 3 and 35.

~~2311.3.1~~ 4303.3.1 **Equipment.**
Appliances and equipment installed in a repair garage shall comply with the provisions of the *International Building Code*, the *International Mechanical Code* and NFPA 70.

~~2311.3.2~~ 4303.3.2 **Smoking.** Smoking shall not be allowed in repair garages except in *approved* locations.

~~2311.4~~ 4303.4 **Below-grade areas.**
Pits and below-grade work areas in repair garages shall comply with Sections ~~2311.4.1~~ 4303.4.1 through ~~2311.4.~~3 4303.4.3.

~~2311.4.1~~ 4303.4.1 **Construction.**
Pits and below-grade work areas shall be constructed in accordance with the *International Building Code*.

~~2311.4.2~~ 4303.4.2 **Means of egress.**
Pits and below-grade work areas shall be provided with *means of egress* in accordance with Chapter 10.

~~2311.4.3~~ 4303.4.3 **Ventilation.**
Where Class I liquids or LP-gas are stored or used within a building having a *basement* or pit wherein flammable vapors could accumulate, the *basement* or pit shall be provided with mechanical ventilation in accordance with the *International Mechanical Code*, at a minimum rate of $1^1/_2$ cubic feet per minute per square foot (cfm/ft^2) [0.008 m^3/(s × m^2)] to prevent the accumulation of flammable vapors.

~~2311.5~~ 4303.5 **Vehicles powered by liquefied petroleum gas (LP-gas).**
Vehicles powered by LP-gas and the servicing of vehicles powered by LP-gas shall be in compliance with this chapter, Chapter 61 and NFPA 58.

~~2311.6~~ 4303.6 **Vehicles powered by liquefied natural gas (LNG) and compressed natural gas (CNG).**
LNG vehicles and CNG vehicles shall comply with Sections ~~2311.6.1~~ 4303.6.1 and ~~2311.6.2~~ 4303.6.2, as applicable.

~~2311.6.1~~ 4303.6.1 **Liquefied natural gas (LNG).** LNG vehicle fuel system pressure shall be measured and recorded prior to entering the repair facility. The maximum allowable system pressure shall be not more than 170 psig (1172 kPa). Pressure greater than 170 psig (1172 kPa) shall be reduced by operating the vehicle or limited venting outdoors, as required.

~~2311.6.2~~ 4303.6.2 **Compressed natural gas (CNG).**
CNG vehicle fuel system pressure and the ambient temperature shall be measured and recorded prior to entering the repair facility. Pressure greater than the indicated maximum pressure in accordance with Table ~~2311.6.2~~ 4303.6.2 shall be reduced by defueling the

vehicle.

TABLE ~~2311.6.2~~ 4303.6.2 TEMPERATURE COMPENSATED CYLINDER PRESSURE TABLE[a]

GAS TEMPERATURE °F	PRESSURE IN FULL 3,600 PSI CNG CONTAINER, psig
123.6	4,500
120	4,455
110	4,272
100	4,105
90	3,936
80	3,768
70	3,600
60	3,432
50	3,263
40	3,094
30	2,926
20	2,757
10	2,589
0	2,421
-10	2,253
-20	2,086
-30	1,919
-40	1,753

For SI: °C = (°F – 32)/1.8, 1 psig = 6.895 kPa.

a. 3,600 psi service pressure calculated from the standard gas composition used to create the gasoline gallon equivalent (GGE).

~~2311.7~~ 4303.7 Fire extinguishers.
Fire extinguishers shall be provided in accordance with Section 906.

~~2311.8~~ 4303.8 Repair garages for vehicles fueled by lighter-than-air fuels.
The room, motor vehicle repair booth or motor vehicle repair space containing repair garage activities for the conversion or repair of vehicles that use CNG, LNG, hydrogen or other lighter-than-air motor fuels shall be in accordance with Sections ~~2311.8~~ 4303.8 through ~~2311.8.11~~ 4303.8.11 in addition to the other requirements of ~~Section 2311~~ this chapter. Repair garages for the repair of vehicles that use hydrogen fuel shall be in accordance with this code and NFPA 2.

Exceptions:

1. Repair garages where work is conducted only on vehicles where the motor vehicle fuel tank and system have been defueled and the motor vehicle fuel tank has been purged with nitrogen gas, and where standard operating procedures to document and maintain the fueling status throughout repair operations are *approved*.
2. Repair garages where work is not performed on the fuel system and is limited to exchange of parts and maintenance not requiring open flame or welding on the CNG-, LNG-, hydrogen- or other lighter-than-air-fueled motor vehicle. Movement of a subassembly on which the motor vehicle fuel tank remains mounted to allow access to other parts of the vehicle that are not a portion of the fuel system shall be permitted.
3. Repair garages for hydrogen-fueled vehicles where work is not performed on the motor vehicle fuel tank and is limited to the exchange of parts and maintenance not requiring open flame or welding on the hydrogen-fueled vehicle. During the work, the entire hydrogen fuel system shall contain less than 400 cubic feet (11.3 m^3) of hydrogen.
4. Repair garages for natural-gas-fueled vehicles where work is not being performed on the motor vehicle fuel tank, and is limited to the exchange of parts and maintenance not requiring open flame or welding on the natural-gas-fueled vehicle. During the work, the natural gas in the motor vehicle fuel tank shall contain a pressure of not more than 250 psi at 70°F (1724 kPa at 21°C).

~~2311.8.1~~ 4303.8.1 Preparation of vehicles for repair. For vehicles powered by gaseous fuels, the fuel shutoff valves shall be closed prior to repairing any portion of the vehicle fuel system.
Vehicles powered by gaseous fuels in which the fuel system has been damaged shall be inspected and evaluated for fuel system integrity prior to being brought into the repair garage. The inspection shall include testing of the entire fuel delivery system for leakage.

~~2311.8.2~~ 4303.8.2 Repair garages used for the repair of hydrogen-fueled vehicles.
Repair garages used for the repair of hydrogen-fueled vehicles shall be provided with an *approved* exhaust ventilation system in accordance with the *International Mechanical Code* and Chapter 6 of NFPA 2.

~~2311.8.3~~ 4303.8.3 Motor vehicle repair rooms.
Motor vehicle repair rooms shall be enclosed with not less than 1-hour *fire barriers* constructed in accordance with Section 707 of the International Building Code, or *horizontal assemblies* constructed in accordance with Section 711 of the International Building Code, or both, with 1-hour-rated opening protectives.

~~2311.8.4~~ 4303.8.4 Motor vehicle repair booths.
The design and construction of motor vehicle repair booths shall be in accordance with Sections ~~2311.8.4.1~~ 4303.8.4.1 through ~~2311.8.4.4~~ 4303.8.4.4.

~~2311.8.4.1~~ 4303.8.4.1 Construction. Motor vehicle repair booths shall be constructed of *approved*noncombustible materials. Where walls or ceiling assemblies are constructed of sheet metal, single-skin assemblies shall be not thinner than 0.0478 inch (18 gage) (1.2 mm) and each sheet of double-skin assemblies shall be not thinner than 0.0359 inch (20 gage) (0.9 mm). Structural sections of motor vehicle repair booths shall be sealed in an *approved* manner.

~~2311.8.4.2~~ 4303.8.4.2 Surfaces. The interior surfaces of motor vehicle repair booths shall be constructed to permit the free passage of exhaust air from all parts of the interior.

~~2311.8.4.3~~ 4303.8.4.3 Means of egress.
Means of egress shall be provided in accordance with Chapter 10.

Exception: *Means of egress* doors from premanufactured motor vehicle repair booths shall be not less than 30 inches (762 mm) in width by 80 inches (2032 mm) in height.

~~2311.8.4.4~~ 4303.8.4.4 Clear space. Motor vehicle repair booths shall be installed so that all parts of the booth be provided with *ready access* for cleaning. A clear area of not less than 3 feet (914 mm) wide shall be maintained on all sides of the motor vehicle repair booth. This clear area shall be kept free of any storage or combustible construction.

Exceptions:

1. This requirement shall not prohibit locating a motor vehicle repair booth closer than 3 feet (914 mm) to or directly against an interior partition, wall or floor/ceiling assembly that has a *fire-resistance rating* of not less than 1 hour, provided that the motor vehicle repair booth can be adequately maintained and cleaned.
2. This requirement shall not prohibit locating a motor vehicle repair booth closer than 3 feet (914 mm) to an *exterior wall* or a roof assembly, provided that the wall or roof is constructed of noncombustible material and the motor vehicle repair booth can be adequately maintained and cleaned.

~~2311.8.5~~ 4303.8.5 Motor vehicle repair spaces. Where such spaces are not separately enclosed, noncombustible spray curtains shall be provided to restrict the spread of *flammable gases*.

~~2311.8.6~~ 4303.8.6 Fire protection. Motor vehicle repair booths or spaces installed in a room or area protected by an *automatic sprinkler system* shall have the protection extended to include the inside of the motor vehicle repair booth or space.

~~2311.8.7~~ 4303.8.7 Fire extinguishers.
Portable fire extinguishers complying with Section 906 shall be provided for motor vehicle repair rooms, motor vehicle repair booths or motor vehicle repair spaces.

~~2311.8.8~~ 4303.8.8 Exhaust ventilation system.
Repair garages used for the repair of CNG, LNG, or other lighter-than-air motor fuels other than hydrogen shall be provided with an *approved* mechanical ventilation system. The mechanical exhaust ventilation system shall be in accordance with the *International Mechanical Code* and Sections ~~2311.8.8.1~~ 4303.8.8.1 and ~~2311.8.8.2~~ 4303.8.8.2.

Exception: Where *approved* by the *fire code official*, natural ventilation shall be permitted in lieu of mechanical exhaust ventilation.

~~2311.8.8.1~~ 4303.8.8.1 Design. For indoor locations, air supply inlets and exhaust outlets for mechanical ventilation shall be arranged to provide uniformly distributed air movement with inlets uniformly arranged on walls near floor level and outlets at the high point of the room in walls or the roof.
Failure of the ventilation system shall cause the fueling system to shut down.

The exhaust ventilation rate shall be not less than 1 cubic foot per minute (0.03 m^3/minute) per 12 cubic feet (34 m^3) of room volume.

~~2311.8.8.2~~ 4303.8.8.2 Operation.
The mechanical exhaust ventilation system shall operate continuously.

Exceptions:

1. Mechanical exhaust ventilation systems that are interlocked with a *gas detection system* designed in accordance with Sections 2311.8.9 4303.8.9 through ~~2311.8.9.2~~ 4303.8.9.2.
2. Mechanical exhaust ventilation systems in repair garages that are used only for repair of vehicles fueled by liquid fuels or odorized gases, such as CNG, where the ventilation system is electrically interlocked with the lighting circuit.

~~2311.8.9~~ 4303.8.9 Gas detection system.
Repair garages used for repair of vehicles fueled by nonodorized gases, including, but not limited to, hydrogen and nonodorized LNG, shall be provided with a *gas detection system* that complies with Section 916. The *gas detection system* shall be designed to detect leakage of nonodorized gaseous fuel. Where lubrication or chassis service pits are provided in garages used for repairing nonodorized LNG-fueled vehicles, gas sensors shall be provided in such pits.

~~2311.8.9.1~~ 4303.8.9.1 System activation. Activation of the gas detection alarm shall result in all of the following:

1. Initiation of local audible and visual alarms in *approved* locations.
2. Deactivation of heating systems located in the repair garage.
3. Activation of the mechanical exhaust ventilation system, where the ventilation system is interlocked with gas detection.

~~2311.8.9.2~~ 4303.8.9.2 Failure of the gas detection system. Failure of the *gas detection system* shall automatically deactivate the heating system, activate the mechanical exhaust ventilation system where the system is interlocked with the *gas detection system* and cause a trouble signal to sound in an *approved* location.

~~2311.8.10~~ 4303.8.10 Classified electrical area.
Areas within 18 inches (450 mm) of a ceiling within a motor vehicle repair room or motor vehicle repair booth shall be designed and installed in accordance with the requirements for Class I, Division 2, classified locations, as set forth in NFPA 70.

Exceptions:

1. Rooms with exhaust ventilation of not less than 1 cubic foot per minute per square foot (0.3 m^3/ min/m^2) of floor area, with suction taken from a point within 18 inches (450 mm) of the highest point in the ceiling in repair garages for vehicles that use CNG, liquefied natural gas (LNG) or other lighter-than-air motor fuels.
2. Rooms used for the repair of hydrogen-fueled vehicles that have an *approved* exhaust ventilation system in accordance with the *International Mechanical Code* and NFPA 2.

~~2311.8.11~~ 4303.8.11 Defueling equipment required at vehicle maintenance and repair facilities.
Facilities for repairing or replacing hydrogen fuel tanks on hydrogen-fueled vehicles shall have equipment to defuel vehicle storage tanks. Where work must be performed on a motor vehicle's fuel tank for the purpose of maintenance, repair or cylinder certification, defueling and purging shall be conducted in accordance with Section ~~2309.6~~ 4303.8.11.1 and NFPA 2.

Add new text as follows:

4303.8.11.1 Documented procedure.. A documented procedure that explains the logic sequence for defueling or discharging

<u>operations shall be maintained on-site and shall be provided to the fire code official upon request. The procedure shall include what actions the operator is required to take in the event of a low-pressure or high-pressure hydrogen release during discharging activity. Schematic design documents shall be maintained on-site, illustrating the arrangement of piping, regulators and equipment settings. The schematic shall illustrate the piping and regulator arrangement and shall be shown in spatial relation to the location of the vehicle being defueled and, if applicable, to the compressor, storage vessels and emergency shutdown devices.</u>

Reason: The purpose of this proposal is to remove repair garages from Chapter 23 and create a chapter just for repair garages. Years ago, motor -fueling operations and repairs garages were typically a connected pair of operations, however, over time that has changed with typical motor-fueling and repair garage operations separate occupancies. Motor-fueling operations are now more commonly associated with convenience centers and fleet operations. Eight sections of Chapter 23 apply to motor-fueling operations with one section devoted to repair garages. With the single section for repair garages currently in Chapter 23 it does not pick up servicing of other fueled vehicle such as industrial power trucks and off-road vehicles which present similar hazards. Moving repair garages to its own chapter highlights its existence and the scope has been modified to capture industrial power trucks and off-road vehicles.

With a dedicated Chapter the goal moving forward is to focus on re-writing the chapter to break down the application of the technical language based upon fuel type in conjunction with changes to the related codes, IBC and IMC. A missing component is repair of EVs.

The changes are overwhelmingly editorial related to the move.

2309.6 - The exception is no longer needed here with the repair garage language being put in its own chapter.

4301.1 - The deleted sentence is covered by new 4303.1.

4303.8.11.1 Is a copy of 2309.6.1. With the repair garage in its own chapter the needed language should be here instead of looking back to Chapter 23.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is an editorial move to relocate 2311 Repair Garages to its own Chapter.

F183-24

F184-24

Chapter 24

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2024 International Fire Code

CHAPTER 24 FLAMMABLE FINISHES

SECTION 2401 GENERAL

Revise as follows:

2401.1 Scope. This chapter shall apply to locations or areas where any of the following activities are conducted:

1. The application of flammable finishes to articles or materials by means of spray apparatus.
2. The application of flammable finishes by dipping or immersing articles or materials into the contents of tanks, vats or containers of *flammable* or *combustible liquids* for coating, finishing, treatment or similar processes.
3. The application of flammable finishes by applying combustible powders to articles or materials utilizing powder spray guns, electrostatic powder spray guns, fluidized beds or electrostatic fluidized beds.
4. Floor surfacing or finishing operations using Class I or II liquids in areas exceeding 350 square feet (32.5 m^2).
5. The application of flammable finishes consisting of dual-component coatings or Class I or II liquids where applied by brush or roller in quantities exceeding 1 gallon (4 L).
6. <u>The application of waterborne finishes that contain ignitable liquids or that produce combustible deposits.</u>

2401.2 Nonapplicability.
This chapter shall not apply to spray finishing utilizing *flammable* or *combustible liquids* that do not sustain combustion, including:

1. Liquids that do not have a fire point when tested in accordance with ASTM D92.
2. Liquids with a flashpoint greater than 95°F (35°C) in a water-miscible solution or dispersion with a water and inert (noncombustible) solids content of more than 80 percent by weight.

2401.3 Permits.
Permits shall be required as set forth in Sections 105.5 and 105.6.

SECTION 2402 DEFINITIONS

2402.1 Definitions.
The following terms are defined in Chapter 2:

DETEARING.

DIP TANK.

ELECTROSTATIC FLUIDIZED BED.

FLAMMABLE FINISHES.

FLAMMABLE VAPOR AREA.

FLUIDIZED BED.

LIMITED SPRAYING SPACE.

RESIN APPLICATION AREA.

ROLL COATING.

SPRAY BOOTH.

SPRAY ROOM.

SPRAYING SPACE.

Revise as follows:

SECTION ~~2404~~ 2403 SPRAY FINISHING

~~2404.1~~ 2403.1 General.
The application of *flammable* or *combustible liquids* by means of spray apparatus in continuous or intermittent processes shall be in accordance with the requirements of Sections 2403.2 through 2403.9.4, 2409, 2410 and NFPA 33. ~~2403 and 2404.4 through 2404.11.4~~.

~~2404.2 Prohibited enclosures for spray application operations~~.
~~Inflatable or portable enclosures shall not be used for spray application of flammable finishes.~~

> **~~Exception:~~** ~~Enclosures for the spray application of flammable finishes in marinas, dry docking areas or construction areas shall comply with Section 2404.3.~~

~~2404.4~~ 2403.2 Location of spray-finishing operations.
Spray-finishing operations conducted in buildings used for Group A, E, I or R occupancies shall be located in a spray room protected with an *approved automatic sprinkler system* installed in accordance with Section 903.3.1.1 and separated vertically and horizontally from the remainder of the building by *fire barrier* walls and *horizontal assemblies* with not less than a 1-hour *fire-resistance rating* in accordance with the *International Building Code*. In other occupancies, spray-finishing operations shall be conducted in a spray room, spray booth or limited spraying space *approved* for such use.

Exceptions:

1. Automobile undercoating spray operations and spray-on automotive lining operations conducted in areas with *approved* natural or mechanical ventilation shall be exempt from the provisions of Section ~~2404~~ 2403 when *approved* and where utilizing Class IIIA or IIIB *combustible liquids*.
2. In buildings other than Group A, E, I or R occupancies, *approved* limited spraying space in accordance with Section ~~2404.11~~ 2403.4.
3. Resin application areas used for manufacturing of reinforced plastics complying with Section ~~2409~~ 2408 shall not be required to be located in a spray room, spray booth or spraying space.

~~2404.5~~ 2403.3 Design and construction.
Design and construction of spray rooms, spray booths, limited finishing workstations, inflatable finishing workstations, membrane enclosures and spray spaces shall be in accordance with Sections ~~2404.5.1~~ 2403.3.1through ~~2494.5.5.1~~ 2403.3.6.1.

~~2404.5.1~~ 2403.3.1 Spray rooms.
The design, construction, protection, operation and maintenance of spray rooms shall be in accordance with NFPA 33, ~~Spray rooms shall be constructed and designed in accordance with~~ Section 416 of the International Building Code and Sections 2403.3.1.1 and 2403.3.1.2 of this code. ~~2404.5.2 of this code, and shall comply with Sections 2404.6 through 2404.10 of this code~~.

Add new text as follows:

2403.3.1.1 Ventilation. The ventilation system shall be designed, installed and maintained so that the flammable contaminates are diluted in noncontaminated air to maintain concentrations in the exhaust airflow below 25 percent of the contaminant's lower flammable limit (LFL).

Revise as follows:

~~2404.5.2~~ 2403.3.1.2 Floor. Combustible floor construction in spray rooms shall be covered by *approved*, noncombustible, nonsparking material, except where combustible coverings, including but not limited to thin paper or plastic and strippable coatings, are utilized over noncombustible materials to facilitate cleaning operations in spray rooms.

~~2404.5.3~~ 2403.3.2 Spray booths.
~~The design and construction of spray booths~~The design, construction, protection, operation and maintenance of spray booths shall be in accordance with NFPA 33, and ~~shall be in accordance with~~ Sections 2403.3.1 through 2403.3.3 ~~2404.5.3.1 through 2404.5.3.6, Sections 2404.6 through 2404.10 and NFPA 33~~.

~~2404.5.3.1 Construction.~~ ~~Spray booths shall be constructed of *approved* noncombustible materials. Aluminum shall not be used. Where walls or ceiling assemblies are constructed of sheet metal, single-skin assemblies shall be not thinner than 0.0478 inch (18 gage) (1.2 mm) and each sheet of double-skin assemblies shall be not thinner than 0.0359 inch (20 gage) (0.9 mm). Structural sections of spray booths are allowed to be sealed with latex-based or similar caulks and sealants.~~

~~2404.5.3.2 Surfaces.~~ ~~The interior surfaces of spray booths shall be smooth; shall be constructed so as to permit the free passage of exhaust air from all parts of the interior, and to facilitate washing and cleaning; and shall be designed to confine residues within the booth. Aluminum shall not be used.~~

~~2404.5.3.3 Floor.~~ ~~Combustible floor construction in spray booths shall be covered by *approved*, noncombustible, nonsparking material, except where combustible coverings, including but not limited to thin paper or plastic and strippable coatings, are utilized over noncombustible materials to facilitate cleaning operations in spray booths.~~

~~2404.9~~ 2403.3.2.1 Ventilation.
Mechanical ventilation of flammable vapor areas shall be provided in accordance with NFPA 33, Section 2403.3.2.1.1 and Section 502.7 of the *International Mechanical Code*.

~~2404.9.3~~ 2403.3.2.1.1 Air velocity.
The ventilation system shall be designed, installed and maintained so that the flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust airflow below 25 percent of the contaminant’s lower flammable limit (LFL). In addition, the spray booth shall be provided with mechanical ventilation so that the average air velocity through openings is in accordance with Sections ~~2404.9.1 and 2404.9.3.2~~ 2403.3.2.1.1.1 and 2403.3.2.1.1.2.

~~2404.9.3.1~~ 2403.3.2.1.1.1 Open-face or open-front spray booth. For spray application operations conducted in an open-face or open-front spray booth, the ventilation system shall be designed, installed and maintained so that the average air velocity into the spray booth through all openings is not less than 100 feet per minute (0.51 m/s).

> **Exception:** For fixed or automated electrostatic spray application equipment, the average air velocity into the spray booth through all openings shall be not less than 50 feet per minute (0.25 m/s).

~~2404.9.3.2~~ 2403.3.2.1.1.2 Enclosed spray booth or spray room with openings for product conveyance. For spray application operations conducted in an enclosed spray booth or spray room with openings for product conveyance, the ventilation system shall be designed, installed and maintained so that the average air velocity into the spray booth through openings is not less than 100 feet per minute (0.51 m/s).

> **Exceptions:**
> 1. For fixed or automated electrostatic spray application equipment, the average air velocity into the spray booth through all openings shall be not less than 50 feet per minute (0.25 m/s).

2. Where methods are used to reduce cross drafts that can draw vapors and overspray through openings from the spray booth or spray room, the average air velocity into the spray booth or spray room shall be that necessary to capture and confine vapors and overspray to the spray booth or spray room.

~~**2404.9.4**~~ **2403.3.2.1.2** **Ventilation obstruction.** Articles being sprayed shall be positioned in a manner that does not obstruct collection of overspray.

~~**2404.9.8.4**~~ **2403.3.2.1.3** **Filter rolls.** Spray booths equipped with a filter roll that is automatically advanced when the air velocity is reduced to less than 100 feet per minute (0.51 m/s) shall be arranged to shut down the spraying operation if the filter roll fails to advance automatically.

~~**2404.5.3.4**~~ **2403.3.2.2** **Means of egress.** *Means of egress* shall be provided in accordance with Chapter 10.

Exception: *Means of egress* doors from premanufactured spray booths shall be not less than 30 inches (762 mm) in width by 80 inches (2032 mm) in height.

~~**2404.5.3.5**~~ **2403.3.2.3** **Clear space.** Spray booths shall be installed so that all parts of the booth are able to be accessed for cleaning. A clear space of not less than 3 feet (914 mm) shall be maintained on all sides of the spray booth. This clear space shall be kept free of any storage or combustible construction.

Exceptions:

1. This requirement shall not prohibit locating a spray booth closer than 3 feet (914 mm) to or directly against an interior partition, wall or floor/ceiling assembly that has a *fire-resistance rating* of not less than 1 hour, provided that the spray booth can be adequately maintained and cleaned.
2. This requirement shall not prohibit locating a spray booth closer than 3 feet (914 mm) to an *exterior wall* or a roof assembly, provided that the wall or roof is constructed of noncombustible material and the spray booth can be adequately maintained and cleaned.

~~**2404.5.3.6 Size.**~~

~~The aggregate area of spray booths in a building shall not exceed the lesser of 10 percent of the area of any floor of a building or the basic area allowed for a Group H-2 occupancy without area increases, as set forth in the *International Building Code*.~~

~~**Exception:** One individual booth not exceeding 500 square feet (46 m^2).~~

~~**2404.5.4**~~ **2403.3.3** **Limited finishing workstation.**

The design, construction, protection, operation and maintenance of a~~A~~ limited finishing workstation shall be in accordance with ~~comply with the applicable provisions of~~ NFPA 33 ~~and Sections 2404.6 through 2404.10~~.

Add new text as follows:

2403.3.4 **Inflatable Finishing Workstation.** The design, construction, protection, operation and maintenance of an inflatable finishing workstation shall be in accordance with NFPA 33.

Revise as follows:

~~**2404.3**~~ **2403.3.5** **Membrane enclosures.**

The design, construction, protection, operation and maintenance of membrane enclosures shall be in accordance with NFPA 33.

~~**2404.5.5**~~ **2403.3.6** **Spraying spaces.**

Spraying spaces shall be designed and constructed in accordance with the *International Building Code*, and Section ~~2404.5.5.1 and Sections 2404.6 through 2404.10~~ 2403.3.6.1 of this code.

~~**2404.5.5.1**~~ **2403.3.6.1** **Floor.** Combustible floor construction in spraying spaces shall be covered by *approved*, noncombustible, nonsparking material, except where combustible coverings, such as thin paper or plastic and strippable coatings, are utilized over noncombustible materials to facilitate cleaning operations in spraying spaces.

Delete without substitution:

~~2404.6 Fire protection~~.
~~Spray booths and spray rooms shall be protected by an *approved automatic fire-extinguishing system* complying with Chapter 9. Protection shall extend to exhaust plenums, exhaust ducts and both sides of dry filters where such filters are used.~~

~~2404.6.1 Fire extinguishers~~.
~~Portable fire extinguishers complying with Section 906 shall be provided for spraying areas in accordance with the requirements for an extra (high) hazard occupancy.~~

~~2404.7 Housekeeping, maintenance and storage of hazardous materials~~.
~~Housekeeping, maintenance, storage and use of hazardous materials shall be in accordance with Sections 2403.3, 2403.4, 2404.7.1 and 2404.7.2.~~

~~2404.7.1 Different coatings.~~ ~~Spray booths, spray rooms and spraying spaces shall not be alternately utilized for different types of coating materials where the combination of materials is conducive to spontaneous ignition, unless all deposits of one material are removed from the booth, room or space and exhaust ducts prior to spraying with a different material.~~

~~2404.7.2 Protection of sprinklers.~~ ~~Automatic sprinklers installed in flammable vapor areas shall be protected from the accumulation of residue from spraying operations in an *approved* manner. Bags used as a protective covering shall be 0.003-inch-thick (0.076 mm) polyethylene or cellophane or shall be thin paper. Automatic sprinklers contaminated by overspray particles shall be replaced with new automatic sprinklers.~~

~~2404.8 Sources of ignition~~.
~~Control of sources of ignition shall be in accordance with Section 2403.2 and Sections 2404.8.1 through 2404.8.2.4.~~

~~2404.8.1 Drying operations~~.
~~Spray booths and spray rooms shall not be alternately used for the purpose of drying by arrangements or methods that could cause an increase in the surface temperature of the spray booth or spray room except in accordance with Sections 2404.8.1.1 and 2404.8.1.2. Except as specifically provided in this section, drying or baking units utilizing a heating system having open flames or that are capable of producing sparks shall not be installed in a flammable vapor areas.~~

~~2404.8.1.1 Spraying procedure.~~ ~~The spraying procedure shall use low-volume spray application.~~

~~2404.8.1.2 Drying apparatus~~.
~~Fixed drying apparatus shall comply with this chapter and the applicable provisions of Chapter 30. Where recirculation ventilation is provided in accordance with Section 2404.9.2, the heating system shall not be within the recirculation air path.~~

~~2404.8.1.2.1 Interlocks.~~ ~~The spraying apparatus, drying apparatus and ventilating system for the spray booth or spray room shall be equipped with interlocks arranged to accomplish all of the following:~~

1. ~~Prevent operation of the spraying apparatus while drying operations are in progress.~~

2. ~~Where the drying apparatus is located in the spray booth or spray room, prevent operation of the drying apparatus until a timed purge of spray vapors from the spray booth or spray room is complete. This purge time shall be based on completing not fewer than four air changes of spray booth or spray room volume or for a period of not less than 3 minutes, whichever is greater.~~
3. ~~Have the ventilating system maintain a safe atmosphere within the spray booth or spray room during the drying process and automatically shut off drying apparatus in the event of a failure of the ventilating system.~~
4. ~~Shut off the drying apparatus automatically if the discharge temperature of the air heater exceeds the maximum discharge air temperature allowed in accordance with the heater's listing or 221°F (105°C).~~

~~2404.8.1.2.2 Portable infrared apparatus.~~
~~Where a portable infrared drying apparatus is used, electrical wiring and portable infrared drying equipment shall comply with NFPA 70. Electrical equipment located within 18 inches (457 mm) of floor level shall be *approved* for Class I, Division 2, hazardous locations. Metallic parts of drying apparatus shall be electrically bonded and grounded. During spraying operations, portable drying apparatus and electrical connections and wiring thereto shall not be located within spray booths, spray rooms or other areas where spray residue would be deposited thereon.~~

~~2404.8.2 Illumination.~~ ~~Where spraying spaces, spray rooms or spray booths are illuminated through glass panels or other transparent materials, only fixed luminaires shall be utilized as a source of illumination.~~

~~2404.8.2.1 Glass panels.~~ ~~Panels for luminaires or for observation shall be of heat-treated glass, wired glass or hammered wire glass and shall be sealed to confine vapors, mists, residues, dusts and deposits to the flammable vapor area. Panels for luminaires shall be separated from the luminaire to prevent the surface temperature of the panel from exceeding 221°F (105°C).~~

~~2404.8.2.2 Exterior luminaires.~~ ~~Luminaires attached to the walls or ceilings of a flammable vapor area, but outside of any classified area and separated from the flammable vapor areas by vapor-tight glass panels, shall be suitable for use in ordinary hazard locations. Such luminaires shall be serviced from outside the flammable vapor areas.~~

~~2404.8.2.3 Integral luminaires.~~ ~~Luminaires that are an integral part of the walls or ceiling of a flammable vapor area are allowed to be separated from the flammable vapor area by glass panels that are an integral part of the luminaire. Such luminaires shall be *listed* for use in Class I, Division 2, or Class II, Division 2, locations, whichever is applicable, and shall be suitable for accumulations of deposits of combustible residues. Such luminaires are allowed to be serviced from inside the flammable vapor area.~~

~~2404.8.2.4 Portable electric lamps.~~ ~~Portable electric lamps shall not be used in flammable vapor areas during spraying operations. Portable electric lamps used during cleaning or repairing operations shall be of a type *approved* for hazardous locations.~~

~~2404.9.1 Operation.~~ ~~Mechanical ventilation shall be kept in operation at all times while spraying operations are being conducted and for a sufficient time thereafter to allow vapors from drying coated articles and finishing material residue to be exhausted. Spraying equipment shall be interlocked with the ventilation of the flammable vapor areas such that spraying operations cannot be conducted unless the ventilation system is in operation.~~

~~2404.9.2 Recirculation.~~
~~Air exhausted from spraying operations shall not be recirculated.~~

~~Exceptions:~~

1. ~~Air exhausted from spraying operations is allowed to be recirculated as makeup air for unmanned spray operations, provided that all of the following conditions exist:~~
    1.1. ~~The solid particulate has been removed.~~
    1.2. ~~The vapor concentration is less than 25 percent of the LFL.~~
    1.3. ~~*Approved* equipment is used to monitor the vapor concentration.~~
    1.4. ~~When the vapor concentration exceeds 25 percent of the LFL, both of the following shall occur:~~
        1.4.1. ~~An alarm shall sound.~~
        1.4.2. ~~Spray operations shall automatically shut down.~~
    1.5. ~~In the event of shutdown of the vapor concentration monitor, 100 percent of the air volume specified in Section 509 of the International Mechanical Code is automatically exhausted.~~
2. ~~Air exhausted from spraying operations is allowed to be recirculated as makeup air to manned spraying operations where all of the conditions provided in Exception 1 are included in the installation and documents have been prepared to show that the installation does not pose a life safety hazard to personnel inside the spray booth, spraying space or spray room.~~

~~**2404.9.5 Independent ducts.** Each spray booth and spray room shall have an independent exhaust duct system discharging to the outside.~~

~~**Exceptions:**~~

1. ~~Multiple spray booths having a combined frontal area of 18 square feet (1.67 m^2) or less are allowed to have a common exhaust where identical spray finishing material is used in each booth. If more than one fan serves one booth, fans shall be interconnected such that all fans will operate simultaneously.~~
2. ~~Where treatment of exhaust is necessary for air pollution control or for energy conservation, ducts shall be allowed to be manifolded if all of the following conditions are met:~~
    2.1. ~~The sprayed materials used are compatible and will not react or cause ignition of the residue in the ducts.~~
    2.2. ~~Nitrocellulose-based finishing material shall not be used.~~
    2.3. ~~A filtering system shall be provided to reduce the amount of overspray carried into the duct manifold.~~
    2.4. ~~Automatic sprinkler protection shall be provided at the junction of each booth exhaust with the manifold, in addition to the protection required by this chapter.~~

~~**2404.9.6 Termination point.** The termination point for exhaust ducts discharging to the atmosphere shall be not less than the following distances:~~

1. ~~Ducts conveying explosive or flammable vapors, fumes or dusts: 30 feet (9144 mm) from the *lot line*; 10 feet (3048 mm) from openings into the building; 6 feet (1829 mm) from *exterior walls* and roofs; 30 feet (9144 mm) from combustible walls or openings into the building that are in the direction of the exhaust discharge; 10 feet (3048 mm) above adjoining grade.~~
2. ~~Other product-conveying outlets: 10 feet (3048 mm) from the *lot line*; 3 feet (914 mm) from *exterior walls* and roofs; 10 feet (3048 mm) from openings into the building; 10 feet (3048 mm) above adjoining grade.~~

~~**2404.9.7 Fan motors and belts.** Electric motors driving exhaust fans shall not be placed inside booths or ducts. Fan rotating elements shall be nonferrous or nonsparking or the casing shall consist of, or be lined with, such material. Belts shall not enter the duct or booth unless the belt and pulley within the duct are tightly enclosed.~~

~~**2404.9.8 Filters.**~~

~~Air intake filters that are part of a wall or ceiling assembly shall be *listed* as Class I or II in accordance with UL 900. Exhaust filters shall be required.~~

~~**2404.9.8.1 Supports.**~~ ~~Supports and holders for filters shall be constructed of noncombustible materials.~~

~~**2404.9.8.2 Attachment.**~~ ~~Overspray collection filters shall be readily removable and able to be accessed for cleaning or replacement.~~

~~**2404.9.8.3 Maintaining air velocity.**~~ ~~Visible gauges, audible alarms or pressure-activated devices shall be installed to indicate or ensure that the required air velocity is maintained.~~

~~**2404.9.8.5 Filter disposal.**~~ ~~Discarded filter pads shall be immediately removed to a safe, detached location or placed in a noncombustible container with a tight-fitting lid and disposed of properly.~~

~~**2404.9.8.6 Spontaneous ignition.**~~ ~~Spray booths using dry filters shall not be used for spraying materials that are highly susceptible to spontaneous heating and ignition. Filters shall be changed prior to spraying materials that could react with other materials previously collected. An example of a potentially reactive combination includes lacquer when combined with varnishes, stains or primers.~~

~~**2404.9.8.7 Waterwash spray booths.**~~ ~~Waterwash spray booths shall be of an *approved* design so as to prevent excessive accumulation of deposits in ducts and residue at duct outlets. Such booths shall be arranged so that air and overspray are drawn through a continuously flowing water curtain before entering an exhaust duct to the building exterior.~~

~~**2404.10 Interlocks.**~~
~~Interlocks for spray application finishes shall be in accordance with Sections 2404.10.1 through 2404.10.2.~~

~~**2404.10.1 Automated spray application operations.**~~ ~~Where protecting automated spray application operations, *automatic fire-extinguishing systems* shall be equipped with an *approved* interlock feature that will, upon discharge of the system, automatically stop the spraying operations and workpiece conveyors into and out of the flammable vapor areas. Where the building is equipped with a *fire alarm system*, discharge of the *automatic fire-extinguishing system* shall also activate the building alarm notification appliances.~~

~~**2404.10.1.1 Alarm station.**~~
~~A manual fire alarm and emergency system shutdown station shall be installed to serve each flammable vapor area. When activated, the station shall accomplish the functions indicated in Section 2404.10.1.~~

~~**2404.10.1.2 Alarm station location.**~~ ~~Not less than one manual fire alarm and emergency system shutdown station shall be provided with *ready access* for operating personnel. Where access to this station is likely to involve exposure to danger, an additional station shall be located adjacent to an *exit* from the area.~~

~~**2404.10.2 Ventilation interlock prohibited.**~~ ~~Air makeup and flammable vapor area exhaust systems shall not be interlocked with the fire alarm system and shall remain in operation during a fire alarm condition.~~

> ~~**Exception:** Where the type of fire-extinguishing system used requires such ventilation to be discontinued, air makeup and exhaust systems shall shut down and dampers shall close.~~

Revise as follows:

~~2404.11~~ 2403.4 Limited spraying spaces.
Limited spraying spaces shall comply with Sections ~~2404.11.1 through 2404.11.4~~ 2403.4.1 through 2403.4.4.

~~2404.11.1~~ 2403.4.1 Job size. The aggregate surface area to be sprayed shall not exceed 9 square feet (0.84 m^2).

~~2404.11.2~~ 2403.4.2 **Frequency.** Spraying operations shall not be of a continuous nature.

~~2404.11.3~~ 2403.4.3 **Ventilation.** Positive mechanical ventilation providing not fewer than six complete air changes per hour shall be installed. Such system shall meet the requirements of this code for handling flammable vapor areas. Explosion venting is not required.

~~2404.11.4~~ 2403.4.4 **Electrical wiring.**
Electrical wiring within 10 feet (3048 mm) of the floor and 20 feet (6096 mm) horizontally of the limited spraying space shall be designed for Class I, Division 2 locations in accordance with NFPA 70.

SECTION ~~2406~~ 2404
POWDER COATING

~~2406.1~~ 2404.1 **General.**
The design, construction, protection, operation and maintenance of powder coating operations and equipment shall be in accordance with NFPA 33.~~Operations using finely ground particles of protective finishing material applied in dry powder form by a fluidized bed, an electrostatic fluidized bed, powder spray guns or electrostatic powder spray guns shall comply with Sections 2406.2 through 2406.7. In addition, Section 2407 shall apply to fixed electrostatic equipment used in powder coating operations.~~

~~2406.2~~ 2404.2 **Location.** Powder coating operations shall be conducted in enclosed powder coating rooms, enclosed powder coating facilities that are ventilated or ventilated spray booths.

~~2406.4~~ 2404.2 **Fire protection.**
Areas used for powder coating shall be protected by an *approved automatic fire-extinguishing system* complying with Chapter 9 and NFPA 33.

~~**2406.3 Construction of powder coating rooms and booths.**~~
~~Powder coating rooms shall be constructed of noncombustible materials. Spray booths shall be constructed in accordance with Section 2404.5.3.~~

~~**Exception:** *Listed* spray-booth assemblies that are constructed of other materials shall be allowed.~~

~~**2406.4.1 Additional protection for fixed systems.** Automated powder application equipment shall be protected by the installation of an *approved*, supervised flame detection apparatus that shall react to the presence of flame within 0.5 second and shall accomplish all of the following:~~

1. ~~Shutting down of energy supplies (electrical and compressed air) to conveyor, ventilation, application, transfer and powder collection equipment.~~
2. ~~Closing of segregation dampers in associated ductwork to interrupt airflow from application equipment to powder collectors.~~
3. ~~Activation of an alarm that is audible throughout the powder coating room or booth.~~

~~**2406.4.2 Fire extinguishers.**~~
~~Portable fire extinguishers complying with Section 906 shall be provided for areas used for powder coating in accordance with the requirements for an extra-hazard occupancy.~~

~~**2406.5 Operation and maintenance.** Powder coating areas shall be kept free from the accumulation of powder coating dusts, including horizontal surfaces such as ledges, beams, pipes, hoods, booths and floors.~~

~~**2406.5.1 Cleaning.** Surfaces shall be cleaned in such a manner so as to avoid scattering dusts to other places or creating dust clouds. Vacuum sweeping equipment shall be of a type *approved* for use in hazardous locations.~~

~~**2406.6 Sources of ignition.**~~
~~Control of sources of ignition shall be in accordance with Section 2403.2 and Sections 2406.6.1 through 2406.6.4.~~

~~**2406.6.1 Drying, curing and fusion equipment**~~**.**
~~Drying, curing and fusion equipment shall comply with Chapter 30.~~

~~**2406.6.2 Spark-producing metals.**~~ ~~Iron or spark-producing metals shall be prevented from being introduced into the powders being applied by magnetic separators, filter-type separators or by other *approved* means.~~

~~**2406.6.3 Preheated parts.**~~ ~~When parts are heated prior to coating, the temperature of the parts shall not exceed the ignition temperature of the powder to be used.~~

~~**2406.6.4 Grounding and bonding**~~**.** ~~Precautions shall be taken to minimize the possibility of ignition by static electrical sparks through static bonding and grounding, where possible, of powder transport, application and recovery equipment.~~

~~**2406.7 Ventilation.**~~ ~~Exhaust ventilation shall be sufficient to maintain the atmosphere below one-half the minimum explosive concentration for the material being applied. Nondeposited, air-suspended powders shall be removed through exhaust ducts to the powder recovery system.~~

SECTION 2405
DIPPING OPERATIONS

Revise as follows:

2405.1 General.
The design, construction, protection, operation and maintenance of dipping operations and equipment~~Dip-tank operations~~ shall comply with the requirements of NFPA 34 ~~Section 2403 and Sections 2405.2 through 2405.11~~.

2405.2 Location of dip-tank operations.
Dip-tank operations conducted in buildings used for Group A, I or R occupancies shall be located in a room designed for that purpose, equipped with an *approved automatic sprinkler system* and separated vertically and horizontally from other areas in accordance with the *International Building Code*.

Revise as follows:

~~**2405.3 Construction of dip tanks**~~**.**
~~Dip tanks shall be constructed in accordance with Sections 2405.3.1 through 2405.3.4.3 and NFPA 34. Dip tanks, including drain boards, shall be constructed of noncombustible material and their supports shall be of heavy metal, reinforced concrete or masonry.~~

~~**2405.3.1 Overflow.**~~ ~~Dip tanks greater than 150 gallons (568 L) in capacity or 10 square feet (0.93 m^2) in liquid surface area shall be equipped with a trapped overflow pipe leading to an *approved* location outside the building. The bottom of the overflow connection shall be not less than 6 inches (152 mm) below the top of the tank.~~

~~**2405.3.2 Bottom drains.**~~ ~~Dip tanks greater than 500 gallons (1893 L) in liquid capacity shall be equipped with bottom drains that are arranged to automatically and manually drain the tank quickly in the event of a fire unless the viscosity of the liquid at normal atmospheric temperature makes this impractical. Access to the manual operation shall be from a safe location. Where gravity flow is not practicable, automatic pumps shall be provided. Such drains shall be trapped and discharged to a closed, vented salvage tank or to an *approved* outside location.~~

> ~~**Exception:** Dip tanks containing Class IIIB *combustible liquids* where the liquids are not heated above room temperature and the process area is protected by automatic sprinklers.~~

~~**2405.3.3 Dipping liquid temperature control.**~~ ~~Protection against the accumulation of vapors, self-ignition and excessively high temperatures shall be provided for dipping liquids that are heated directly or heated by the surfaces of the object being dipped.~~

~~2405.3.4 Dip-tank covers.~~

~~Dip-tank covers allowed by Section 2405.4.1 shall be capable of manual operation and shall be automatic closing by *approved* automatic-closing devices designed to operate in the event of a fire.~~

~~2405.3.4.1 Construction.~~ ~~Covers shall be constructed of noncombustible material or be of a tin-clad type with enclosing metal applied with locked joints.~~

~~2405.3.4.2 Supports.~~ ~~Chain or wire rope shall be utilized for cover supports or operating mechanisms.~~

~~2405.3.4.3 Closed covers.~~ ~~Covers shall be kept closed when tanks are not in use.~~

~~2405.4 Fire protection.~~

~~Dip-tank operations shall be protected in accordance with Sections 2405.4.1 through 2405.4.2.~~

~~2405.4.1 Fixed fire-extinguishing equipment.~~

~~An *approved automatic fire-extinguishing system* or dip-tank cover in accordance with Section 2405.3.4 shall be provided for the following dip tanks:~~

1. ~~Dip tanks less than 150 gallons (568 L) in capacity or 10 square feet (0.93 m^2) in liquid surface area.~~
2. ~~Dip tanks containing a liquid with a *flash point* below 110°F (43°C) used in such manner that the liquid temperature could equal or be greater than its *flash point* from artificial or natural causes, and having both a capacity of more than 10 gallons (37.9 L) and a liquid surface area of more than 4 square feet (0.37 m^2).~~

~~2405.4.1.1 Fire-extinguishing system.~~

~~An *approved automatic fire-extinguishing system* shall be provided for dip tanks with a 150-gallon (568 L) or more capacity or 10 square feet (0.93 m^2) or larger in a liquid surface area. Fire-extinguishing system design shall be in accordance with NFPA 34.~~

~~2405.4.2 Portable fire extinguishers.~~

~~Areas in the vicinity of dip tanks shall be provided with portable fire extinguishers complying with Section 906 and suitable for *flammable* and *combustible liquid* fires as specified for extra (high) hazard occupancies.~~

~~2405.5 Housekeeping, maintenance and storage of hazardous materials.~~

~~Housekeeping, maintenance, storage and use of hazardous materials shall be in accordance with Sections 2403.3 and 2403.4.~~

~~2405.6 Sources of ignition.~~

~~Control of sources of ignition shall be in accordance with Section 2403.2.~~

~~2405.7 Ventilation of flammable vapor areas.~~ ~~Flammable vapor areas shall be provided with mechanical ventilation adequate to prevent the dangerous accumulation of vapors. Required ventilation systems shall be arranged such that the failure of any ventilating fan shall automatically stop the dipping conveyor system.~~

~~2405.8 Conveyor interlock.~~ ~~Dip tanks utilizing a conveyor system shall be arranged such that in the event of a fire, the conveyor system shall automatically cease motion and the required tank bottom drains shall open.~~

~~2405.9 Hardening and tempering tanks.~~

~~Hardening and tempering tanks shall comply with Sections 2405.3 through 2405.3.3, 2405.9.4 and 2405.8, but shall be exempt from other provisions of Section 2405.~~

~~2405.9.1 Location.~~ ~~Tanks shall be located as far as practical from furnaces and shall not be located on or near combustible floors.~~

~~2405.9.2 Hoods.~~ ~~Tanks shall be provided with a noncombustible hood and vent or other *approved* venting means, terminating outside of the structure to serve as a vent in case of a fire. Such vent ducts shall be treated as flues and proper clearances shall be maintained from~~

~~combustible materials.~~

~~**2405.9.3 Alarms.** Tanks shall be equipped with a high-temperature limit switch arranged to sound an alarm when the temperature of the quenching medium reaches 50°F (10°C) below the *flash point*.~~

~~**2405.9.4 Fire protection.**~~
~~Hardening and tempering tanks greater than 500 gallons (1893 L) in capacity or 25 square feet (2.3 m²) in liquid surface area shall be protected by an *approved automatic fire-extinguishing system* complying with Chapter 9.~~

~~**2405.9.5 Use of air pressure.** Air under pressure shall not be used to fill or agitate oil in tanks.~~

~~**2405.10 Flow-coating operations.** Flow-coating operations shall comply with the requirements for dip tanks. The area of the sump and any areas on which paint flows shall be considered to be the area of a dip tank.~~

~~**2405.10.1 Paint supply.** Paint shall be supplied by a gravity tank not exceeding 10 gallons (38 L) in capacity or by direct low-pressure pumps arranged to shut down automatically in case of a fire by means of *approved* heat-actuated devices.~~

~~**2405.11 Roll-coating operations.**~~
~~Roll-coating operations shall comply with Section 2405.10. In roll-coating operations utilizing *flammable* or *combustible liquids*, sparks from static electricity shall be prevented by electrically bonding and grounding all metallic rotating and other parts of machinery and equipment and by the installation of static collectors, or by maintaining a conductive atmosphere such as a high relative humidity.~~

SECTION ~~2407~~ 2406
ELECTROSTATIC APPARATUS

~~2407.1~~ 2406.1 General. Electrostatic apparatus and devices used in connection with paint-spraying and paint-*detearing* operations shall be ~~of an *approved* type~~ in accordance with the requirements of NFPA 33.

~~**2407.2 Location and clear space.** A space of not less than twice the sparking distance shall be maintained between goods being painted or *deteared* and electrodes, electrostatic atomizing heads or conductors. A sign stating the sparking distance shall be conspicuously posted near the assembly.~~

~~**Exception:** Portable electrostatic paint-spraying apparatus *listed* for use in Class I, Division 1, locations.~~

~~**2407.3 Construction of equipment.** Electrodes and electrostatic atomizing heads shall be of *approved* construction, rigidly supported in permanent locations and effectively insulated from ground. Insulators shall be nonporous and noncombustible.~~

~~**Exception:** Portable electrostatic paint-spraying apparatus *listed*for use in Class I, Division 1, locations.~~

~~**2407.3.1 Barriers.** Booths, fencing, railings or guards shall be placed about the equipment such that either by their location or character, or both, isolation of the process is maintained from plant storage and personnel. Railings, fencing and guards shall be of conductive material, adequately grounded, and not less than 5 feet (1524 mm) from processing equipment.~~

~~**Exception:** Portable electrostatic paint-spraying apparatus *listed* for use in Class I, Division 1, locations.~~

~~**2407.4 Fire protection.**~~
~~Areas used for electrostatic spray finishing with fixed equipment shall be protected with an *approved automatic fire-extinguishing system* complying with Chapter 9 and Section 2407.4.1.~~

~~**2407.4.1 Protection for automated liquid electrostatic spray application equipment.** Automated liquid electrostatic spray application equipment shall be protected by the installation of an *approved*, supervised flame detection apparatus that shall, in the event of ignition, react to the presence of flame within 0.5 second and shall accomplish all of the following:~~

1. ~~Activation of a local alarm in the vicinity of the spraying operation and activation of the building alarm system, if such a system is provided.~~
2. ~~Shutting down of the coating material delivery system.~~
3. ~~Termination of all spray application operations.~~
4. ~~Stopping of conveyors into and out of the flammable vapor areas.~~
5. ~~Disconnection of power to the high-voltage elements in the flammable vapor areas and disconnection of power to the system.~~

~~2407.5 Housekeeping, maintenance and storage of hazardous materials~~.
~~Housekeeping, maintenance, storage and use of hazardous materials shall be in accordance with Sections 2403.3, 2403.4 and Sections 2407.5.1 and 2407.5.2.~~

~~2407.5.1 Maintenance~~. ~~Insulators shall be kept clean and dry. Drip plates and screens subject to paint deposits shall be removable and taken to a safe place for cleaning. Grounds and bonding means for the paint-spraying apparatus and all associated equipment shall be periodically cleaned and maintained free of overspray.~~

~~2407.5.2 Signs~~. ~~Signs shall be posted to provide the following information:~~
1. ~~Designate the process zone as dangerous with respect to fire and accident.~~
2. ~~Identify the grounding requirements for all electrically conductive objects in the flammable vapor area, including persons.~~
3. ~~Restrict access to qualified personnel only.~~

~~2407.6 Sources of ignition~~.
~~Transformers, power packs, control apparatus and all other electrical portions of the equipment, except high-voltage grids and electrostatic atomizing heads and connections, shall be located outside of the flammable vapor areas or shall comply with Section 2403.2.~~

~~2407.7 Ventilation~~.
~~The flammable vapor area shall be ventilated in accordance with Section 2404.9.~~

~~2407.8 Emergency shutdown~~.
~~Electrostatic apparatus shall be equipped with automatic controls operating without time delay to disconnect the power supply to the high-voltage transformer and signal the operator under any of the following conditions:~~
1. ~~Stoppage of ventilating fans or failure of ventilating equipment from any cause.~~
2. ~~Stoppage of the conveyor carrying articles past the high-voltage grid.~~
3. ~~Occurrence of a ground or an imminent ground at any point of the high-voltage system.~~
4. ~~Reduction of clearance below that required in Section 2407.2.~~

~~2407.9 Ventilation interlock~~. ~~Hand electrostatic equipment shall be interlocked with the ventilation system for the spraying area so that the equipment cannot be operated unless the ventilating system is in operation.~~

SECTION ~~2408~~ 2407
ORGANIC PEROXIDES AND DUAL-COMPONENT COATINGS

~~2408.1~~ 2407.1 General.
Spraying operations involving the use of *organic peroxides* and other dual-component coatings shall be in accordance with the requirements of NFPA 33~~Section 2403 and Sections 2408.2 through 2408.5~~.

~~**2408.2 Use of organic peroxide coatings.**~~
~~Spraying operations involving the use of *organic peroxides* and other dual-component coatings shall be conducted in *approved* sprinklered spray booths complying with Section 2404.5.3.~~

~~**2408.3 Equipment.** Spray guns and related handling equipment used with *organic peroxides* shall be of a type manufactured for such use.~~

~~**2408.3.1 Pressure tanks.** Separate pressure vessels and inserts specifically for the application shall be used for the resin and for the *organic peroxide*, and shall not be interchanged. Organic peroxide pressure tank inserts shall be constructed of stainless steel or polyethylene.~~

~~**2408.4 Housekeeping, maintenance, storage and use of hazardous materials.**~~
~~Housekeeping, maintenance, storage and use of hazardous materials shall be in accordance with Sections 2403.3 and 2403.4 and Sections 2408.4.1 through 2408.4.7.~~

~~**2408.4.1 Contamination prevention.** *Organic peroxide* initiators shall not be contaminated with foreign substances.~~

~~**2408.4.2 Spilled material.** Spilled *organic peroxides* shall be promptly removed and any residue thereof promptly eliminated. Spilled material absorbed by using a noncombustible absorbent shall be promptly disposed of in accordance with the manufacturer's recommendation.~~

~~**2408.4.3 Residue control.** Materials shall not be contaminated by dusts and overspray residues resulting from the sanding or spraying of finishing materials containing *organic peroxides*.~~

~~**2408.4.4 Handling.** Handling of *organic peroxides* shall be conducted in a manner that avoids shock and friction that produces decomposition and violent reaction hazards.~~

~~**2408.4.5 Mixing.** *Organic peroxides* shall not be mixed directly with accelerators or promoters.~~

~~**2408.4.6 Personnel qualifications.** Personnel working with *organic peroxides* and dual-component coatings shall be specifically trained to work with these materials.~~

~~2408.4.7~~ <u>2407.2</u> Storage.
The storage of *organic peroxides* shall comply with Chapter 62.

~~**2408.5 Sources of ignition.** Only nonsparking tools shall be used in areas where *organic peroxides* are stored, mixed or applied.~~

SECTION ~~2409~~ <u>2408</u>
INDOOR MANUFACTURING OF REINFORCED PLASTICS

~~2409.1~~ <u>2408.1</u> General.
Indoor manufacturing processes involving spray or hand application of reinforced plastics and using more than 5 gallons (19 L) of resin in a 24-hour period shall be in accordance with <u>NFPA 33</u>~~Sections 2409.2 through 2409.6.1~~.

~~**2409.2 Resin application equipment.**~~
~~Equipment used for spray application of resin shall be installed and used in accordance with Section 2408 and Sections 2409.3 through 2409.6.1.~~

~~**2409.3 Fire protection.** Resin application areas shall be protected by an *automatic sprinkler system*. The sprinkler system design shall be not less than that required for Ordinary Hazard, Group 2, with a minimum design area of 3,000 square feet (279 m²). Where the materials or storage arrangements are required by other regulations to be provided with a higher level of sprinkler system protection, the~~

~~higher level of sprinkler system protection shall be provided.~~

~~2409.4 Housekeeping, maintenance, storage and use of hazardous materials~~.
~~Housekeeping, maintenance, storage and use of hazardous materials shall be in accordance with Sections 2403.3 and 2403.4 and Sections 2409.4.1 through 2409.4.3.~~

~~2409.4.1 Handling of excess catalyzed resin.~~ ~~A noncombustible, open-top container shall be provided for disposal of excess catalyzed resin. Excess catalyzed resin shall be drained into the container while still in the liquid state. Enough water shall be provided in the container to maintain a minimum 2-inch (51 mm) water layer over the contained resin.~~

~~2409.4.2 Control of overchop.~~ ~~In areas where chopper guns are used, exposed wall and floor surfaces shall be covered with paper, polyethylene film or other *approved* material to allow for removal of overchop. Overchop shall be allowed to cure for not less than 4 hours prior to removal.~~

~~2409.4.2.1 Disposal~~.
~~Following removal, used wall and floor covering materials required by Section 2409.4.2 shall be placed in a noncombustible container and removed from the facility.~~

2408.2~~9.4.3~~ Storage ~~and use of hazardous materials~~.
Storage ~~and use of~~ *organic peroxides* shall be in accordance with ~~Section 2408 and~~Chapter 62. Storage and use of *flammable* and *combustible liquids* shall be in accordance with Chapter 57. Storage and use of unstable (reactive) materials shall be in accordance with Chapter 66.

~~2409.5 Sources of ignition in resin application areas~~.
~~Sources of ignition in resin application areas shall comply with Section 2403.2.~~

~~2409.6 Ventilation~~.
~~Mechanical ventilation shall be provided throughout resin application areas in accordance with Section 2404.9. The ventilation rate shall be adequate to maintain the concentration of flammable vapors in the resin application area at or below 25 percent of the LFL.~~

> **~~Exception:~~** ~~Mechanical ventilation is not required for buildings that have 75 percent of the perimeter unenclosed.~~

~~2409.6.1 Local ventilation~~. ~~Local ventilation shall be provided inside of workpieces where personnel will be under or inside of the workpiece.~~

SECTION ~~2410~~ 2409
FLOOR SURFACING AND FINISHING OPERATIONS

~~2410.1~~ 2409.1 Scope.
Floor surfacing and finishing operations exceeding 350 square feet (33 m^2) and using Class I or II liquids shall comply with Sections ~~2410.2 through 2410.5~~ 2409.2 through 2409.5.

~~2410.2~~ 2409.2 Mechanical system operation. Heating, ventilation and air-conditioning systems shall not be operated during resurfacing or refinishing operations or within 4 hours of the application of *flammable* or *combustible liquids*.

~~2410.3~~ 2409.3 Business operation. Floor surfacing and finishing operations shall not be conducted while an establishment is open to the public.

~~2410.4~~ 2409.4 Ignition sources. The power shall be shut down to all electrical sources of ignition within the flammable vapor area, unless those devices are classified for use in Class I, Division 1, hazardous locations.

~~2410.5~~ 2409.5 Ventilation. To prevent the accumulation of flammable vapors, mechanical ventilation at a minimum rate of 1 cubic foot per minute per square foot [0.00508 m^3 /(s × m^2)] of area being finished shall be provided. Such exhaust shall be by *approved* temporary or portable means. Vapors shall be exhausted to the exterior of the building.

SECTION ~~2403~~ 2410
STORAGE, HANDLING AND USE OF FLAMMABLE OR COMBUSTIBLE LIQUIDS ~~PROTECTION OF OPERATIONS~~

~~2403.3~~ 2410.1 Storage, use and handling of flammable and combustible liquids.
The storage, use and handling of *flammable* and *combustible liquids* shall be in accordance with this section~~, and~~ Chapter 57 and NFPA 33.

~~2403.3.1~~ 24010.1.1 Use. Containers supplying spray nozzles shall be of a closed type or provided with metal covers that are kept closed. Containers not resting on floors shall be on noncombustible supports or suspended by wire cables. Containers supplying spray nozzles by gravity flow shall not exceed 10 gallons (37.9 L) in capacity.

~~2403.3.2~~ 2410.1.2 Valves. Containers and piping to which a hose or flexible connection is attached shall be provided with a shutoff valve at the connection. Such valves shall be kept shut when hoses are not in use.

~~2403.3.3~~ 2410.1.3 Pumped liquid supplies. Where *flammable* or *combustible liquids* are supplied to spray nozzles by positive displacement pumps, pump discharge lines shall be provided with an *approved* relief valve discharging to pump suction or a safe detached location.

~~2404.3.4~~ 2410.1.4 Liquid transfer. Where a flammable mixture is transferred from one portable container to another, a bond shall be provided between the two containers. Not less than one container shall be grounded. Piping systems for Class I and II liquids shall be permanently grounded.

~~2403.3.5~~ 2410.1.5 Class I liquids as solvents.
Class I liquids used as solvents shall be used in spray gun and equipment cleaning machines that have been *listed* and *approved* for such purpose or shall be used in spray booths or spray rooms in accordance with Sections ~~2403.3.5.1 and 2403.3.5.2~~ 2410.1.5.1 and 2410.1.5.2.

~~2403.3.5.1~~ 2410.1.5.1 Listed devices. Cleaning machines for spray guns and equipment shall not be located in areas open to the public and shall be separated from ignition sources in accordance with their listings or by a distance of 3 feet (914 mm), whichever is greater. The quantity of solvent used in a machine shall not exceed the design capacity of the machine.

~~2403.3.5.2~~ 2410.1.5.2 Within spray booths and spray rooms. Where solvents are used for cleaning spray nozzles and auxiliary equipment within spray booths and spray rooms, the ventilating equipment shall be operated during cleaning.

~~2403.3.6~~ 2410.1.6 Class II and III liquids. Solvents used outside of spray booths, spray rooms or *listed* and *approved* spray gun and equipment cleaning machines shall be restricted to Class II and III liquids.

~~2403.1 General.~~
~~Operations covered by this chapter shall be protected as required by Sections 2403.2 through 2403.4.4.~~

~~2403.2 Sources of ignition.~~
~~Protection against sources of ignition shall be provided in accordance with Sections 2403.2.1 through 2403.2.8.~~

~~2403.2.1 Electrical wiring and equipment.~~
~~Electrical wiring and equipment shall comply with this chapter and NFPA 70.~~

~~2403.2.1.1 Flammable vapor areas.~~

~~Electrical wiring and equipment in flammable vapor areas shall be of an explosionproof type *approved* for use in such hazardous locations. Such areas shall be considered to be Class I, Division 1, or Class II, Division 1, hazardous locations in accordance with NFPA 70.~~

~~2403.2.1.2 Areas subject to deposits of residues~~.

~~Electrical equipment, flammable vapor areas or drying operations that are subject to splashing or dripping of liquids shall be specifically *approved* for locations containing deposits of readily ignitable residue and explosive vapors.~~

Exceptions:

1. ~~This provision shall not apply to wiring in rigid conduit, threaded boxes or fittings not containing taps, splices or terminal connections.~~
2. ~~This provision shall not apply to electrostatic equipment allowed by Section 2407.~~

~~In resin application areas, electrical wiring and equipment that is subject to deposits of combustible residues shall be *listed* for such exposure and shall be installed as required for hazardous (classified) locations. Electrical wiring and equipment not subject to deposits of combustible residues shall be installed as required for ordinary hazard locations.~~

~~2403.2.1.3 Areas adjacent to spray booths.~~ ~~Electrical wiring and equipment located outside of, but within 3 feet (914 mm) of openings in a spray booth or a spray room, shall be *approved* for Class I, Division 2, or Class II, Division 2, hazardous locations, whichever is applicable.~~

~~2403.2.1.4 Areas subject to overspray deposits~~.

~~Electrical equipment in flammable vapor areas located such that deposits of combustible residues could readily accumulate thereon shall be specifically *approved* for locations containing deposits of readily ignitable residue and explosive vapors in accordance with NFPA 70.~~

Exceptions:

1. ~~Wiring in rigid conduit.~~
2. ~~Boxes or fittings not containing taps, splices or terminal connections.~~
3. ~~Equipment allowed by Sections 2404 and 2407 and Chapter 30.~~

~~2403.2.2 Open flames and sparks~~.

~~Open flames and spark-producing devices shall not be located in flammable vapor areas and shall not be located within 20 feet (6096 mm) of such areas unless separated by a permanent partition.~~

~~Exception:~~ ~~Drying and baking apparatus complying with Section 2404.8.1.2.~~

~~2403.2.3 Hot surfaces~~.

~~Heated surfaces having a temperature sufficient to ignite vapors shall not be located in flammable vapor areas. Space-heating appliances, steam pipes or hot surfaces in a flammable vapor area shall be located such that they are not subject to accumulation of deposits of combustible residues.~~

~~Exception:~~ ~~Drying apparatus complying with Section 2404.8.1.2.~~

~~2403.2.4 Equipment enclosures.~~ ~~Equipment or apparatus that is capable of producing sparks or particles of hot metal that would fall into a flammable vapor area shall be totally enclosed.~~

~~2403.2.5 Grounding~~.

~~Metal parts of spray booths, exhaust ducts and piping systems conveying Class I or II liquids shall be electrically grounded in accordance with NFPA 70. Metallic parts located in resin application areas, including but not limited to exhaust ducts, ventilation fans, spray application equipment, workpieces and piping, shall be electrically grounded.~~

~~2403.2.6 Smoking prohibited~~.

~~Smoking shall be prohibited in flammable vapor areas and hazardous materials storage rooms associated with flammable finish~~

~~processes. "No Smoking" signs complying with Section 310 shall be conspicuously posted in such areas.~~

~~**2403.2.8 Powered industrial trucks.** Powered industrial trucks used in electrically classified areas shall be *listed* for such use.~~

~~**2403.2.7 Welding warning signs.** Welding, cutting and similar spark-producing operations shall not be conducted in or adjacent to flammable vapor areas or dipping or coating operations unless precautions have been taken to provide safety. Conspicuous signs with the following warning shall be posted in the vicinity of flammable vapor areas, dipping operations and paint storage rooms:~~

~~NO WELDING~~
~~THE USE OF WELDING OR CUTTING~~
~~EQUIPMENT IN OR NEAR THIS AREA~~
~~IS DANGEROUS BECAUSE OF FIRE~~
~~AND EXPLOSION HAZARDS. WELDING~~
~~AND CUTTING SHALL BE DONE ONLY~~
~~UNDER THE SUPERVISION OF THE~~
~~PERSON IN CHARGE.~~

~~**2403.4 Operations and maintenance.** Flammable vapor areas, exhaust fan blades and exhaust ducts shall be kept free from the accumulation of deposits of combustible residues. Where excessive residue accumulates in such areas, spraying operations shall be discontinued until conditions are corrected.~~

~~**2403.4.1 Tools.** Scrapers, spuds and other tools used for cleaning purposes shall be constructed of nonsparking materials.~~

~~**2403.4.2 Residue.** Residues removed during cleaning and debris contaminated with residue shall be immediately removed from the premises and properly disposed.~~

~~**2403.4.3 Waste cans.** *Approved* metal waste cans equipped with self-closing lids shall be provided wherever rags or waste are impregnated with finishing material. Such rags and waste shall be deposited therein immediately after being utilized. The contents of waste cans shall be properly disposed of not less than once daily and at the end of each shift.~~

~~**2403.4.4 Solvent recycling**~~**.**
~~Solvent distillation equipment used to recycle and clean dirty solvents shall comply with Section 5705.4.~~

NFPA

NFPA
NFPA
1 Batterymarch Park
Quincy, MA 02169-7471

33—~~21~~ 24 Standard for Spray Application Using Flammable or Combustible Materials

34— ~~21~~ 24 Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids

Staff Analysis: A review of the standard proposed for inclusion in the code as shown below with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

- ***Standard for Spray Application Using Flammable or Combustible Materials (NFPA 33-2024)***
- ***Standard for Dipping, Coating, and Printing Processes Using Flammable or Combustible Liquids (NFPA 34-2024)***

Reason: The current chapter includes some, but not all of the safety requirements for spray finishing, powder coating, and dipping. This edit removed items that are duplicated in NFPA 33 and NFPA 34 and directs the user to the complete set of safety requirements in the appropriate NFPA standard that would be challenging to repeat within this Chapter.

Specific fire protection requirements for the various operations and enclosures that involve spray and dipping operations can be found in the referenced NFPA documents and have been removed from this chapter.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The change is editorial in that the requirements removed already exist in an NFPA standard that fully addresses the hazards.

F184-24

F185-24

IFC: 2403.2.1.2, 2403.2.1.4

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

2403.2.1.2 Areas subject to deposits of residues.
Electrical equipment, flammable vapor areas or drying operations that are subject to splashing or dripping of liquids shall be specifically *approved* for locations containing deposits of readily ignitable residue and flammable ~~explosive~~ vapors.

Exceptions:

1. This provision shall not apply to wiring in rigid conduit, threaded boxes or fittings not containing taps, splices or terminal connections.
2. This provision shall not apply to electrostatic equipment allowed by Section 2407.

In resin application areas, electrical wiring and equipment that is subject to deposits of combustible residues shall be *listed* for such exposure and shall be installed as required for hazardous (classified) locations. Electrical wiring and equipment not subject to deposits of combustible residues shall be installed as required for ordinary hazard locations.

2403.2.1.4 Areas subject to overspray deposits.
Electrical equipment in flammable vapor areas located such that deposits of combustible residues could readily accumulate thereon shall be specifically *approved* for locations containing deposits of readily ignitable residue and flammable ~~explosive~~ vapors in accordance with NFPA 70.

Exceptions:

1. Wiring in rigid conduit.
2. Boxes or fittings not containing taps, splices or terminal connections.
3. Equipment allowed by Sections 2404 and 2407 and Chapter 30.

Reason: The proposal is to change explosive to flammable to be consistent with the language used within each section. Flammable vapors or fumes is a defined term.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal will not increase or decrease the cost of construction as the change just uses the correct term without changes to intent.

F185-24

F186-24

IFC: 2403.2.6

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

2403.2.6 Smoking and vaping prohibited.
Smoking and vaping shall be prohibited in flammable vapor areas and hazardous materials storage rooms associated with flammable finish processes. “No Smoking or Vaping” signs complying with Section 310 shall be conspicuously posted in such areas.

Reason: The proposal is to include vaping as prohibited in areas where ignitable materials may be present. Vape pens may be a credible ignition source.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal will not increase or decrease the cost of construction as the cost of the proposed sign does not appear to be significantly different than current no smoking signs.

F186-24

F187-24

IFC: 2404.2, 2404.5.5 (New), 2404.3, 2404.5.5, 2404.5.5.1, NFPA Chapter 80

Proponents: Geoffrey Raifsnider, Global Finishing Solutions, Self (graifsnider@globalfinishing.com)

2024 International Fire Code

Revise as follows:

~~**2404.2 Prohibited enclosures for spray application operations.**~~
~~Inflatable or portable enclosures shall not be used for spray application of flammable finishes.~~

> ~~**Exception:** Enclosures for the spray application of flammable finishes in marinas, dry docking areas or construction areas shall comply with Section 2404.3~~.

Add new text as follows:

2404.5.5 Inflatable Finishing Workstations. The design, construction, protection, operation and maintenance of inflatable finishing workstations shall be in accordance with NFPA 33. Inflatable finishing workstations shall be used outdoors only.

Revise as follows:

~~2404.3~~ 2404.5.6 Membrane enclosures.
The design, construction, protection, operation and maintenance of membrane enclosures shall be in accordance with NFPA 33.

~~2404.5.5~~ 2404.5.7 Spraying spaces.
Spraying spaces shall be designed and constructed in accordance with the *International Building Code*, and Section 2404.5.5.1 and Sections 2404.6 through 2404.10 of this code.

~~2404.5.5.1~~ 2404.5.7.1 Floor. Combustible floor construction in spraying spaces shall be covered by *approved*, noncombustible, nonsparking material, except where combustible coverings, such as thin paper or plastic and strippable coatings, are utilized over noncombustible materials to facilitate cleaning operations in spraying spaces.

NFPA

NFPA
NFPA
1 Batterymarch Park
Quincy, MA 02169-7471

33—~~21~~ 24 Standard for Spray Application Using Flammable or Combustible Materials

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Standard for Spray Application Using Flammable or Combustible Materials (NFPA 33-2024)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: NFPA 33 2024 edition (Section 14.4) now includes new requirements for inflatable finishing workstations that this code can reference in a format similar to references to Limited Finishing Workstation (2404.5.4) and membrane enclosures (currently 2404.3).

This proposal also renumbers the sections for membrane enclosures and spraying spaces to group these other types of spray finishing environments together.

IFC had previously prohibited these enclosures as there had not been any guidance provided by NFPA 33.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal will not increase or decrease the cost of construction as previously Inflatable Finishing Workstations were not allowed by the code.

F188-24

IFC: 2404.9.2; IMC®: [F] 502.7.3.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

2404.9.2 Recirculation.
Air exhausted from spraying operations shall not be recirculated.

Exceptions:

1. Air exhausted from spraying operations is allowed to be recirculated as makeup air for unmanned spray operations, provided that all of the following conditions exist:
   1.1. The solid particulate has been removed.
   1.2. The vapor concentration is less than 25 percent of the LFL.
   1.3. *Approved* equipment is used to monitor the vapor concentration.
   1.4. When the vapor concentration exceeds 25 percent of the LFL, both of the following shall occur:
      1.4.1. An alarm shall sound.
      1.4.2. Spray operations shall automatically shut down.
   1.5. In the event of shutdown or failure of the vapor concentration monitor, ~~100 percent of the air volume specified in Section 510 of the *International Mechanical Code* is automatically exhausted~~ spray operations shall automatically shut down.
2. Air exhausted from spraying operations is allowed to be recirculated as makeup air to manned spraying operations where all of the conditions provided in Exception 1 are included in the installation and documents have been prepared to show that the installation does not pose a life safety hazard to personnel inside the spray booth, spraying space or spray room.

2024 International Mechanical Code

Revise as follows:

[F] 502.7.3.2 Recirculation. Air exhausted from spraying operations shall not be recirculated.

Exceptions:

1. Air exhausted from spraying operations shall be permitted to be recirculated as *makeup air* for unmanned spray operations provided that:
   1.1. The solid particulate has been removed.
   1.2. The vapor concentration is less than 25 percent of the lower flammable limit (LFL).
   1.3. *Approved equipment* is used to monitor the vapor concentration.
   1.4. An alarm is sounded and spray operations are automatically shut down if the vapor concentration exceeds 25 percent of the LFL.
   1.5. In the event of shutdown or failure of the vapor concentration monitor spray operations shall automatically shut down.~~, 100 percent of the air volume specified in Section 509 is automatically exhausted~~.
2. Air exhausted from spraying operations is allowed to be recirculated as *makeup air* to manned spraying operations where all of the conditions provided in Exception 1 are included in the installation and documents have been prepared to show that the installation does not pose a life safety hazard to personnel inside the spray booth, spraying space or spray room.

Reason: Section 510.3 states "The design and operation of the exhaust system shall be such that flammable contaminants are diluted in noncontaminated air to maintain concentrations in the exhaust flow below 25 percent of the contaminant's lower flammability limit."

Exception 1.2 requires the vapor concentration in the exhaust to be less than 25% of the LFL. Monitoring to ensure this concentration is not exceeded is also a requirement.

Therefore, the current language does not provide any additional protection upon failure or shutdown of the monitoring system as it does not increase the air flow rate.

Current industry practice is to first set an alarm point to alert operations that there may be an issue with the ventilation system. The alarm point varies depending upon the specific spray operation variables. This practice is intended to address quality issues if the spray were to be shut down in the middle of an application. This alarm point is not a safety issue and the proposed change does not include addressing the alarm point. The shut down point is set to 25% as is required by exception 1.4.

The change to 1.5 addresses the lack of a functioning monitor and requires the source of vapors (spray operations) to be shut down.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal will not increase or decrease the cost of construction as the change just clarifies the appropriate action that needs to occur.

F188-24

F189-24

IFC: 2406.7; IMC®: [F] 502.7.6

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

2406.7 Ventilation. Exhaust ventilation shall be sufficient to maintain the atmosphere <u>in the ductwork to a recovery system</u> below one-half the minimum <u>explosible</u> ~~explosive~~ concentration for the material being applied. Nondeposited, air-suspended powders shall be removed through exhaust ducts to the powder recovery system.

2024 International Mechanical Code

Revise as follows:

[F] 502.7.6 Powder coating. Exhaust ventilation for powder-coating operations shall be sufficient to maintain the atmosphere <u>in the ductwork to a recovery system</u> below one-half of the minimum ~~explosive~~ <u>explosible</u> concentration for the material being applied. Nondeposited, air-suspended powders shall be removed through exhaust ducts to the powder recovery system.

Reason: The proposed change clarifies where the concentration needs to be diluted. In the powder spray pattern, which may be present anywhere in the spray booth or spray room, the concentration may be greater than 50% of the minimum explosible concentration.

Explosive has been replaced with explosible as it is the correct term in this context.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal will not increase or decrease the cost of construction as the change just clarifies where the concentration is to be maintained.

F189-24

F190-24

IFC Chapter 27

Proponents: William Koffel, Koffel Associates, Inc., Semiconductor Industry Association (wkoffel@koffel.com)

2024 International Fire Code

CHAPTER 27 SEMICONDUCTOR FABRICATION FACILITIES

SECTION 2701
GENERAL

Revise as follows:

2701.1 Scope.
Semiconductor fabrication facilities and comparable research and development areas classified as Group H-5 shall comply with ~~this chapter~~NFPA 318 and the *International Building Code*. The use, storage and handling of hazardous materials in Group H-5 shall comply with NFPA 318, this chapter, other applicable provisions of this code and the *International Building Code*.

2701.2 Application. The requirements set forth in this chapter are requirements specific only to Group H-5 and shall be applied as exceptions or additions to applicable requirements set forth elsewhere in this code.

2701.3 Multiple hazards.
Where a material poses multiple hazards, all hazards shall be addressed in accordance with Section 5001.1.

2701.4 Existing buildings and existing fabrication areas.
Existing buildings and existing *fabrication areas* shall comply with this chapter, except that transportation and handling of HPM in *corridors* and enclosures for *stairways* and *ramps* shall be allowed where in compliance with Section 2705.3.2 and the *International Building Code*.

2701.5 Permits.
Permits shall be required as set forth in Section 105.5.

SECTION 2702
DEFINITIONS

2702.1 Definitions.
The following terms are defined in Chapter 2:

EMERGENCY CONTROL STATION.

FABRICATION AREA.

GAS DETECTION SYSTEM.

HAZARDOUS PRODUCTION MATERIAL (HPM).

HPM.

HPM ROOM.

PASS-THROUGH.

SEMICONDUCTOR FABRICATION FACILITY.

SERVICE CORRIDOR.

TOOL.

WORKSTATION.

SECTION 2703
GENERAL SAFETY PROVISIONS

Revise as follows:

2703.1 Emergency control station.
An *emergency control station* shall be provided in accordance with Sections 2703.1.1 through 2703.1.2.

2703.1.1 Location. ~~The *emergency control station* shall be located on the premises at an *approved* location outside the fabrication area.~~

2703.1.~~2~~1 Staffing. Trained personnel shall continuously staff the *emergency control station*.

2703.1.~~3~~2 Signals.
The *emergency control station* shall receive signals from emergency equipment and alarm and detection systems. Such emergency equipment and alarm and detection systems shall include, but not be limited to, the following where such equipment or systems are required to be provided either in this chapter or elsewhere in this code:

1. *Automatic sprinkler system* alarm and monitoring systems.
2. Manual fire alarm systems.
3. *Emergency alarm systems*.
4. *Gas detection systems*.
5. Smoke detection systems.
6. Emergency power systems.
7. Automatic detection and alarm systems for *pyrophoric* liquids and Class 3 water-reactive liquids required by Section 2705.2.3.4.
8. Exhaust ventilation flow alarm devices for *pyrophoric* liquids and Class 3 water-reactive liquids and cabinet exhaust ventilation systems required by Section 2705.2.3.4.

2703.2 Systems, equipment and processes.
Systems, equipment and processes shall be in accordance with Sections 2703.2.1 through 2703.2.3.2.

2703.2.1 Application. Systems, equipment and processes shall include, but not be limited to, containers, cylinders, tanks, piping, tubing, valves and fittings.

2703.2.2 General requirements.
In addition to the requirements in Section 2703.2, systems, equipment and processes shall comply with Section 5003.2, other applicable provisions of this code, the *International Building Code* and the *International Mechanical Code*.

2703.2.3 Additional requirements for HPM supply piping.
In addition to the requirements in Section 2703.2, HPM supply piping and tubing for HPM gases and liquids shall comply with this section.

2703.2.3.1 General requirements.
The requirements set forth in Section 5003.2.2.2 shall apply to supply piping and tubing for HPM gases and liquids.

2703.2.3.2 Health-hazard ranking 3 or 4 HPM. Supply piping and tubing for HPM gases and liquids having a health-hazard ranking of 3 or 4 shall be welded throughout, except for connections located within a ventilation enclosure if the material is a gas, or an *approved* method of drainage or containment provided for connections if the material is a liquid.

2703.3 Construction requirements.
Construction of semiconductor fabrication facilities shall be in accordance with Sections 2703.3.1 through 2703.3.9.

2703.3.1 Fabrication areas.
Construction and location of *fabrication areas* shall comply with the *International Building Code*.

2703.3.2 Pass-throughs in exit access corridors.
Pass-throughs in *exit access corridors* shall be constructed in accordance with the *International Building Code*.

2703.3.3 Liquid storage rooms.
Liquid storage rooms shall comply with Chapter 57 and the *International Building Code*.

2703.3.4 HPM rooms.
HPM rooms shall comply with the *International Building Code*.

2703.3.5 Gas cabinets.
Gas cabinets shall comply with Section 5003.8.6.

2703.3.6 Exhausted enclosures.
Exhausted enclosures shall comply with Section 5003.8.5.

2703.3.7 Gas rooms.
Gas rooms shall comply with Section 5003.8.4.

2703.3.8 Service corridors.
Service corridors shall comply with Section 2705.3 and the *International Building Code*.

2703.3.9 Cabinets containing pyrophoric liquids or water-reactive Class 3 liquids.
Cabinets in *fabrication areas* containing *pyrophoric* liquids or Class 3 water-reactive liquids in containers or in amounts greater than $^{1}/_{2}$ gallon (2 L) shall comply with Section 2705.2.3.4.

2703.4 Emergency plan.
An emergency plan shall be established as set forth in Section 403.6.1.

2703.5 Maintenance of equipment, machinery and processes.
Maintenance of equipment, machinery and processes shall comply with Section 5003.2.6.

2703.6 Security of areas.
Areas shall be secured in accordance with Section 5003.9.2.

Delete without substitution:

~~2703.7 Electrical wiring and equipment~~.
~~Electrical wiring and equipment in HPM facilities shall comply with Sections 2703.7.1 through 2703.7.3.~~

~~2703.7.1 Fabrication areas~~.
~~Electrical wiring and equipment in *fabrication areas* shall comply with NFPA 70.~~

~~**2703.7.2 Workstations**~~**.**

~~Electrical equipment and devices within 5 feet (1524 mm) of workstations in which flammable or *pyrophoric* gases or *flammable liquids* are used shall comply with NFPA 70 for Class I, Division 2 hazardous locations. Workstations shall not be energized without adequate exhaust ventilation in accordance with Section 2703.14.~~

> ~~**Exception:** Class I, Division 2 hazardous electrical equipment is not required where the air removal from the workstation or dilution will prevent the accumulation of flammable vapors and fumes on a continuous basis.~~

~~**2703.7.3 Hazardous production material (HPM) rooms, gas rooms and liquid storage rooms**~~**.**

~~Electrical wiring and equipment in HPM rooms, gas rooms and liquid storage rooms shall comply with NFPA 70.~~

2703.8 Corridors and enclosures for stairways and ramps. Hazardous materials shall not be used or stored in *corridors* or enclosures for *stairways* and *ramps*.

2703.9 Service corridors. Hazardous materials shall not be used in an *open-system* use condition in service corridors.

Delete without substitution:

~~**2703.10 Automatic sprinkler system**~~**.**

~~An *approved automatic sprinkler system* shall be provided in accordance with Sections 2703.10.1 through 2703.10.5 and Chapter 9.~~

~~**2703.10.1 Workstations and tools.** The design of the sprinkler system in the area shall take into consideration the spray pattern and the effect on the equipment.~~

~~**2703.10.1.1 Combustible workstations.** A sprinkler head shall be installed within each branch exhaust connection or individual plenums of workstations of combustible construction. The sprinkler head in the exhaust connection or plenum shall be located not more than 2 feet (610 mm) from the point of the duct connection or the connection to the plenum. Where necessary to prevent corrosion, the sprinkler head and connecting piping in the duct shall be coated with *approved* or *listed* corrosion-resistant materials. Access to the sprinkler head shall be provided for periodic inspection.~~

> ~~**Exceptions:**~~
>
> 1. ~~*Approved* alternative *automatic fire-extinguishing systems* are allowed. Activation of such systems shall deactivate the related processing equipment.~~
> 2. ~~Process equipment that operates at temperatures exceeding 932°F (500°C) and is provided with automatic shutdown capabilities for hazardous materials.~~
> 3. ~~Exhaust ducts 10 inches (254 mm) or less in diameter from flammable gas storage cabinets that are part of a workstation.~~
> 4. ~~Ducts *listed* or *approved* for use without internal automatic sprinkler protection.~~

~~**2703.10.1.2 Combustible tools**~~**.**

~~Where the horizontal surface of a combustible tool is obstructed from ceiling sprinkler discharge, automatic sprinkler protection that covers the horizontal surface of the tool shall be provided.~~

> ~~**Exceptions:**~~
>
> 1. ~~An automatic gaseous fire-extinguishing local surface application system shall be allowed as an alternative to sprinklers. Gaseous-extinguishing systems shall be actuated by infrared (IR) or ultraviolet/infrared (UV/IR) optical detectors.~~
> 2. ~~Tools constructed of materials that are *listed* as Class 1 or Class 2 in accordance with UL 2360 or *approved* for use without internal fire-extinguishing system protection.~~

~~**2703.10.2 Gas cabinets and exhausted enclosures.** An *approved automatic sprinkler system* shall be provided in gas cabinets and exhausted enclosures containing HPM *compressed gases.*~~

~~**Exception:** Gas cabinets located in an HPM room other than those cabinets containing *pyrophoric* gases.~~

~~**2703.10.3 Pass-throughs in existing exit access corridors.** Pass-throughs in existing *exit access corridors* shall be protected by an *approved automatic sprinkler system.*~~

~~**2703.10.4 Exhaust ducts for HPM.**~~
~~An *approved automatic sprinkler system* shall be provided in exhaust ducts conveying gases, vapors, fumes, mists or dusts generated from HPM in accordance with this section and the *International Mechanical Code*.~~

~~**2703.10.4.1 Metallic and noncombustible nonmetallic exhaust ducts.** An *approved automatic sprinkler system* shall be provided in metallic and noncombustible nonmetallic exhaust ducts where all of the following conditions apply:~~

1. ~~Where the largest cross-sectional diameter is equal to or greater than 10 inches (254 mm).~~
2. ~~The ducts are within the building.~~
3. ~~The ducts are conveying flammable gases, vapors or fumes.~~

~~**2703.10.4.2 Combustible nonmetallic exhaust ducts.** An *approved automatic sprinkler system* shall be provided in combustible nonmetallic exhaust ducts where the largest cross-sectional diameter of the duct is equal to or greater than 10 inches (254 mm).~~

~~**Exceptions:**~~

1. ~~Ducts *listed* or *approved* for applications without *automatic sprinkler system* protection.~~
2. ~~Ducts not more than 12 feet (3658 mm) in length installed below ceiling level.~~

~~**2703.10.4.3 Exhaust connections and plenums of combustible workstations.**~~
~~*Automatic fire-extinguishing system* protection for exhaust connections and plenums of combustible workstations shall comply with Section 2703.10.1.1.~~

~~**2703.10.4.4 Exhaust duct sprinkler system requirements.** Automatic sprinklers installed in exhaust duct systems shall be hydraulically designed to provide 0.5 gallon per minute (gpm) (1.9 L/min) over an area derived by multiplying the distance between the sprinklers in a horizontal duct by the width of the duct. Minimum discharge shall be 20 gpm (76 L/min) per sprinkler from the five hydraulically most remote sprinklers.~~

~~**2703.10.4.4.1 Sprinkler locations.** Automatic sprinklers shall be installed at 12-foot (3658 mm) intervals in horizontal ducts and at changes in direction. In vertical runs, automatic sprinklers shall be installed at the top and at alternate floor levels.~~

~~**2703.10.4.4.2 Control valve.** A separate indicating control valve shall be provided for sprinklers installed in exhaust ducts.~~

~~**2703.10.4.4.3 Drainage.** Drainage shall be provided to remove sprinkler water discharged in exhaust ducts.~~

~~**2703.10.4.4.4 Corrosive atmospheres.** Where corrosive atmospheres exist, exhaust duct sprinklers and pipe fittings shall be manufactured of corrosion-resistant materials or coated with *approved* materials.~~

~~**2703.10.4.4.5 Maintenance and inspection.** Access to sprinklers in exhaust ducts shall be provided for periodic inspection and maintenance.~~

~~**2703.10.5 Sprinkler alarms and supervision.**~~
~~*Automatic sprinkler systems* shall be electrically supervised and provided with alarms in accordance with Chapter 9. *Automatic sprinkler system* alarm and supervisory signals shall be transmitted to the *emergency control station.*~~

~~**2703.11 Manual fire alarm system.**~~
~~A manual *fire alarm system* shall be installed throughout buildings containing a Group H-5 occupancy. Activation of the alarm system shall initiate a local alarm and transmit a signal to the *emergency control station*. Manual fire alarm systems shall be designed and installed in accordance with Section 907.~~

2703.12 Emergency alarm system.
Emergency alarm systems shall be provided in accordance with Sections 2703.12.1 through 2703.12.3, Section 5004.9 and Section 5005.4.4. The *maximum allowable quantity per control area* provisions of Section 5004.1 shall not apply to *emergency alarm systems* required for HPM.

2703.12.1 Where required.
Emergency alarm systems shall be provided in the areas indicated in Sections 2703.12.1.1 through 2703.12.1.3.

2703.12.1.1 Service corridors. An *approved emergency alarm system* shall be provided in service corridors, with not less than one alarm device in the service corridor.

2703.12.1.2 Corridors and interior exit stairways and ramps.
Emergency alarms for *corridors*, *interior exit stairways* and *ramps* and *exit passageways* shall comply with Section 5005.4.4.

2703.12.1.3 Liquid storage rooms, HPM rooms and gas rooms.
Emergency alarms for liquid storage rooms, HPM rooms and gas rooms shall comply with Section 5004.9.

2703.12.2 Alarm-initiating devices. An *approved* emergency telephone system, local alarm manual pull stations, or other *approved* alarm-initiating devices are allowed to be used as emergency alarm-initiating devices.

2703.12.3 Alarm signals. Activation of the *emergency alarm system* shall sound a local alarm and transmit a signal to the *emergency control station*.

2703.13 Gas detection systems.
A *gas detection system* complying with Section 916 shall be provided for HPM gases where the physiological warning threshold level of the gas is at a higher level than the accepted permissible exposure limit (PEL) for the gas and for flammable gases in accordance with Sections 2703.13.1 through 2703.13.2.2.

2703.13.1 Where required.
A *gas detection system* shall be provided in the areas identified in Sections 2703.13.1.1 through 2703.13.1.4.

2703.13.1.1 Fabrication areas. A *gas detection system* shall be provided in *fabrication areas* where HPM gas is used in the *fabrication area*.

2703.13.1.2 HPM rooms. A *gas detection system* shall be provided in HPM rooms where HPM gas is used in the room.

2703.13.1.3 Gas cabinets, exhausted enclosures and gas rooms. A *gas detection system* shall be provided in gas cabinets and exhausted enclosures for HPM gas. A *gas detection system* shall be provided in gas rooms where HPM gases are not located in gas cabinets or exhausted enclosures.

2703.13.1.4 Corridors. Where HPM gases are transported in piping placed within the space defined by the walls of a *corridor* and the floor or roof above the *corridor*, a *gas detection system* shall be provided where piping is located and in the *corridor*.

Exception: A *gas detection system* is not required for occasional transverse crossings of the *corridors* by supply piping that is enclosed in a ferrous pipe or tube for the width of the *corridor*.

2703.13.2 Gas detection system operation.

The *gas detection system* shall be capable of monitoring the room, area or equipment in which the HPM gas is located at or below all the following gas concentrations:

1. Immediately dangerous to life and health (IDLH) values where the monitoring point is within an exhausted enclosure, ventilated enclosure or gas cabinet.
2. Permissible exposure limit (PEL) levels where the monitoring point is in an area outside an exhausted enclosure, ventilated enclosure or gas cabinet.
3. For flammable gases, the monitoring detection threshold level shall be vapor concentrations in excess of 25 percent of the lower flammable limit (LFL) where the monitoring is within or outside an exhausted enclosure, ventilated enclosure or gas cabinet.
4. Except as noted in this section, monitoring for highly toxic and toxic gases shall also comply with Chapter 60.

2703.13.2.1 Alarms. The *gas detection system* shall initiate a local alarm and transmit a signal to the *emergency control station* when a short-term hazard condition is detected. The alarm shall be both visible and audible and shall provide warning both inside and outside the area where the gas is detected. The audible alarm shall be distinct from all other alarms.

2703.13.2.2 Shut off of gas supply. The *gas detection system* shall automatically close the shutoff valve at the source on gas supply piping and tubing related to the system being monitored for which gas is detected when a short-term hazard condition is detected. Automatic closure of shutoff valves shall comply with the following:

1. Where the gas-detection sampling point initiating the *gas detection system* alarm is within a gas cabinet or exhausted enclosure, the shutoff valve in the gas cabinet or exhausted enclosure for the specific gas detected shall automatically close.
2. Where the gas-detection sampling point initiating the *gas detection system* alarm is within a room and *compressed gas* containers are not in gas cabinets or exhausted enclosure, the shutoff valves on all gas lines for the specific gas detected shall automatically close.
3. Where the gas-detection sampling point initiating the *gas detection system* alarm is within a piping distribution manifold enclosure, the shutoff valve supplying the manifold for the *compressed gas* container of the specific gas detected shall automatically close.

Exception: Where the gas-detection sampling point initiating the *gas detection system* alarm is at the use location or within a gas valve enclosure of a branch line downstream of a piping distribution manifold, the shutoff valve for the branch line located in the piping distribution manifold enclosure shall automatically close.

2703.14 Exhaust ventilation systems for HPM.

Exhaust ventilation systems and materials for exhaust ducts utilized for the exhaust of HPM shall comply with Sections 2703.14.1 through 2703.14.3, other applicable provisions of this code, the *International Building Code* and the *International Mechanical Code*.

2703.14.1 Where required.

Exhaust ventilation systems shall be provided in the following locations in accordance with the requirements of this section and the *International Building Code*:

1. *Fabrication areas*: Exhaust ventilation for *fabrication areas* shall comply with the *International Building Code*. The *fire code official* is authorized to require additional manual control switches.
2. Workstations: A ventilation system shall be provided to capture and exhaust gases, fumes and vapors at workstations.
3. Liquid storage rooms: Exhaust ventilation for liquid storage rooms shall comply with Section 5004.3.1 and the *International Building Code*.
4. HPM rooms: Exhaust ventilation for HPM rooms shall comply with Section 5004.3.1 and the *International Building Code*.

5. Gas cabinets: Exhaust ventilation for gas cabinets shall comply with Section 5003.8.6.2. The gas cabinet ventilation system is allowed to connect to a workstation ventilation system. Exhaust ventilation for gas cabinets containing highly toxic or toxic gases shall also comply with Chapter 60.
6. Exhausted enclosures: Exhaust ventilation for exhausted enclosures shall comply with Section 5003.8.5.2. Exhaust ventilation for exhausted enclosures containing highly toxic or toxic gases shall also comply with Chapter 60.
7. Gas rooms: Exhaust ventilation for gas rooms shall comply with Section 5003.8.4.2. Exhaust ventilation for gas rooms containing highly toxic or toxic gases shall also comply with Chapter 60.
8. Cabinets containing *pyrophoric* liquids or Class 3 water-reactive liquids: Exhaust ventilation for cabinets in *fabrication areas* containing *pyrophoric* liquids or Class 3 water-reactive liquids shall be as required in Section 2705.2.3.4.

2703.14.2 Penetrations.
Exhaust ducts penetrating *fire barriers* constructed in accordance with Section 707 of the International Building Code or *horizontal assemblies* constructed in accordance with Section 711 of the International Building Code shall be contained in a shaft of equivalent *fire-resistance-rated* construction. Exhaust ducts shall not penetrate *fire walls*. *Fire dampers* shall not be installed in exhaust ducts.

2703.14.3 Treatment systems.
Treatment systems for highly toxic and toxic gases shall comply with Chapter 60.

Delete without substitution:

~~2703.15 Emergency power system~~.
~~An emergency power system shall be provided in Group H-5 occupancies in accordance with Section 1203. The emergency power system shall supply power automatically to the electrical systems specified in Section 2703.15.1 when the normal supply system is interrupted.~~

~~2703.15.1 Required electrical systems~~.
~~Emergency power shall be provided for electrically operated equipment and connected control circuits for the following systems:~~

1. ~~HPM exhaust ventilation systems.~~
2. ~~HPM gas cabinet ventilation systems.~~
3. ~~HPM exhausted enclosure ventilation systems.~~
4. ~~HPM gas room ventilation systems.~~
5. ~~HPM *gas detection systems*.~~
6. ~~*Emergency alarm systems*.~~
7. ~~Manual fire alarm systems.~~
8. ~~*Automatic sprinkler system* monitoring and alarm systems.~~
9. ~~Automatic alarm and detection systems for *pyrophoric* liquids and Class 3 water-reactive liquids required in Section 2705.2.3.4.~~
10. ~~Flow alarm switches for *pyrophoric* liquids and Class 3 water-reactive liquids cabinet exhaust ventilation systems required in Section 2705.2.3.4.~~
11. ~~Electrically operated systems required elsewhere in this code or in the *International Building Code* applicable to the use, storage or handling of HPM.~~

~~2703.15.2 Exhaust ventilation systems.~~ ~~Exhaust ventilation systems are allowed to be designed to operate at not less than one-half the normal fan speed on the emergency power system where it is demonstrated that the level of exhaust will maintain a safe atmosphere.~~

~~**2703.16 Sub-atmospheric pressure gas systems.**~~
~~Sub-atmospheric pressure gas systems (SAGS) shall be in accordance with NFPA 318.~~

SECTION 2704
STORAGE

2704.1 General.
Storage of hazardous materials shall comply with Section 2703 and this section and other applicable provisions of this code.

2704.2 Fabrication areas.
Hazardous materials storage and the maximum quantities of hazardous materials in use and storage allowed in *fabrication areas* shall be in accordance with Sections 2704.2.1 through 2704.2.2.1.

2704.2.1 Location of HPM storage in fabrication areas.
Storage of HPM in *fabrication areas* shall be within *approved* or *listed* storage cabinets, gas cabinets, exhausted enclosures or within a workstation as follows:

1. *Flammable* and *combustible liquid* storage cabinets shall comply with Section 5704.3.2.
2. Hazardous materials storage cabinets shall comply with Section 5003.8.7.
3. Gas cabinets shall comply with Section 5003.8.6. Gas cabinets for highly toxic or toxic gases shall also comply with Section 6004.1.2.
4. Exhausted enclosures shall comply with Section 5003.8.5. Exhausted enclosures for highly toxic or toxic gases shall also comply with Section 6004.1.3.
5. Workstations shall comply with Section 2705.2.3.

2704.2.2 Maximum aggregate quantities in fabrication areas.
The aggregate quantities of hazardous materials stored or used in a single *fabrication area* shall be limited as specified in this section.

Exception: *Fabrication areas* containing quantities of hazardous materials not exceeding the maximum allowable quantities per control area established by Sections 5003.1.1, 5704.3.4 and 5704.3.5.

Revise as follows:

2704.2.2.1 Storage and use in fabrication areas.
The maximum quantities of hazardous materials stored or used in a single *fabrication area* shall not exceed the quantities set forth in <u>NFPA 318.</u>~~Table 2704.2.2.1.~~

Delete without substitution:

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

HAZARD CATEGORY	SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP per square foot)
Physical-Hazard Materials			
Combustible dust	Note b	Not Applicable	Not Applicable
Combustible fiber		Not Applicable	Not Applicable
Loose	Note b		
Baled	Notes b and c		
Combustible liquid	Not Applicable		Not Applicable
Class II		<u>0.02</u>	
Class IIIA		<u>0.04</u>	
Class IIIB		Not Limited	
Combination Class I, II and IIIA		<u>0.08</u>	

HAZARD CATEGORY	SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP per square foot)
Cryogenic gas	Not Applicable	Not Applicable	
Flammable			Note d
Oxidizing			2.5
Explosives	Note b	Note b	Note b
Flammable gas	Not Applicable	Not Applicable	
Gaseous			Note d
Liquefied			Note d
Flammable liquid	Not Applicable		Not Applicable
Class IA		0.005	
Class IB		0.05	
Class IC		0.05	
Combination Class IA, IB and IC		0.05	
Combination Class I, II and IIIA		0.08	
Flammable solid	0.002	Not Applicable	Not Applicable
Organic peroxide			Not Applicable
Unclassified detonable	Note b	Note b	
Class I	Note b	Note b	
Class II	0.05	0.0025	
Class III	0.2	0.02	
Class IV	Not Limited	Not Limited	
Class V	Not Limited	Not Limited	
Oxidizing gas	Not Applicable	Not Applicable	
Gaseous			2.5
Liquefied			2.5
Combination of gaseous and liquefied			2.5
Oxidizer			Not Applicable
Class 4	Note b	Note b	
Class 3	0.006	0.06	
Class 2	0.006	0.06	
Class 1	0.006	0.06	
Combination Class 1, 2, 3	0.006	0.06	
Pyrophoric materials	Note b	0.0025	Notes d and e
Unstable (reactive)			
Class 4	Note b	Note b	Note b
Class 3	0.05	0.005	Note b
Class 2	0.2	0.02	Note b
Class 1	Not Limited	Not Limited	Not Limited
Water reactive			Not Applicable
Class 3	0.02 [f]	0.0025	
Class 2	0.5	0.05	
Class 1	Not Limited	Not Limited	
Health-Hazard Materials			
Corrosives	Not Limited	Not Limited	Not Limited
Highly toxic	Not Limited	Not Limited	Note d
Toxics	Not Limited	Not Limited	Note d

~~For SI: 1 pound = 0.454 kg, 1 pound per square foot = 4.882 kg/m^2, 1 gallon per square foot = 40.7 L/m^2, 1 cubic foot @ NTP/square foot = 0.305 m^3 @ NTP/m^2, 1 cubic foot = 0.02832 m^3.~~

a. ~~Hazardous materials within piping shall not be included in the calculated quantities.~~

b. ~~Quantity of hazardous materials in a single fabrication area shall not exceed the maximum allowable quantities per control area in Tables 5003.1.1(1) and 5003.1.1(2).~~

c. ~~Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.~~

d. ~~The aggregate quantity of flammable, pyrophoric, toxic and highly toxic gases shall not exceed the greater of 0.2 cubic feet at NTP/square foot or 9,000 cubic feet at NTP.~~

e. ~~The aggregate quantity of pyrophoric gases in the building shall not exceed the amounts set forth in Table 5003.8.2.~~

f. ~~Quantity of Class 3 water-reactive solids in a single tool shall not exceed 1 pound.~~

2704.3 Indoor storage outside of fabrication areas.

The indoor storage of hazardous materials outside of *fabrication areas* shall be in accordance with Sections 2704.3.1 through 2704.3.3.

2704.3.1 HPM storage.
The indoor storage of HPM in quantities greater than those listed in Sections 5003.1.1 and 5704.3.4 shall be in a room complying with the requirements of the *International Building Code* and this code for a liquid storage room, HPM room or gas room as appropriate for the materials stored.

2704.3.2 Other hazardous materials storage.
The indoor storage of other hazardous materials shall comply with Sections 5001, 5003 and 5004 and other applicable provisions of this code.

2704.3.3 Separation of incompatible hazardous materials.
Incompatible hazardous materials in storage shall be separated from each other in accordance with Section 5003.9.8.

SECTION 2705
USE AND HANDLING

2705.1 General.
The use and handling of hazardous materials shall comply with this section, Section 2703 and other applicable provisions of this code.

2705.2 Fabrication areas.
The use of hazardous materials in *fabrication areas* shall be in accordance with Sections 2705.2.1 through 2705.2.3.4.

2705.2.1 Location of HPM in use in fabrication areas. Hazardous production materials in use in *fabrication areas* shall be within *approved* or *listed* gas cabinets, exhausted enclosures or a workstation.

Revise as follows:

2705.2.2 Maximum aggregate quantities in fabrication areas.
The aggregate quantities of hazardous materials in a single *fabrication area* and the quantity of HPM in use at a workstation shall comply with NFPA 318. ~~Section 2704.2.2 and Table 2704.2.2.1. The quantity of HPM in use at a workstation shall not exceed the quantities listed in Table 2705.2.2.~~

Delete without substitution:

~~TABLE 2705.2.2 MAXIMUM QUANTITIES OF HPM AT A WORKSTATION~~[d]

HPM CLASSIFICATION	STATE	MAXIMUM QUANTITY
Flammable, highly toxic, pyrophoric and toxic combined	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
Flammable	Liquid	15 gallons[a, b]
	Solid	5 pounds[a, b]
Corrosive	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
	Liquid	Use-open system: 25 gallons[b] Use-closed system: 150 gallons[b, e]
	Solid	20 pounds[a, b]
Highly toxic	Liquid	15 gallons[a, b]
	Solid	5 pounds[a, b]
Oxidizer	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
	Liquid	Use-open system: 12 gallons[b] Use-closed system: 60 gallons[b]
	Solid	20 pounds[a, b]
Pyrophoric	Liquid	0.5 gallon[c, f]
	Solid	4.4 pounds[c, f]
Toxic	Liquid	Use-open system: 15 gallons[b] Use-closed system: 60 gallons[b]
	Solid	5 pounds[a, b]
Unstable reactive Class 3	Liquid	0.5 gallon[a, b]
	Solid	5 pounds[a, b]
Water-reactive Class 3	Liquid	0.5 gallon[c, f]
	Solid	See Table 2704.2.2.1

~~For SI: 1 pound = 0.454 kg, 1 gallon = 3.785 L.~~

a. ~~Maximum allowable quantities shall be increased 100 percent for closed system operations. Where Note b applies, the increase for both notes shall be allowed.~~

b. ~~Quantities shall be allowed to be increased 100 percent where workstations are internally protected with an *approved* automatic fire-extinguishing or suppression system complying with Chapter 9. Where Note a applies, the increase for both notes shall be allowed. Where Note e applies, the maximum increase allowed for both Notes b and e shall not exceed 100 percent.~~

c. ~~Allowed only in workstations that are internally protected with an *approved* automatic fire-extinguishing or fire protection system complying with Chapter 9 and compatible with the reactivity of materials in use at the workstation.~~

d. ~~The quantity limits apply only to materials classified as HPM.~~

e. ~~Quantities shall be allowed to be increased 100 percent for nonflammable, noncombustible corrosive liquids where the materials of construction for workstations are listed or *approved* for use without internal fire-extinguishing or suppression system protection. Where Note b applies, the maximum increase allowed for both Notes b and e shall not exceed 100 percent.~~

f. ~~A maximum quantity of 5.3 gallons of liquids and 44 pounds of total liquids and solids shall be allowed at a workstation where conditions are in accordance with Section 2705.2.3.4.~~

2705.2.3 Workstations.
Workstations in *fabrication areas* shall be in accordance with Sections 2705.2.3.1 through 2705.2.3.4.

2705.2.3.1 Construction. Workstations in *fabrication areas* shall be constructed of materials compatible with the materials used and stored at the workstation. The portion of the workstation that serves as a cabinet for HPM gases, Class I *flammable liquids* or Class II or Class IIIA *combustible liquids* shall be noncombustible and, if of metal, shall be not less than 0.0478-inch (18 gage) (1.2 mm) steel.

2705.2.3.2 Protection of vessels.
Vessels containing hazardous materials located in or connected to a workstation shall be protected as follows:

1. HPM: Vessels containing HPM shall be protected from physical damage and shall not project from the workstation.
2. Hazardous *cryogenic fluids*, gases and liquids: Hazardous *cryogenic fluid*, gas and liquid vessels located within a workstation shall be protected from seismic forces in an *approved* manner in accordance with the *International Building Code*.
3. *Compressed gases*: Protection for *compressed gas* vessels shall also comply with Section 5303.5.
4. *Cryogenic fluids*: Protection for *cryogenic fluid* vessels shall also comply with Section 5503.5.

2705.2.3.3 Drainage and containment for HPM liquids. Each workstation utilizing HPM liquids shall have all of the following:

1. Drainage piping systems connected to a compatible system for disposition of such liquids.
2. The work surface provided with a slope or other means for directing spilled materials to the containment or drainage system.
3. An *approved* means of containing or directing spilled or leaked liquids to the drainage system.

2705.2.3.4 Pyrophoric solids, liquids and Class 3 water-reactive liquids. *Pyrophoric* liquids and Class 3 water-reactive liquids in containers greater than 0.5-gallon (2 L) but not exceeding 5.3-gallon (20 L) capacity and *pyrophoric* solids in containers greater than 4.4 pounds (2 kg) but not exceeding 44 pounds (20 kg) shall be allowed at workstations where located inside cabinets and the following conditions are met:

1. Maximum amount per cabinet: The maximum amount per cabinet shall be limited to 5.3 gallons (20 L) of liquids and 44 pounds (20 kg) of total liquids and solids.

2. Cabinet construction: Cabinets shall be constructed in accordance with the following:
   2.1. Cabinets shall be constructed of not less than 0.097-inch (2.5 mm) (12 gage) steel.

   2.2. Cabinets shall be permitted to have self-closing limited access ports or noncombustible windows that provide access to equipment controls.

   2.3. Cabinets shall be provided with self- or manual-closing doors. Manual-closing doors shall be equipped with a door switch that will initiate local audible and visual alarms when the door is in the open position.

3. Cabinet exhaust ventilation system: An exhaust ventilation system shall be provided for cabinets and shall comply with the following:
   3.1. The system shall be designed to operate at a negative pressure in relation to the surrounding area.

   3.2. The system shall be equipped with monitoring equipment to ensure that required exhaust flow or static pressure is provided.

   3.3. Low-flow or static pressure conditions shall send an alarm to the on-site *emergency control station*. The alarm shall be both visual and audible.

4. Cabinet spill containment: Spill containment shall be provided in each cabinet, with the spill containment capable of holding the contents of the aggregate amount of liquids in containers in each cabinet.
5. Valves: Valves in supply piping between the product containers in the cabinet and the workstation served by the containers shall fail in the closed position upon power failure, loss of exhaust ventilation and upon actuation of the fire control system.
6. Fire detection system: Each cabinet shall be equipped with an automatic fire detection system complying with the following conditions:
   6.1. Automatic detection system: UV/IR, high-sensitivity smoke detection (HSSD) or other *approved* detection systems shall be provided inside each cabinet.

   6.2. Automatic shutoff: Activation of the detection system shall automatically close the shutoff valves at the source on the liquid supply.

   6.3. Alarms and signals: Activation of the detection system shall initiate a local alarm within the *fabrication area* and transmit a signal to the *emergency control station*. The alarms and signals shall be both visual and audible.

2705.3 Transportation and handling.
The transportation and handling of hazardous materials shall comply with Sections 2705.3.1 through 2705.3.4.1 and other applicable provisions of this code.

2705.3.1 Corridors and enclosures for stairways and ramps.
Corridors and enclosures for *exit stairways* and *ramps* in new buildings or serving new *fabrication areas* shall not contain HPM, except as permitted in *corridors* by Section 415.11.7.4 of the International Building Code and Section 2705.3.2 of this code.

2705.3.2 Transport in corridors and enclosures for stairways and ramps.
Transport in *corridors* and enclosures for *stairways* and *ramps* shall be in accordance with Sections 2705.3.2.1 through 2705.3.3.

2705.3.2.1 Fabrication area alterations.
Where existing *fabrication areas* are altered or modified in existing buildings, HPM is allowed to be transported in existing *corridors* where such *corridors* comply with Section 5003.10 of this code and Section 415.11.2 of the International Building Code.

2705.3.2.2 HPM transport in corridors and enclosures for stairways and ramps.
Nonproduction HPM is allowed to be transported in *corridors* and enclosures for *stairways* and *ramps* where utilized for maintenance, lab work and testing when the transportation is in accordance with Section 5003.10.

2705.3.3 Service corridors.
Where a new *fabrication area* is constructed, a service corridor shall be provided where it is necessary to transport HPM from a liquid

storage room, HPM room, gas room or from the outside of a building to the perimeter wall of a *fabrication area*. Service corridors shall be designed and constructed in accordance with the *International Building Code*.

2705.3.4 Carts and trucks.

Carts and trucks used to transport HPM in *corridors* and enclosures for *stairways* and *ramps* shall comply with Section 5003.10.3.

2705.3.4.1 Identification. Carts and trucks shall be marked to indicate the contents.

Reason: The overall intent of this proposal is to be more reliant on the nationally recognized standard, NFPA 318. For the most part, provisions in this chapter that are design and construction related are proposed for deletion unless the provisions refer to additional requirements in another I-code or another section of the IFC, that may not be in NFPA 318. With the exception of the MAQ tables, storage, use, and handling requirements have been retained for several reasons, one of which is that the requirements of NFPA 318 do not apply to existing facilities. The MAQ tables are being proposed for deletion since proposals are submitted almost every cycle to correlate the tables in the IFC with the tables in NFPA 318. Due to the different revision cycles, the tables in a particular edition of the IFC will not necessarily correlate with the tables in the edition of NFPA 318 that is referenced. Lastly, the deletion of text will reduce the likelihood of potential claims regarding copyright infringement issues.

For the most part, the proposal is not intended to be a technical change. The text that is proposed for deletion is covered in NFPA 318 or other sections of the IFC or IBC. For example, sprinkler protection will still be required for semiconductor facilities based upon the requirements of NFPA 318. The installation requirements that currently are contained in the IFC are also contained in either NFPA 318 or NFPA 13, which also references NFPA 318. NFPA 318 requires electrical systems to comply with NFPA 70 in addition to a requirement in the IFC for electrical systems to comply with NFPA 70.

In addition to better correlation with NFPA 318, the proposal should result in a Chapter that is easier to enforce by focusing on use and operational requirements, while relying on the IBC and NFPA 318 for design and construction requirements.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

While not editorial or a clarification, the proposal does result in better correlation between the IFC and NFPA 318. The proposal may decrease the cost of construction in instances where NFPA 318 contains a provision that is not currently specifically permitted by the IFC.

F190-24

F191-24

IFC: 2703.14.1; IMC®: [F] 502.10.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

2703.14.1 Where required.
Mechanical exhaust ~~Exhaust~~ ventilation systems shall be provided in the following locations in accordance with the requirements of this section and the *International Building Code*:

1. *Fabrication areas*: Mechanical exhaust ~~Exhaust~~ ventilation for *fabrication areas* shall comply with the *International Building Code*. The *fire code official* is authorized to require additional manual control switches.
2. Workstations: A mechanical exhaust ventilation system shall be provided to capture and exhaust gases, fumes and vapors at workstations.
3. Liquid storage rooms: Mechanical exhaust ~~Exhaust~~ ventilation for liquid storage rooms shall comply with Section 5004.3.1 and the *International Building Code*.
4. HPM rooms: Mechanical exhaust ~~Exhaust~~ ventilation for HPM rooms shall comply with Section 5004.3.1 and the *International Building Code*.
5. Gas cabinets: Mechanical exhaust ~~Exhaust~~ ventilation for gas cabinets shall comply with Section 5003.8.6.2. The gas cabinet ventilation system is allowed to connect to a workstation ventilation system. Mechanical exhaust ~~Exhaust~~ ventilation for gas cabinets containing highly toxic or toxic gases shall also comply with Chapter 60.
6. Exhausted enclosures: Mechanical exhaust ~~Exhaust~~ ventilation for exhausted enclosures shall comply with Section 5003.8.5.2. Mechanical exhaust ~~Exhaust~~ ventilation for exhausted enclosures containing highly toxic or toxic gases shall also comply with Chapter 60.
7. Gas rooms: Mechanical exhaust ~~Exhaust~~ ventilation for gas rooms shall comply with Section 5003.8.4.2. Mechanical exhaust ~~Exhaust~~ ventilation for gas rooms containing highly toxic or toxic gases shall also comply with Chapter 60.
8. Cabinets containing *pyrophoric* liquids or Class 3 water-reactive liquids: Mechanical exhaust ~~Exhaust~~ ventilation for cabinets in *fabrication areas* containing *pyrophoric* liquids or Class 3 water-reactive liquids shall be as required in Section 2705.2.3.4.
9. Where materials having a hazard ranking of 3 or 4 in accordance with NFPA 704 are used or dispensed, mechanical exhaust ventilation that captures gases, fumes, mists or vapors at the point of generation shall be provided in accordance with Sections 5005.2.1.1 and 5005.2.2.1.

2024 International Mechanical Code

Revise as follows:

[F] 502.10.1 Where required. Exhaust ventilation systems shall be provided in the following locations in accordance with the requirements of this section and the *International Building Code* .

1. Fabrication areas: Mechanical exhaust ~~Exhaust~~ ventilation for fabrication areas shall comply with the *International Building Code* . Additional manual control switches shall be provided where required by the code official.
2. Workstations: A mechanical exhaust ventilation system shall be provided to capture and exhaust gases, fumes and vapors at workstations.
3. Liquid storage rooms: Mechanical exhaust ~~Exhaust~~ ventilation for liquid storage rooms shall comply with Section 502.8.1.1 and the *International Building Code* .

4. HPM rooms: Mechanical exhaust ~~Exhaust~~ ventilation for HPM rooms shall comply with Section 502.8.1.1 and the *International Building Code* .
5. Gas cabinets: Mechanical exhaust ~~Exhaust~~ ventilation for gas cabinets shall comply with Section 502.8.2. The gas cabinet ventilation system is allowed to connect to a workstation ventilation system. Mechanical exhaust ~~Exhaust~~ ventilation for gas cabinets containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.
6. Exhausted enclosures: Mechanical exhaust ~~Exhaust~~ ventilation for exhausted enclosures shall comply with Section 502.8.2. Mechanical exhaust ~~Exhaust~~ ventilation for exhausted enclosures containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.
7. Gas rooms: Mechanical exhaust ~~Exhaust~~ ventilation for gas rooms shall comply with Section 502.8.2. Mechanical exhaust ~~Exhaust~~ ventilation for gas rooms containing highly toxic or toxic gases shall also comply with Sections 502.9.7 and 502.9.8.
8. Cabinets containing pyrophoric liquids or Class 3 water-reactive liquids: Mechanical exhaust ~~Exhaust~~ ventilation for cabinets in fabrication areas containing pyrophoric liquids shall be as required in Section 2705.2.3.4 of the International Fire Code.
9. Where materials having a hazard ranking of 3 or 4 in accordance with NFPA 704 are used or dispensed, mechanical exhaust ventilation that captures gases, fumes, mists or vapors at the point of generation shall be provided in accordance with Sections 502.8.4 and 502.8.5.

Reason: This proposal updates the term 'exhaust ventilation' to 'mechanical exhaust ventilation' throughout the section to clarify that exhaust ventilation in these specific locations must be mechanical in nature. Also, a new item (9) is proposed to help ensure that the general mechanical exhaust ventilation requirements found in IFC Sections 5005.2.1.1 and 5005.2.2.1 are also applied to HPM wherever HPM is located in semiconductor facilities. Because Section 2703.14.1 specifically addresses where mechanical exhaust ventilation is required, it could be interpreted that the general provisions in Chapter 50 do not apply. This type of exhaust ventilation, capturing gases, fumes, mists, vapors at the point of generation, is sometimes referred to as ‘point-source’ ventilation and is distinguished from general exhaust systems that serve an entire room or area.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no intended change to the current technical requirements. The proposal clarifies that 1) exhaust ventilation must be mechanical and 2) the general provision in Chapter 50 requiring point-source ventilation for HPM is required. Approving this proposal highlights existing requirements and will have no impact of construction.

F191-24

F192-24

IFC: TABLE 2704.2.2.1; IBC: [F]TABLE 415.11.1.1

Proponents: William Koffel, Koffel Associates, Inc., Semiconductor Industry Association (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

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

HAZARD CATEGORY	SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP per square foot)
Physical-Hazard Materials			
Combustible dust	Note b	Not Applicable	Not Applicable
Combustible fiberLooseBaled	Note b Notes b and c	Not Applicable	Not Applicable
Combustible liquidClass IIClass IIIAClass IIIBCombination Class I, II and IIIA	Not Applicable	0.02 0.04 Not Limited 0.08	Not Applicable
Cryogenic gasFlammableOxidizing	Not Applicable	Not Applicable	Note d 2.5
Explosives	Note b	Note b	Note b
Flammable gasGaseousLiquefied	Not Applicable	Not Applicable	Note d Note d
Flammable liquidClass IAClass IBClass ICCombination Class IA, IB and ICCombination Class I, II and IIIA	Not Applicable	0.005 0.05 0.05 0.05 0.08	Not Applicable
Flammable solid	0.002	Not Applicable	Not Applicable
Organic peroxideUnclassified detonableClass IClass IIClass IIIClass IVClass V	Note b Note b 0.05 0.2 Not Limited Not Limited	Note b Note b 0.0025 0.02 Not Limited Not Limited	Not Applicable
Oxidizing gasGaseousLiquefiedCombination of gaseous and liquefied	Not Applicable	Not Applicable	2.5 2.5 2.5
OxidizerClass 4Class 3Class 2Class 1Combination Class 1, 2, 3	Note b 0.006 0.006 0.006 0.006	Note b 0.06 0.06 0.06 0.06	Not Applicable
Pyrophoric materials	Note b	0.0025	Notes d and e
Unstable (reactive)Class 4Class 3Class 2Class 1	Note b 0.05 0.2 Not Limited	Note b 0.005 0.02 Not Limited	Note b Note b Note b Not Limited
Water reactiveClass 3Class 2Class 1	0.02 [f] 0.5 Not Limited	0.0025 0.05 Not Limited	Not Applicable
Health-Hazard Materials			
Corrosives	Not Limited	Not Limited	Not Limited
Highly toxic	Not Limited	Not Limited	Note d
Toxics	Not Limited	Not Limited	Note d

For SI: 1 pound = 0.454 kg, 1 pound per square foot = 4.882 kg/m^2, 1 gallon per square foot = 40.7 L/m^2, 1 cubic foot @ NTP/square foot

= 0.305 m^3 @ NTP/m^2, 1 cubic foot = 0.02832 m^3.

a. Hazardous materials within piping shall not be included in the calculated quantities.

b. Quantity of hazardous materials in a single fabrication area shall not exceed the maximum allowable quantities per control area in Tables 5003.1.1(1) and 5003.1.1(2).

c. Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.

d. The aggregate quantity of flammable, pyrophoric, toxic and highly toxic gases shall not exceed the greater of 0.2 cubic feet at NTP/square foot or 9,000 cubic feet at NTP. The total quantity of a gas in the fabrication area contributes once to the aggregate quantity, even if the gas presents more than one of the noted hazards.

e. The aggregate quantity of pyrophoric gases in the building shall not exceed the amounts set forth in Table 5003.8.2.

f. Quantity of Class 3 water-reactive solids in a single tool shall not exceed 1 pound.

2024 International Building Code

Revise as follows:

[F]TABLE 415.11.1.1 QUANTITY LIMITS FOR HAZARDOUS MATERIALS IN A SINGLE FABRICATION AREA IN GROUP H-5[a]

HAZARD CATEGORY		SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP/square foot)
PHYSICAL-HAZARD MATERIALS				
Combustible dust		Note b	Not Applicable	Not Applicable
Combustible fiber	Loose	Note b	Not Applicable	Not Applicable
	Baled	Notes b and c		
Combustible liquid	II	Not Applicable	0.02	Not Applicable
	IIIA		0.04	
	IIIB		Not Limited	
Combination Class	I, II and IIIA		0.08	
Cryogenic gas	Flammable	Not Applicable	Not Applicable	Note d
	Oxidizing			2.5
Explosives		Note b	Note b	Note b
Flammable gas	Gaseous	Not Applicable	Not Applicable	Note d
	Liquefied			Note d
Flammable liquid	IA	Not Applicable	0.005	Not Applicable
	IB		0.05	
	IC		0.05	
Combination Class	IA, IB and IC		0.05	
Combination Class	I, II and IIIA		0.08	
Flammable solid		0.002	Not Applicable	Not Applicable
Organic peroxide	Unclassified detonable	Note b	Note b	Not Applicable
	Class I	Note b	Note b	

HAZARD CATEGORY		SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP/square foot)
	Class II	0.05	0.0025	
	Class III	0.2	0.02	
	Class IV	Not Limited	Not Limited	
	Class V	Not Limited	Not Limited	
Oxidizing gas	Gaseous	Not Applicable	Not Applicable	2.5
	Liquefied			2.5
Combination of gaseous and liquefied				2.5
Oxidizer	Class 4	Note b	Note b	Not Applicable
	Class 3	0.006	0.06	
	Class 2	0.006	0.06	
	Class 1	0.006	0.06	
Combination Class	1, 2, 3	0.006	0.06	
Pyrophoric materials		Note b	0.0025	Notes d and e
Unstable (reactive)	Class 4	Note b	Note b	Note b
	Class 3	0.05	0.005	Note b
	Class 2	0.2	0.02	Note b
	Class 1	Not Limited	Not Limited	Not Limited
Water reactive	Class 3	0.02 [f]	0.0025	Not Applicable
	Class 2	0.5	0.05	
	Class 1	Not Limited	Not Limited	
HEALTH-HAZARD MATERIALS				
Corrosives		Not Limited	Not Limited	Not Limited
Highly toxic		Not Limited	Not Limited	Note d
Toxics		Not Limited	Not Limited	Note d

For SI: 1 pound = 0.454 kg, 1 pound per square foot = 4.882 kg/m^2, 1 gallon per square foot = 40.7 L/m^2, 1 cubic foot @ *NTP*/square foot = 0.305 m^3 @ *NTP*/m^2, 1 cubic foot = 0.02832 m^3.

a. Hazardous materials within piping shall not be included in the calculated quantities.

b. Quantity of hazardous materials in a single fabrication shall not exceed the maximum allowable quantities per control area in Tables 307.1(1) and 307.1(2).

c. Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.

d. The aggregate quantity of flammable, pyrophoric, toxic and highly toxic gases shall not exceed the greater of 0.2 cubic feet at *NTP*/square foot or 9,000 cubic feet at *NTP*. The total quantity of a gas in the fabrication area contributes once to the aggregate quantity, even if the gas presents more than one of the noted hazards.

e. The aggregate quantity of pyrophoric gases in the building shall not exceed the amounts set forth in Table 415.6.5.

f. Quantity of Class 3 water-reactive solids in a single tool shall not exceed 1 pound.

Reason: There can be confusion on how to consider gases with multiple hazards when applying IFC Table 2704.2.2.1, QUANTITY LIMITS FOR HAZARDOUS MATERIALS IN A SINGLE FABRICATION AREA IN GROUP H-5 Footnote d, which limits the aggregate quantity of flammable, pyrophoric, toxic, and highly toxic gases in a single fabrication area. Where a gas meets the definition of more than one of the noted hazard classes, users may attempt to include the quantity in each applicable hazard class when determining the aggregate quantity. This proposal clarifies that the code intends for the quantity of a gas to contribute to the aggregate quantity only once, even if it presents more than one of the noted hazards.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

While there are some who have interpreted the application of the Table differently, the proposal intends to clarify the original intent of the Code.

F192-24

F193-24

IFC: TABLE 2705.2.2

Proponents: William Koffel, Koffel Associates, Inc., Semiconductor Industry Association (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

TABLE 2705.2.2 MAXIMUM QUANTITIES OF HPM AT A WORKSTATION[d]

HPM CLASSIFICATION	STATE	MAXIMUM QUANTITY
Flammable, highly toxic, pyrophoric and toxic combined	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
Flammable	Liquid	15 gallons[a, b]
	Solid	5 pounds[a, b]
Corrosive	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
	Liquid	Use-open system: 25 gallons[b] Use-closed system: 150 gallons[b, e]
	Solid	~~20~~ 400 pounds[~~a,~~ b, e]
Highly toxic	Liquid	15 gallons[a, b]
	Solid	5 pounds[a, b]
Oxidizer	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
	Liquid	Use-open system: 12 gallons[b] Use-closed system: 60 gallons[b]
	Solid	20 pounds[a, b]
Pyrophoric	Liquid	0.5 gallon[c, f]
	Solid	4.4 pounds[c, f]
Toxic	Liquid	Use-open system: 15 gallons[b] Use-closed system: 60 gallons[b]
	Solid	5 pounds[a, b]
Unstable reactive Class 3	Liquid	0.5 gallon[a, b]
	Solid	5 pounds[a, b]
Water-reactive Class 3	Liquid	0.5 gallon[c, f]
	Solid	See Table 2704.2.2.1

For SI: 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. Maximum allowable quantities shall be increased 100 percent for closed system operations. Where Note b applies, the increase for both notes shall be allowed.

b. Quantities shall be allowed to be increased 100 percent where workstations are internally protected with an *approved* automatic fire-extinguishing or suppression system complying with Chapter 9. Where Note a applies, the increase for both notes shall be allowed. Where Note e applies, the maximum increase allowed for both Notes b and e shall not exceed 100 percent.

c. Allowed only in workstations that are internally protected with an *approved* automatic fire-extinguishing or fire protection system complying with Chapter 9 and compatible with the reactivity of materials in use at the workstation.

d. The quantity limits apply only to materials classified as HPM.

e. Quantities shall be allowed to be increased 100 percent for nonflammable, noncombustible corrosive liquids where the materials of construction for workstations are listed or *approved* for use without internal fire-extinguishing or suppression system protection. Where Note b applies, the maximum increase allowed for both Notes b and e shall not exceed 100 percent.

f. A maximum quantity of 5.3 gallons of liquids and 44 pounds of total liquids and solids shall be allowed at a workstation where conditions are in accordance with Section 2705.2.3.4.

Reason: The proposal does two things:

- The MAQ for solid corrosives is increased from 20 to 400 pounds
- For solid corrosives, footnote a is proposed to be deleted but footnote e is proposed to be added

The net effect of the change is to more closely align the MAQs for solid corrosives at a workstation and liquid corrosives at a workstation. If all increases are applied, the current code would restrict the quantity of solid corrosives at a workstation to 80 pounds while the quantity of liquid corrosives at a workstation would be permitted to be 300 gallons (approximately 2500 pounds).

Solid corrosives have a low vapor pressure that required a vacuum to sublime the material in order to produce enough vapor for use in manufacturing. Therefore, the solid corrosive needs to be located close to the point of use. The current MAQ for solid corrosives at a workstation is not realistic for consistent operation of a manufacturing process. Furthermore, the highest risk is associated with changing out a solid corrosive vessel.When comparing the risk of liquid corrosives versus solid corrosives, liquid corrosives generally present a higher risk than solid corrosives for the following reasons:

- Liquids can disseminate across the floor and to lower levels in the event of a leak.
- Solids are of a low vapor pressure resulting in a lower risk of vapor exposure as compared to liquids.
- In the event of a container breach or leak, a liquid can escape to the surrounding area with the potential for a liquid exposure as well as a vapor exposure.
- Vapors are controlled by the exhausted enclosure as well as the area exhaust. Solids are less likely to escape the exhausted enclosure as compared to liquids.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00. The cost of construction and operation should decrease

Estimated Immediate Cost Impact Justification (methodology and variables):

Increasing the MAQ permitted at the workstation reduces the need to change out solid corrosive vessels. This is also not related to construction.

F193-24

F194-24

IFC: TABLE 2705.2.2

Proponents: William Koffel, Koffel Associates, Inc., Semiconductor Industry Association (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

TABLE 2705.2.2 MAXIMUM QUANTITIES OF HPM AT A WORKSTATION[d]

HPM CLASSIFICATION	STATE	MAXIMUM QUANTITY
Flammable, highly toxic, pyrophoric and toxic combined	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
Flammable	Liquid	15 gallons[a, b]
	Solid	5 pounds[a, b]
Corrosive	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
	Liquid	Use-open system: 25 gallons[b] Use-closed system: 150 gallons[b, e]
	Solid	20 pounds[a, b]
Highly toxic	Liquid	15 gallons[a, b]
	Solid	5 pounds[a, b]
Oxidizing	Gas	Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet
Oxidizer Class 3 and Class 4 (aggregate)	~~Gas~~	~~Combined aggregate volume of all cylinders at a workstation shall not exceed an internal cylinder volume of 39.6 gallons or 5.29 cubic feet~~
	Liquid	Use-open system: 12 gallons[b] Use-closed system: 60 gallons[b]
	Solid	20 pounds[a, b]
Oxidizer Class 4	Liquid Solid	Maximum Allowable Quantity Maximum Allowable Quantity
Pyrophoric	Liquid	0.5 gallon[c, f]
	Solid	4.4 pounds[c, f]
Toxic	Liquid	Use-open system: 15 gallons[b] Use-closed system: 60 gallons[b]
	Solid	5 pounds[a, b]
Unstable reactive Class 3	Liquid	0.5 gallon[a, b]
	Solid	5 pounds[a, b]
Unstable reactive Class 4	Liquid Solid	Maximum allowable quantity Maximum allowable quantity
Water-reactive Class 3	Liquid	0.5 gallon[c, f]
	Solid	See Table 2704.2.2.1

For SI: 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. Maximum allowable quantities shall be increased 100 percent for closed system operations. Where Note b applies, the increase for both notes shall be allowed.

b. Quantities shall be allowed to be increased 100 percent where workstations are internally protected with an *approved* automatic fire-extinguishing or suppression system complying with Chapter 9. Where Note a applies, the increase for both notes shall be allowed. Where Note e applies, the maximum increase allowed for both Notes b and e shall not exceed 100 percent.

c. Allowed only in workstations that are internally protected with an *approved* automatic fire-extinguishing or fire protection system complying with Chapter 9 and compatible with the reactivity of materials in use at the workstation.

d. The quantity limits apply only to materials classified as HPM.

e. Quantities shall be allowed to be increased 100 percent for nonflammable, noncombustible corrosive liquids where the materials of construction for workstations are listed or *approved* for use without internal fire-extinguishing or suppression system protection. Where Note b applies, the maximum increase allowed for both Notes b and e shall not exceed 100 percent.

f. A maximum quantity of 5.3 gallons of liquids and 44 pounds of total liquids and solids shall be allowed at a workstation where conditions are in accordance with Section 2705.2.3.4.

Reason: The Table is reconfigured to isolate Oxidizing Gas, which is not further classified, from Class 3 and Class 4 liquid and solid oxidizers which are defined as HPM. This reconfiguration also clarifies for the reader that Class 1 and Class 2 liquid and solid oxidizers are not considered, which is consistent with the treatment of Unstable (reactives) and Water Reactives in this Table.

It is presumed that the current quantities allowed for Liquid and Solid Oxidizers in Table 2705.2.2 is the aggregate of both Class 3 and 4 Oxidizers at a workstation. Class 4 Oxidizers are defined as materials that have the potential to undergo an explosive reaction and they are limited by Table 2704.2.2.1 in a single fabrication area to the Maximum Allowable Quantity provided for in Table 5003.1.1(1), which is 0.25 pounds and 0.25 pounds (0.025 gallons), respectively. Without clarification, the reader can misinterpret IFC Table 2705.2.2 to allow for 12 gallons of Class 4 Oxidizer liquids in open use and 60 gallons of Class 4 Oxidizer liquids in closed use in a single workstation in Group H-5. And similarly, 20 pounds of Class 4 Oxidizer solids.

This proposal does not intend to make any changes to the quantities currently allowed, but it does:

1)Align the hazard categories for oxidizing materials with IFC Table 5003.1.1(1),2)Clarify that the quantities listed apply to the aggregate of Class 3 and Class 4 Oxidizer liquids and solids, and3)Adds a new row for Class 4 Oxidizer liquids and solids with maximum quantity limits aligned with the maximum quantities allowed in a single fabrication area in Group H-5 by IFC Table 2704.2.2.1.

The quantity of Class 4 Unstable reactive liquids and solids allowed at a workstation in Group H-5 is also clarified. Both Class 3 and Class 4 Unstable (reactive) liquids and solids are defined as HPM, but only Class 3 Unstable reactive is listed in Table 2705.2.2. IFC Table 2704.2.2.1 currently allows up to the Maximum Allowable Quantity (MAQ) of Class 4 Unstable liquids and solids listed in IFC Table 5003.1.1(1) in a single fabrication area in Group H-5. But, because the Class 4 Unstable (reactive) hazard classification does not appear in Table 2705.2.2, the reader is led to question whether Class 4 Unstable (reactive) materials are allowed at workstations in Group H-5.

The proposal clarifies the code by adding the Class 4 Unstable (reactive) hazard category to Table 2705.2.2 and aligns the maximum quantities for Class 4 Unstable (reactive) liquids and solids with the maximum quantities currently allowed by IFC Table 2704.2.2.1 for these materials in a single fabrication area.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As noted in the Reason Statement, the proposal clarifies the intent of the current code requirements.

F194-24

F195-24

IFC: 2705.4 (New), NFPA Chapter 80

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new text as follows:

2705.4 Waste recovery, handling and treatment systems. Effluent gas or vapor that is toxic or highly toxic shall be handled and treated in accordance with Chapter 60. Waste recovery, handling and treatment systems for other hazardous materials shall comply with NFPA 318.

Revise as follows:

NFPA

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02169-7471

318—22 Standard for the Protection of Semiconductor Fabrication Facilities
2703.16, 2705.4

Reason: IFC Chapter 27 does not currently include specific requirements for the recovery, handling, or treatment of hazardous material waste although these activities are typically integral to every semiconductor manufacturing facility. Chapter 50 and the material-specific chapter requirements are applicable, but still do not specifically address protections and controls that apply to waste recovery, handling, and treatment. NFPA 318 Chapter 10 includes numerous requirements for designing and protecting the various activities and types of waste streams one is likely to encounter at a semiconductor facility. The topics covered by NFPA 318 include waste recovery and handling systems, acid waste treatment systems, organic waste treatment, waste liquid handling, effluent treatment systems, scrubbers, vapor recovery, and vapor processing systems. This proposal sends the user to NFPA 318 Chapter 10 to ensure appropriate safeguards are in place, but because Chapter 50 adequately addresses treatment systems for toxic and highly toxic gas and vapor, there is no need to refer to NFPA 318 for these systems.

The applicable update to NFPA 318 reference standard is proposed to include the new section, 2705.4.

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Minimal or no increased cost of construction, operation, or maintenance is anticipated. Although the IFC does not specifically address waste handling, recovery and treatment currently, the costs associated with these processes are likely already being incurred based on the hazard class(es) of the materials, waste streams and industry best practices. Treatment is also likely to already be occurring to meet state and local environmental waste disposal regulations.

F195-24

F196-24

IFC: SECTION 3005, 3005.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Delete without substitution:

~~SECTION 3005~~
~~INTERLOCKS~~

~~**3005.1 Shut down.** Interlocks shall be provided for Class A ovens so that conveyors or sources of flammable or combustible materials shall shut down if either the exhaust or recirculation air supply fails.~~

Reason: There are over a hundred references to interlocks in NFPA 86. There is currently only one interlock mentioned in Chapter 30. This may give the false impression that this is the only interlock that is required. It would be clearer to remove this single requirement, which is already addressed in NFPA 86, and direct users to NFPA 86 for the appropriate requirements for interlocks. Renumber remaining sections.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The code change proposal will not increase or decrease the cost of construction as the change just clarifies where the interlock requirements can be found.

F196-24

F197-24

IFC: 3006.1, 3006.2 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

3006.1 Protection study~~Required protection~~.
The *owner* shall conduct a study of the oven in accordance with Section 9.1 of NFPA 86 to determine the need for a fire protection system in Class A ~~and B~~ ovens ~~that contain, or are utilized for the processing of, combustible materials shall be protected by an *approved automatic fire-extinguishing system* complying with Chapter 9~~where any of the following conditions exist.

1. Oven is constructed of combustible materials.
2. Workpieces are constructed of combustible materials.
3. Devices for moving or supporting the workpiece are constructed of combustible materials.
4. Ancillary materials applied to or within the workpiece are combustible.

Exceptions:

1. Small tabletop ovens used in laboratory facilities.
2. Nonwalk-in ovens that are less than 4 feet (1219 mm) in length and width.

Add new text as follows:

3006.2 Required protection. Where the study in Section 3006.1 indicated that fire protection is required, the fire protection system shall be in accordance with Chapter 9.

Reason: Changes are based upon FM guidance (FM Datasheet 6-9), current requirements in NFPA 86 and response from ICC Staff (see attached). The requirement for fire protection is based upon the combustibility of the contents of the oven, or the oven itself. A study would determine if there is sufficient combustibles on, or in, the workpiece to require fire protection. Some liquid and powder coated workpieces do not contain enough ignitible material to require fire protection. Class B oven was removed as, by definition, there are no combustibles. The proposed language also identifies who is responsible for the study and points to the appropriate section in NFPA 86 which includes requirements and supporting information in the annex.

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Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is a clarification where fire protection is required. With the revised language it may be possible that this would reduce the cost as the hazard is more specifically addressed.

F197-24

F198-24

IFC: SECTION 105, 105.5.51, [A] 105.6.25, SECTION 3103, 3103.4

Proponents: Jonathan Siu, Jon Siu Consulting, LLC, Self

2024 International Fire Code

SECTION 105
PERMITS

Revise as follows:

105.5.51 Temporary membrane structures, special event structures and tents. An operational permit is required to operate ~~an air-supported~~ a temporary membrane structure, a temporary *special event structure* or a tent having an area in excess of 400 square feet (37 m^2).

Exceptions:

1. Tents used exclusively for recreational camping purposes.
2. Tents, curtains and extensions attached thereto, when used for funeral services.
3. Tents open on all sides, which comply with all of the following:
   - 3.1. Individual tents having a maximum size of 700 square feet (65 m^2).
   - 3.2. The aggregate area of multiple tents placed side by side without a fire break clearance of not less than 12 feet (3658 mm) shall not exceed 700 square feet (65 m^2) total.
   - 3.3. A minimum clearance of 12 feet (3658 mm) to structures and other tents shall be provided.

[A] 105.6.25 Temporary membrane structures and tents. A construction permit is required to erect ~~an air-supported~~ a temporary membrane structure, a temporary special event structure or a tent in accordance with Section 105.5.51.

SECTION 3103
TEMPORARY TENTS AND MEMBRANE STRUCTURES

Revise as follows:

3103.4 Use period.
Temporary *tents*, air-supported, air-inflated or ~~tensioned~~ tensile *membrane structures* shall not be erected for a period of more than 180 days within a 12-month period on a single premises.

Reason: This proposal is intended to make the IFC internally consistent, with respect to its application to temporary structures.

In the process of investigating the application of the building code and the fire code to temporary structures for a separate proposal, it became apparent that there were some discrepancies in the provisions in the 2024 IFC:

- Sections 105.5.51 and 105.6.25 require construction and operational permits for air supported temporary membrane structures. However, Section 3101.1 appears to scope in all membrane structures:

> **3101.1 Scope.** *Tents*, temporary special event structures and *membrane structures* shall comply with this chapter. The provisions of Section 3103 are applicable only to temporary *tents* and *membrane structures*. The provisions of Sections 3104 and 3108 are applicable to temporary and permanent *tents* and *membrane structures*. The provisions of Section 3105 are applicable to temporary special event structures. The provisions of Section 3106 are applicable to inflatable amusement devices. The provisions of Section 3107are applicable to outdoor assembly events. Other temporary structures shall comply with

the *International Building Code*.

- In addition, Section 3103.4 prohibits "tensioned" membrane structures from being permitted for more than 180 days within 12 months. However, since neither Section 105.5.51 nor 105.6.25 require permits for these, they aren't really regulated by the IFC-- there is no "code path" (i.e., legal authority) that gets someone to 3101 or 3103.4.

This proposal revises Sections 105.5.51 and 105.6.25 to encompass all membrane structures, consistent with Section 3101.1. This takes the "lowest common denominator" approach, i.e., takes the broadest interpretation as to what is regulated by the IFC. The changes to Sections 105.5.51 and 105.6.25 will also resolve the code path issue in Section 3103.4. A more strict approach (not taken in this proposal) would have been to revise Sections 3101.1 and 3103.4 to only apply to air-supported temporary membrane structures, consistent with the current provisions in Sections 105.5.51 and 105.6.25.

Finally, Section 3103.4 refers to "tensioned" membrane structures, but the defined term is "tensile" membrane structures. This proposal revises Section 3103.4 to refer to the defined term.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal just makes the IFC internally consistent as far as its scoping of temporary structures is concerned. There are sections in the 2024 IFC that appear to regulate temporary structures more broadly than a tight technical reading of the code would indicate, and jurisdictions who have been enforcing the code with that broad view will see no change in how they approach permits for these structures.

F198-24

F199-24

IFC: 3103.1, 3103.6.1, 3103.8, 3103.8.2, 3103.8.3, 3103.8.4, 3104.1, 3105.1, 3105.4

Proponents: Jennifer Goupil, Structural Engineering Institute of ASCE, American Society of Civil Engineers (jgoupil@asce.org); Don Scott, Don Scott Consulting, PLLC, ASCE/SEI Ad Hoc Committee for Loads on Temporary Structures (don@donscottconsulting.com)

2024 International Fire Code

Revise as follows:

3103.1 General.
Tents and *membrane structures* used for temporary periods shall comply with this section, ~~and~~Section 3107, and with the *International Building Code* as applicable. Other temporary structures erected for a period of 180 days or less shall comply with the *International Building Code*.

3103.6.1 Inspection report. Where required by the *fire code official* or *building official*, an inspection report shall be provided and shall consist of maintenance, anchors and fabric inspections.

3103.8 Structural stability and anchorage required. *Tents* or *membrane structures* and their appurtenances shall be designed and installed ~~to withstand the elements of weather and prevent collapsing~~ in accordance with Sections 3103.8.1 through 3103.8.4. Documentation of structural stability shall be furnished to the *fire code official*.

3103.8.2 Tents and membrane structures greater than one story.
Tents and *membrane structures* exceeding one story shall be designed and constructed to comply with ~~Sections 1606 through 1609 of~~ the International Building Code.

3103.8.3 Tents and membrane structures greater than 7,500 square feet.
Tents and *membrane structures* greater than 7,500 square feet (697 m^2) shall be designed and constructed to comply ~~with Sections 1606 through 1609 of~~ the International Building Code.

3103.8.4 Tents and membrane structures with an occupant load greater than 1,000.
Tents and *membrane structures* with an occupant capacity greater than 1,000 persons shall be designed and constructed to comply with ~~Sections 1606 through 1609 of~~ the International Building Code.

3104.1 General.
Tents and *membrane structures*, both temporary and permanent, shall be in accordance with this section and Sections 3107 and 3108, and~~. Permanent *tents* and *membrane structures*~~ shall also comply with the *International Building Code*.

3105.1 General.
Temporary special event structures shall comply with Section 3104, Sections 3105.2 through 3105.8 and ~~ANSI E1.21~~the *International Building Code*.

3105.4 Required documents.
The following documents shall be submitted to the *fire code official* and the building official for review before a permit is *approved*:

1. Construction documents: *Construction documents* shall be prepared by a *registered design professional* in accordance with Section 3103 of the *International Building Code* ~~and ANSI E1.21~~ where applicable. *Construction documents* shall include:
   1.1. A summary sheet showing the building code used, design criteria, loads and support reactions.
   1.2. Detailed construction and installation drawings.
   1.3. Design calculations.
   1.4. Operating limits of the structure explicitly outlined by the *registered design professional* including environmental conditions and physical forces.
   1.5. Effects of additive elements such as video walls, supported scenery, audio equipment, vertical and horizontal coverings.
   1.6. Means for adequate stability including specific requirements for guying and cross-bracing, ground anchors or ballast for different ground conditions.
2. Designation of responsible party: The *owner* of the temporary special event structure shall designate in writing a person to have responsibility for the temporary special event structure on the site. The designated person shall have sufficient knowledge of the *construction documents*, manufacturer's recommendations and operations plan to make judgments regarding the structure's safety and to coordinate with the *fire code official*.
3. Operations plan: The operations plan shall reflect manufacturer's operational guidelines, procedures for environmental monitoring and actions to be taken under specified conditions consistent with the *construction documents*.

Reason: This code change proposal is being submitted to align the IFC with the current provisions in the IBC regarding temporary structures.

In Group B of the last cycle, a committee organized by ASCE/SEI submitted code change proposal S116-22, which was approved as modified by public comments by the membership. S116-22 added provisions for modified loads on public-occupancy temporary structures into 2024 IBC 3103. The provisions also included requirements for installation and maintenance inspections, controlled occupancy procedures, and durability. The industry standards for these types of structures (ANSI E1.21 and ANSI ES1.7) were adopted by reference in IBC Chapter 35.

This proposal will align the next edition of the IFC with the new IBC provisions by:

- Pointing to the IBC or the building official as needed (Sections 3103.1 and 3103.6.1);
- Clarifying that larger tents and membrane structures must comply with more than just the listed sections in the IBC (Sections 3103.8.2 through 3103.8.4);
- Clarifying that compliance with the IBC is required for both temporary and permanent tents and membrane structures (Section 3104.1); and
- Deleting a now-unnecessary reference to ANSI E1.21 and pointing to the IBC (Sections 3105.1 and 3105.5 Item 1);

The ad hoc group that worked on the IBC last cycle, continuted this effort with this coordinating code change for this cycle. This code change will align the IFC with what is currently in the 2024 IBC for temporary structures.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Since this is just aligning the 2027 IFC with the requirements already in the 2024 IBC, there will be no impact on the cost of construction. (A cost impact statement for the IBC changes was included in S116-22.)

F199-24

F200-24

IFC: SECTION 3103, 3103.8, SECTION 3105, 3105.5.2

Proponents: Jonathan Siu, Jon Siu Consulting, LLC, Self

2024 International Fire Code

SECTION 3103
TEMPORARY TENTS AND MEMBRANE STRUCTURES

Revise as follows:

3103.8 Structural stability and anchorage required. *Tents* or *membrane structures* and their appurtenances shall be designed and installed to withstand the elements of weather and prevent collapsing. Documentation of structural stability shall be furnished to the *fire code official* and the building official.

SECTION 3105
TEMPORARY SPECIAL EVENT STRUCTURES

Revise as follows:

3105.5.2 Inspection report. The inspecting agency or individual shall furnish an inspection report to the *fire code official* and the building official. The inspection report shall indicate that the temporary special event structure was inspected and was or was not installed in accordance with the *approved construction documents*. Discrepancies shall be brought to the immediate attention of the installer for correction. Where any discrepancy is not corrected, it shall be brought to the attention of the *fire code official*, the building official, and the designated responsible party.

Reason: The purpose of this proposal is to clarify in the IFC that the building official should also receive appropriate permit and inspection documentation, for the benefit of permit applicants who mostly work with the IFC.

IFC Section 3103.8 states that "documentation of structural stability" for temporary tents or membrane structures must be submitted to the fire code official. However, temporary tents and membrane structures that are regulated by the IFC also require building permits (compare IFC Sections 105.5.51 and 105.6.25 with IBC Section 3103.1.3). It stands to reason that the same documentation submitted to the fire code official for structural stability should be also submitted to the building official.

Similarly, IFC Section 3105.5.2 requires what is essentially a special inspector's report to be submitted to the fire code official, but temporary special event structures also require a building permit (IFC Section 3105.2). The building official will also need the special inspection report to close out the permit, and should be notified of any discrepancies between what was constructed and what was approved on the plans.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal only clarifies in the IFC what is already required by the IBC. As such, there is no impact on the cost of construction or enforcement.

F200-24

F201-24

IFC: 3104.1, 3104.2, 3104.3, 3104.4

Proponents: Marcelo Hirschler, GBH International, GBH International (mmh@gbhint.com); Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

3104.1 General.
Tents and *membrane structures*, both temporary and permanent, shall be in accordance with this section and Sections 3107 and 3108. Permanent *tents* and *membrane structures* shall also comply with the *International Building Code*.

Revise as follows:

3104.2 Flame propagation performance testing and certification.
Before a permit is granted, the *owner* or agent shall file with the *fire code official* ~~a certificate~~ an affidavit provided by the product manufacturer to verify that the materials have been tested and certified by an *approved* testing laboratory. The affidavit ~~certificate~~ shall indicate that the floor coverings, *tents*, *membrane structures* and their appurtenances, which include sidewalls, drops and tarpaulins, are composed of materials meeting the flame propagation performance of Test Method 2 of NFPA 701. Additionally, it shall indicate that the bunting and combustible decorative materials and effects are composed of material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2 of NFPA 701, as applicable. Alternatively, the materials shall be treated with a flame retardant in an *approved* manner and meet the flame propagation performance criteria of the applicable test method of NFPA 701. The affidavit ~~certificate~~ shall indicate compliance with the testing requirements of NFPA 701, Chapter 16. The flame propagation performance criteria shall be effective for the period specified by the permit.

3104.3 Label.
Membrane structures or *tents* shall have a permanently affixed label bearing the following information:

1. The identification of size and fabric or material.
2. The names and addresses of the manufacturers of the *tent* or air-supported structure.
3. A statement that the fabric or material meets the requirements of Section 3104.2.
4. If treated, the date when a flame-retardant treatment was last applied to the fabric or material, the trade name or kind of chemical used in treatment, name of person or firm treating the fabric or material, and name of testing agency and test standard by which the fabric or material was tested.
5. If untreated, a statement that no treatment was applied when the fabric or material met the requirements of Section 3104.2.

3104.4 Affidavit.
The affidavit required by Section 3104.2 shall contain all of the information specified in Section 3104.3.

Reason: Section 3104.4 states that the "affidavit" required in section 3104.2 shall contain certain information. In actual fact, section 3104.2 does not contain the word "affidavit" but the word "certificate" and requires that a certificate provide all the relevant information. Clearly the two words are intended to have the same meaning. Since the requirement for an "affidavit" associated with this testing is also called for in the section on inflatables (in 3106), this proposal simply changes the word "certificate" for the word "affidavit" in section 3104.2. The use of the word "affidavit" in section 3104.4 was originally proposed by the industry using these types of tents for events.

Grammatically, the use of the word "certificate" in the same sentence as the word "certified" is relatively poor use of language: "Before a permit is granted, the owner or agent shall file with the fire code official a **certificate** provided by the product manufacturer to verify that the materials have been tested and **certified** by an approved testing laboratory."

This is not the sole location where the term "affidavit" is used in ICC codes. It is actually also used in the IBC and in the IRC.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Simply changes words meaning the same.

F201-24

F202-24

IFC: 3104.2, 3104.4, 3104.3, 3106.3

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

3104.2 Flame propagation performance testing and certification.
Before a permit is granted, the *owner* or agent shall file with the *fire code official* a certificate provided by the product manufacturer to verify that the materials have been tested and certified by an *approved* testing laboratory. The certificate shall indicate that the floor coverings, *tents*, *membrane structures* and their appurtenances, which include sidewalls, drops and tarpaulins, are composed of materials meeting the flame propagation performance of Test Method 2 of NFPA 701. Additionally, it shall indicate that the bunting and combustible decorative materials and effects are composed of material meeting the flame propagation performance criteria of Test Method 1 or Test Method 2 of NFPA 701, as applicable. Alternatively, the materials shall be treated with a flame retardant in an *approved* manner and meet the flame propagation performance criteria of the applicable test method of NFPA 701. The certificate shall indicate compliance with the testing requirements of NFPA 701, Chapter 16. The flame propagation performance criteria shall be effective for the period specified by the permit.

Revise as follows:

~~3104.4~~ 3104.2.1 ~~Affidavit~~Certificate.
The ~~affidavit~~certificate required by Section 3104.2 shall contain all of the information specified in Section 3104.3.

3104.3 Label.
Membrane structures ~~or~~and *tents* shall have a permanently affixed label bearing the following information:

Exception: A certificate or documentation from the manufacturer is acceptable for existing membrane structures and tents not provided with a label at the time of manufacturing.

1. The identification of size and fabric or material.
2. The names and addresses of the manufacturers of the *tent* or air-supported structure.
3. A statement that the fabric or material meets the requirements of Section 3104.2.
4. If treated, the date when a flame-retardant treatment was last applied to the fabric or material, the trade name or kind of chemical used in treatment, name of person or firm treating the fabric or material, and name of testing agency and test standard by which the fabric or material was tested.
5. If untreated, a statement that no treatment was applied when the fabric or material met the requirements of Section 3104.2.

3106.3 Combustible materials.
The materials used in the construction of the inflatable amusement device shall meet the flame propagation criteria of Test Method 2 of NFPA 701. ~~Additionally, a~~A label ~~and affidavit~~ containing the information required in ~~Sections~~Section 3104.3 ~~and 3104.4 of this code~~ shall be permanently affixed to the device.

Reason: Sections 3104.4 and 3106.3 refer to an “affidavit”. Section 3104.2 requires an affidavit as specified in Section 3104.2. But, Section 3104.2 does not require an affidavit, nor does it even refer to an affidavit. This proposal is intended to clarify the requirements in these sections.

An affidavit is a "sworn statement made under oath". Affidavit is not the appropriate term for this requirement. The code official is looking for documentation that the item has met specific criteria. Section 3104.2 requires a certificate to be submitted to the fire code official at the time the permit is applied for. Additionally, Section 3104.3 requires a permanent label to be affixed to membrane structure. Therefore, a certificate and label are both required for the membrane structure. The revision will eliminate confusion as to the affidavit which can be construed as a 3rd piece of documentation.

There are existing membrane structures which do not bear a label, however they do have a certificate stating acceptable flammability requirements. For those situations, an exception is added to allow use of these older membrane structures when they can produce a certificate, but don't have a label.

Section 3104.4 is relocated to Section 3104.2.1. This section is revised to refer to the certificate and state the criteria for the certificate is listed in 3104.3. The certificate and label contain the information needed to determine compliance with flammability requirements.

Section 3104.3 is also revised to clarifies the provisions apply to membrane structures and tents.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal does not add any requirements. It provides an optional method to identify the flame resistance of materials, and clarifies what type of "affidavit" is acceptable.

F202-24

F203-24

IFC: SECTION 202, 3105.3, 3105.4, 3107.4.1, ANSI Chapter 80 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Richard Nix, Entertainment Services and Technology Association (ESTA), ESTA, and the Event Safety Alliance (ESA) (rnix@zoomtown.com)

2024 International Fire Code

Revise as follows:

TEMPORARY SPECIAL EVENT STRUCTURE. Any temporary ground-supported structure, platform, stage, stage scaffolding or rigging, canopy, tower~~, upporting audio or visual effects equipment~~ <u>or similar structures supporting entertainment-related equipment or signage for a special event.</u>~~ not regulated within the scope of the *International Building Code*.~~

3105.3 Use period.
Temporary special event structures erected in accordance with ANSI E1.21 shall not be erected for a period of more than <u>180 days.</u> ~~six consecutive weeks.~~

3105.4 Required documents.
The following documents shall be submitted to the *fire code official* and the building official for review before a permit is *approved*:

1. Construction documents: *Construction documents* shall be prepared by a *registered design professional* in accordance with the *International Building Code* and ANSI E1.21 where applicable. *Construction documents* shall include:
   - 1.1. A summary sheet showing the building code used, design criteria, loads and support reactions.
   - 1.2. Detailed construction and installation drawings.
   - 1.3. Design calculations.
   - 1.4. Operating limits of the structure explicitly outlined by the *registered design professional* including environmental conditions and physical forces.
   - 1.5. Effects of additive elements such as video walls, supported scenery, audio equipment, vertical and horizontal coverings.
   - 1.6. Means for adequate stability including specific requirements for guying and cross-bracing, ground anchors or ballast for different ground conditions.
2. Designation of responsible party: The *owner* of the temporary special event structure shall designate in writing a person to have responsibility for the temporary special event structure on the site. The designated person shall have sufficient knowledge of the *construction documents*, manufacturer’s recommendations and operations plan to make judgments regarding the structure’s safety and to coordinate with the *fire code official*.
3. Operations <u>management</u> plan: The operations <u>management</u> plan shall <u>comply with</u> <u>the requirements of ANSI E1.21, and shall</u> reflect manufacturer’s operational guidelines, procedures for environmental monitoring and actions to be taken under specified conditions consistent with the *construction documents*.

3107.4.1 Public safety plan for gatherings.
A public safety plan shall be prepared where required by Section 403.11.2. <u>The public safety plan shall include the operations management plan required by Section 3105.4 item 3, and a weather preparedness plan in accordance with ANSI ES1.7.</u> The public safety plan shall be submitted to the *fire code official* with the application for an operational permit as required by Section 3107.2.2.

Add new standard(s) as follows:

ANSI

American National Standards Institute
25 West 43rd Street, 4th Floor
New York, NY 10036

<u>ES1.7-2021</u>	<u>Event Safety Requirements - Weather Preparedness</u> <u>3107.4.1</u>

Staff Analysis: The proposed referenced standard, ***Event Safety Requirements - Weather Preparedness (ANSI ES1.7-2021)***, is currently referenced in the ***IBC***.

Reason:

FCAC:

1. The revised definition harmonizes with the IBC definition.

   [BG]SPECIAL EVENT STRUCTURE. Any ground-supported *structure*, *platform, stage, stage* scaffolding or rigging, *canopy*, tower or similar *structure* supporting entertainment-related equipment or signage.

   [BS]TEMPORARY EVENT.A single use during the *service life* of a *public-occupancy temporary structure* at a given location that includes its installation, inspection, use and occupancy, and dismantling.

   [BS]TEMPORARY STRUCTURE.Any *building* or *structure* erected for a period of 180 days or less to support *temporary events*. *Temporary structures* include a range of *structure* types (*public-occupancy temporary structures*, temporary *special event structures*, *tents*, umbrellas and other membrane *structures*, *relocatable buildings*, temporary *bleachers*, etc.) for a range of purposes (storage, equipment protection, dining, workspace, assembly, etc.).
2. The change in use period is now consistent with both IBC and ANSI E1.21. ANSI E1.21 has been revised to incorporate the new IBC design load requirements, thereby eliminating the 6-week limitation.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website.

Richard Nix:

1. The revised definition harmonizes with the IBC definition.
2. The change in use period is now consistent with both IBC and ANSI E1.21. ANSI E1.21 has been revised to incorporate the new IBC design load requirements, thereby eliminating the 6-week limitation.
3. The change in operational requirements enhances the public safety plan, if required, by including the Operations Management Plan information, and the weather preparedness plan information, providing an approved ANSI standard as a reference for the weather preparedness details.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The definition change is in coordination with the IBC 2024 requirements. The change from '6weeks' to '180 days' will reduce costs. The adoption of ANSI ES1.7 Event Safety - Weather Preparedness may increase costs of compliance but is considered industry practice and is not related to construction costs.

F203-24

F204-24

IFC: 3106.3, ASTM Chapter 80

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

3106.3 Combustible materials.
The materials used in the construction of the inflatable amusement device shall comply with the requirements of ASTM F2374 ~~meet the flame propagation criteria of Test Method 2 of NFPA 701~~. Additionally, a label and affidavit containing the information required in Sections 3104.3 and 3104.4 of this code shall be permanently affixed to the device.

ASTM

ASTM International
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F2374—22 ~~19~~ Standard Practice for Design, Manufacture, Operation, and Maintenance of Inflatable Amusement Devices

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Standard Practice for Design, Manufacture, Operation, and Maintenance of Inflatable Amusement Devices (ASTM F2374—22 ~~19~~)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: The requirements in this section are based on the requirements for fire testing in ASTM F2374 (Standard Practice for Design, Manufacture, Operation, and Maintenance of Inflatable Amusement Devices). When this IFC section was approved, ASTM F2374 required all fabrics in these inflatable devices to comply with the fire test in NFPA 701. Since then, ASTM F2374 has been updated, in 2022, to exclude internal gusset fabrics from being required to be tested to NFPA 701 test method 2. The reason that ASTM F2374 was changed is that the fabrics used for internal gusset are always very lightweight fabrics and they typically cannot comply with the flame propagation requirements of NFPA 701 Test Method 2 (which is much more severe than NFPA 701 Test Method 1). Furthermore, as a consequence, in actual practice several ahjs are just recommending to manufacturers that they should just meet NFPA 705 (which is just a match test) and ignore the actual requirement. NFPA 705 is in no way an appropriate fire test.

The change in fire safety requirements within ASTM E2574 reflects actual practice but is not expected to adversely affect the safety of the inflatable device.In fact, since ASTM F2374 contains the actual requirements for the combustible materials to be used in these inflatable devices, there is no need for the IFC to repeat the requirements in the code.FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

This change has the potential to decrease the cost of compliance and is not related to construction. The revised standard allows some (lightweight fabric) materials to be tested to a less severe fire test (NFPA 701 test method 1 instead of test method 2) for compliance. Generally these are the fabrics that are in use now so the cost savings is probably minimal.

F204-24

F205-24

IFC: 3203.9, 3203.9.1, 3203.9.2, FIGURE 3203.9(1), SECTION 202 (New)

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

3203.9 ~~Limited quantities of~~ Commodities containing Group A plastics ~~in mixed commodities~~.

~~Figures 3203.9(1) and 3203.9(2) shall be used to determine the commodity classification based on the quantity of Group A plastics in the following situations:~~

1. ~~The product is not listed in Table 3203.8 and contains Group A plastics.~~
2. ~~The commodity contains Group A plastics and is not classified as high hazard in Table 3203.8.~~
3. ~~The product listing in Table 3203.8 does not specifically include packaging, and the packaging material includes Group A plastics.~~

Commodities containing any amount of Group A plastics shall be classified as a Group A plastic commodity, unless either of the following apply:

1. The product is listed in Table 3203.8 and the listing specifically includes Group A plastics or packaging material of Group A plastics.
2. The commodity is evaluated in accordance with Section 3203.9.1 based on the amount of Group A plastics contained in the commodity and the result is other than Group A plastics.

3203.9.1 Classifying mixed commodities with limited Group A plastics.

The percentage of Group A plastics determined in accordance with Section 3203.9.2 shall be used in Figures 3203.9(1) and 3203.9(2). ~~Results from Figure 3203.9(1) must be compared to results from Figure 3203.9(2) and the commodity will be classified with the highest commodity classification.~~ Commodities with products in cartons, boxes or crates shall use Figure 3203.9(1). Commodities with exposed Group A plastics shall use Figure 3203.9(1).

Figures 3203.9(1) and 3203.9(2) shall not be used to reduce the commodity classification shown in Table 3203.8.

3203.9.2 Percentage of Group A plastics.

The pallet, if any, shall not be included when measuring the weight of the commodity (W_{PU} ~~or W_{PE}~~) or the volume of the commodity (V_{PE}). The pallet, if any, shall be included when measuring the weight of the entire load (W_L) or the volume of the entire load (V_L).

Exception: Where noncombustible pallets are used, the pallets shall not be included in the volume and weight calculations.

The percentage by weight of Group A unexpanded plastics in the load shall be calculated in accordance with Equation 32-1.

The percentage by volume of Group A expanded plastics in the load shall be calculated in accordance with Equation 32-2.

~~The percentage by weight of Group A expanded plastics in the load shall be calculated in accordance with Equation 32-3.~~

$$P_{WU} = W_{PU} / W_L \quad \textbf{(Equation-32-1)}$$

where:

P_{WU} = Percentage by weight of Group A unexpanded plastic.

W_{PU} = Weight of Group A unexpanded plastic in the commodity, not including the weight of the pallet, if any.

W_L = Weight of the entire load, including the weight of the pallet, if any.

$$P_{VE} = V_{PE} / V_L \quad \textbf{(Equation-32-1)}$$

where:

P_{VE} = Percentage by volume of Group A expanded plastic.

V_{PE} = Volume of Group A expanded plastic in the commodity, not including the volume of the pallet, if any.

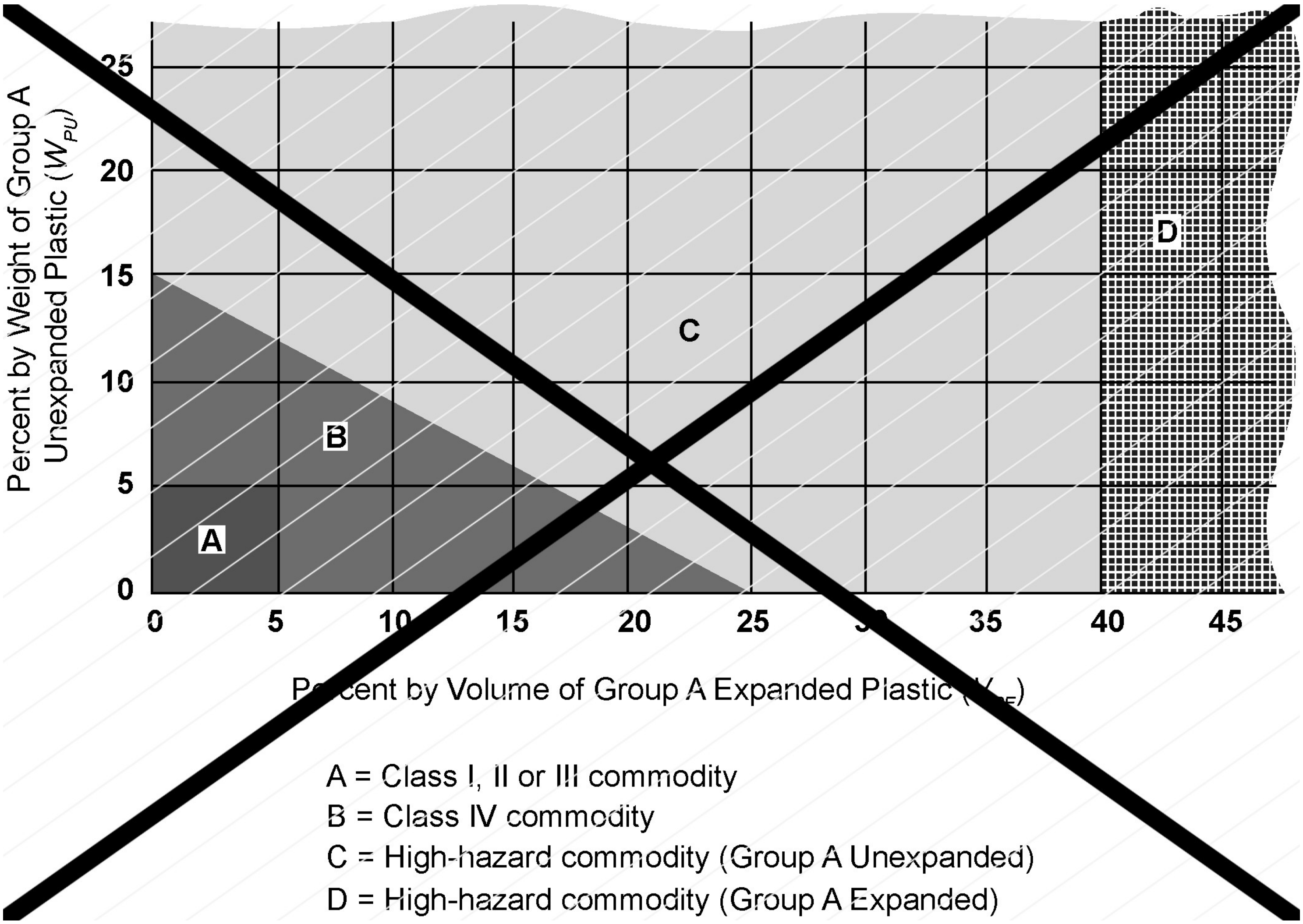
V_L = Volume of the entire load, including the volume of the pallet, if any.

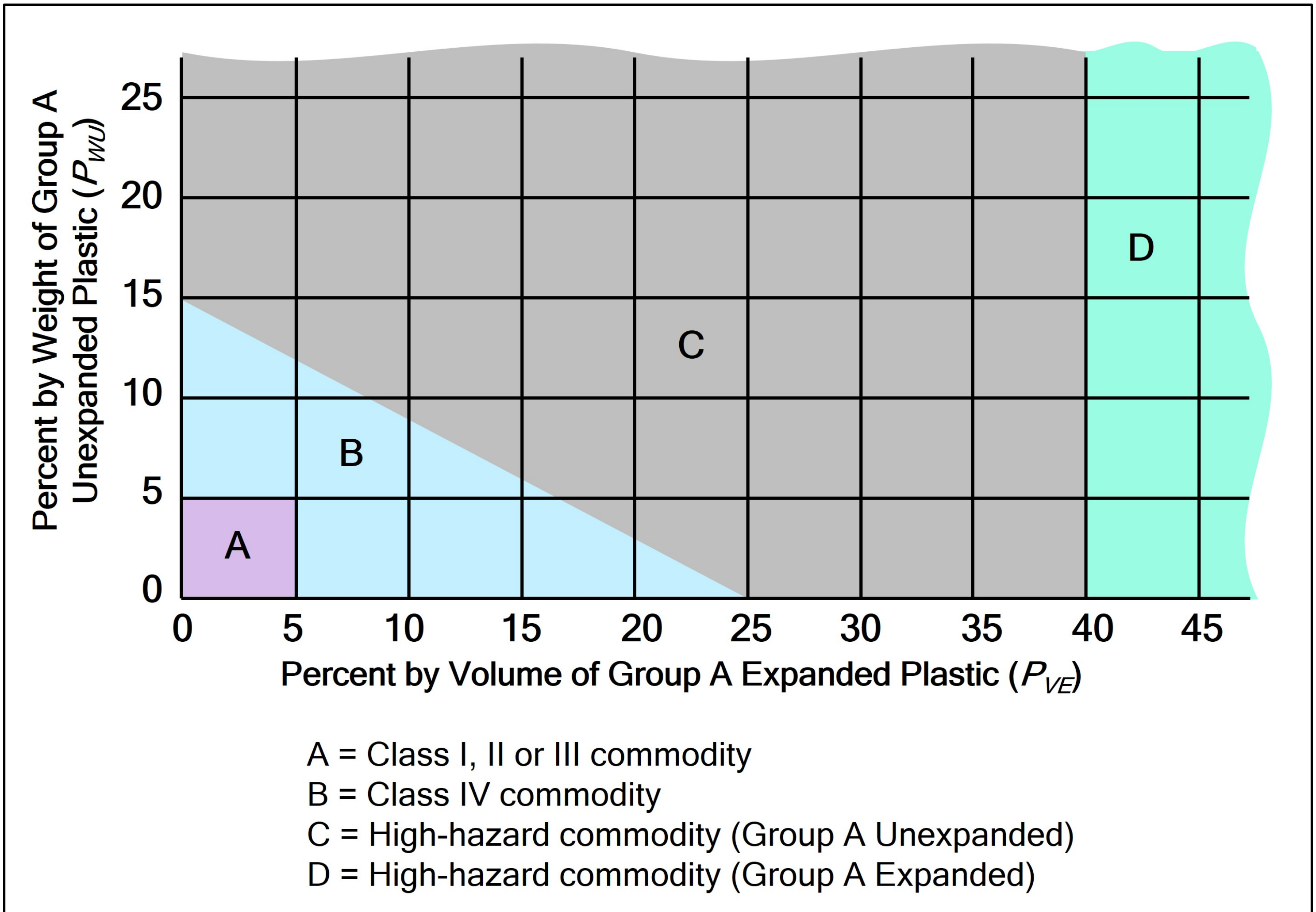
~~$P_{WE} = W_{PE} / W_L$~~ ~~**(Equation 32-3)**~~~~where:~~

~~P_{WE} = Percentage by weight of Group A expanded plastic.~~

~~W_{PE} = Weight of Group A expanded plastic in the commodity, not including the weight of the pallet, if any.~~

~~W_L = Weight of the entire load, including the weight of the pallet, if any.~~





a. This figure is used to determine the commodity classification of a mixed commodity with Group A plastics in a package or crate.

b. The following is an example of how to apply Figure 3203.9(1): A pallet load consists of a Class III commodity in cardboard boxes with components of unexpanded Group A plastic and packing material of expanded Group A plastic. Using Equation 32-1, the weight of unexpanded Group A plastic is 5 percent. Using Equation 32-2, the volume of expanded Group A plastic is 15 percent. This commodity is classified as a Class IV commodity. If the volume of the expanded Group A plastic is increased to 20 percent, the classification changes to a high-hazard (Group A unexpanded) commodity. Where the load is stored on a plastic pallet, the requirements in Section 3203.10 also apply.

FIGURE 3203.9(1) EVALUATION OF CARTONED COMMODITIES CONTAINING GROUP A PLASTICS[a, b]

Add new definition as follows:

EXPOSED GROUP A PLASTIC. Commodities containing any amount of Group A plastics that are not within packaging, cartons or coverings that can absorb water to affect the burning hazard of the commodity. Encapsulated loads containing Group A plastic shall be considered exposed Group A plastic. Products containing Group A plastic with a single-thickness paper wrapping shall be considered exposed Group A plastic.

Reason: This proposal clarifies the method for determining whether limited quantities of Group A plastics affect the classification of the commodity.

Section 2303.9 is revised with no technical change. The section is revised to say that commodities containing Group A plastics shall be classified as Group A plastics. This provision has two options: 1) the listing in Table 3203.8 includes a description of the commodity and includes the Group A plastics, and 2) the subsequent figures are used to evaluate the quantity of Group A plastics and determine the impact provided by those limited quantities.

Figures 3203.9(1) and (2) were revised in the 2021 IFC to alter their use. However, some of the code text needing revision to correlate was missed. This proposal correlates the text with the figures.

Figure 3203.9(1) is revised. The only changes are the parenthetic acronyms for Percentage by Weight of Expanded plastic (PWE) and Percentage by Volume of Unexpanded plastic (PVU). This is done to correlate with the terms in Equations 32-1 and 32-2.

Only one figure is required to complete the calculation of the impact of Group A plastic. Figure 3203.9(1) is used for classifying commodities which are cartoned, boxed, or crated. Figure 3203.9(2) is used for classifying commodities which are exposed. To facilitate this difference, a new definition is added for exposed Group A plastics. This definition is consistent with the definition in NFPA 13.

Both figures compare the weight of unexpanded plastic (Y axis) to the volume of expanded plastic (X axis). The weight of expanded plastics is no longer used in the figures. Equation 32-3 was used to determine the weight of expanded plastics and is no longer needed, so Equation 32-3 is deleted.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal correlates the requirements and terms in these sections and adds a definition to assist in their application. It also corrects an editorial error in the 2024 IFC.

F205-24

F206-24

IFC: 3203.9.2

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

3203.9.2 Percentage of Group A plastics.

The pallet, if any, shall not be included when measuring the weight of the commodity (W_{PU} or W_{PE}) or the volume of the commodity (V_{PE}). The pallet, if any, shall not be included when measuring the weight of the entire load (W_L) or the volume of the entire load (V_L).

~~**Exception:** Where noncombustible pallets are used, the pallets shall not be included in the volume and weight calculations.~~

The percentage by weight of Group A unexpanded plastics in the load shall be calculated in accordance with Equation 32-1.
The percentage by volume of Group A expanded plastics in the load shall be calculated in accordance with Equation 32-2.
The percentage by weight of Group A expanded plastics in the load shall be calculated in accordance with Equation 32-3.

$$P_{WU} = W_{PU} / W_L \qquad \textbf{(Equation-32-1)}$$

where:

P_{WU} = Percentage by weight of Group A unexpanded plastic.

W_{PU} = Weight of Group A unexpanded plastic in the commodity, not including the weight of the pallet, if any.

W_L = Weight of the entire load, not including the weight of the pallet, if any.

$$P_{VE} = V_{PE} / V_L \qquad \textbf{(Equation 32-2)}$$

where:

P_{VE} = Percentage by volume of Group A expanded plastic.

V_{PE} = Volume of Group A expanded plastic in the commodity, not including the volume of the pallet, if any.

V_L = Volume of the entire load, not including the volume of the pallet, if any.

$$P_{WE} = W_{PE} / W_L \qquad \textbf{(Equation 32-3)}$$

where:

P_{WE} = Percentage by weight of Group A expanded plastic.

W_{PE} = Weight of Group A expanded plastic in the commodity, not including the weight of the pallet, if any.

W_L = Weight of the entire load, not including the weight of the pallet, if any.

Reason: This proposal removes the pallet from the calculation of the volume and weight when determining the percentages of Group A plastics. The pallet should not be included in these calculations, because a separate section addresses the pallet, if pallets are utilized.

When calculating the percentage of Group A plastics, the commodity only is to be addressed. The commodity includes the products and the packaging components. Once the commodity is classified, that classification is applicable whether a wooden pallet is used or not. For example, consider a Class IV commodity consisting of boxes stacked to 15' high. The commodity is still considered Class IV when wooden pallets are added in the storage configuration. This is evidenced in the descriptions of the commodity classifications which state "…with or without wood pallets."

Therefore, when calculating the impact of Group A materials within the commodity, the pallet is not included. The sections have been revised to state that the pallet is not included.

However, if plastic pallets are utilized, then Section 3203.10 applies which deals with plastic pallets. Even if the pallets are of a Group A plastic material, they are not included in the commodity classification. Once the commodity classification is determined, Section 3203.10 will be used to determine if the plastic pallets further modify the commodity classification.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00 or more depending on the increase in water flow required per square foot if the commodity changes to a higher commodity classification. It is possible that the water flow required per square foot could increase 10% or more. This will only result in an increase in cost if the water system or piping distribution system cannot accommodate the increased flows.

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal could result in a slight cost increase because the percentage of Group A plastics by weight and by volume will change. Based on the number of variables involved in the final design it is not feasible to provide a reasonable estimate of the possible increase.

F206-24

F207-24

IFC: TABLE 3206.2

Proponents: John Swanson, National Fire Sprinkler Association, NFSA (swanson@nfsa.org); Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Revise as follows:

TABLE 3206.2 GENERAL FIRE PROTECTION AND LIFE SAFETY REQUIREMENTS

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE AREA[a] (square feet) (see Sections 3206.2 and 3206.3)	ALL STORAGE AREAS (see Sections 3206, 3207 and 3208)[b]				SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (see Section 3207.3)		
		Automatic sprinkler system ~~fire-extinguishing system~~ ~~(see Section 3206.4)~~	Fire detection system (see Section 3206.5)	Fire department access doors (see Section 3206.7)	Smoke and heat removal (see Section 3206.8)	Maximum pile dimension[c] (feet)	Maximum permissible storage height[d] (feet)	Maximum pile volume (cubic feet)
I–IV	0–500	Not Required[a]	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
	501–2,500	Not Required[a]	Yes[g]	Not Required	Not Required	120	40	100,000
	2,501–12,000 Open to the public	Yes	Not Required	Not Required	Not Required	120	40	400,000
	2,501–12,000 Not open to the public (Option 1)	Yes	Not Required	Not Required	Not Required	120	40	400,000
	2,501–12,000 Not open to the public (Option 2)	Not Required[a]	Yes	Yes	Yes[h, i]	120	30[e]	200,000
	12,001–500,000	Yes	Not Required	Yes	Yes[h, i]	120	40	400,000
	Greater than 500,000[f]	Yes	Not Required	Yes	Yes[h, i]	120	40	400,000
High hazard	0–500	Not Required[a]	Not Required	Not Required	Not Required	60	Not Required	Not Required
	501–2,500 Open to the public	Yes	Not Required	Not Required	Not Required	60	30	75,000
	501–2,500 Not open to the public (Option 1)	Yes	Not Required	Not Required	Not Required	60	30	75,000
	501–2,500 Not open to the public (Option 2)	Not Required[a]	Yes[g]	Yes	Yes[h, i]	60	20	50,000
	2,501–300,000	Yes	Not Required	Yes	Yes[h, i]	60	30	75,000
	Greater than 300,000[f]	Yes	Not Required	Yes	Yes[h, i]	60	30	75,000

For SI: 1 foot = 304.8 mm, 1 cubic foot = 0.02832 m^3, 1 square foot = 0.0929 m^2.

a. Where automatic sprinklers are required for reasons other than those in Chapter 32, the portion of the sprinkler system protecting the high-piled storage area shall be designed and installed in accordance with Sections 3207 and 3208.

b. For aisles, see Section 3206.10.

c. Piles shall be separated by aisles complying with Section 3206.10.

d. For storage in excess of the height indicated, special fire protection shall be provided in accordance with Note f where required by the fire code official. See Chapters 51 and 57 for special limitations for aerosols and flammable and combustible liquids, respectively.

e. For storage exceeding 30 feet in height, Option 1 shall be used.

f. Special fire protection provisions including, but not limited to, fire protection of exposed steel columns; increased sprinkler density; additional in-rack sprinklers, without associated reductions in ceiling sprinkler density; or fire department hose connections shall be provided where required by the fire code official.

g. Not required where an automatic fire-extinguishing system is designed and installed to protect the high-piled storage area in accordance with Sections 3207 and 3208.

h. Not required where storage areas are protected by either early suppression fast response (ESFR) sprinkler systems or control mode special application sprinklers with a response time index of 50 (meters-seconds)$^{1/2}$ or less that are listed to control a fire in the stored commodities with 12 or fewer sprinklers, installed in accordance with NFPA 13.

i. Not required in frozen food warehouses used solely for storage of Class I and II commodities where protected by an *approved* automatic sprinkler system.

Reason: Over the past several code cycles NFSA has worked to correlate the terminology used for automatic sprinkler system in the International codes. Previously, the codes used terms such as "automatic extinguishing system", "automatic sprinkler system", "fire suppression system", and "fire sprinklers" when referring to fire sprinklers. This change is trying to correlate the terminology since the codes define "automatic sprinkler system".

Bibliography: John Swanson, National Fire Sprinkler Association

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

No cost impact. Change is made for correlation purposes when the code requires an "automatic sprinkler system" to be installed so the same terminology is being used.

F207-24

F208-24

IFC: 3206.4

Proponents: John Swanson, National Fire Sprinkler Association, NFSA (swanson@nfsa.org); Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Revise as follows:

3206.4 Automatic sprinkler~~s~~ system.
Automatic sprinkler systems shall be provided in accordance with Sections 3207, 3208 and 3209.

Reason: Over the past several code cycles NFSA has worked to correlate the terminology used for automatic sprinkler system in the International codes. Previously, the codes used terms such as "automatic extinguishing system", "automatic sprinkler system", "fire suppression system", and "fire sprinklers" when referring to fire sprinklers. This change is trying to correlate the terminology since the codes define "automatic sprinkler system".

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no cost impact to this change. Change is intended to bring correlation and consistency to the IFC when referring to automatic sprinkler systems and when they are required.

F208-24

F209-24

IFC: 3206.7, 3206.7.1, 3206.7.2, 3206.7.3, 3206.7.4, 3206.7.5, 3206.7.6, 3206.7.7, 3206.7.8

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

3206.7 Fire department access doors.
Where fire department access doors are required by Table 3206.2, fire department access doors shall be provided in accordance Sections 3206.7.1 through ~~3206.7.8~~3206.7.7.

Delete without substitution:

~~**3206.7.1 Exterior walls without fire department access doors**~~.
~~Fire department access doors are not required in an *exterior wall* that does not face a fire apparatus access road provided that all of the following conditions occur:~~

1. ~~The opposite *exterior wall* faces a fire apparatus access road.~~
2. ~~The opposite *exterior wall* is provided with fire department access doors.~~
3. ~~The entire interior surface of the *exterior wall* is less than 150 feet (45 720 mm) away from a fire department access door.~~
4. ~~The building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1.~~

Revise as follows:

~~**3206.7.2**~~ **3206.7.1 Where located.** Where *exterior walls* surrounding *high-piled storage areas* face fire apparatus access roads, such walls shall be provided with fire department access doors.

Exception: Fire department access doors are not required in an exterior wall provided that all of the following conditions occur:

1. The opposite exterior wall faces a fire apparatus access road.
2. The opposite exterior wall is provided with fire department access doors.
3. The entire interior surface of the exterior wall is less than 150 feet (45 720 mm) away from a fire department access door in the opposite wall.
4. The building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

~~**3206.7.3**~~**3206.7.2 Access to doors.** Fire department access doors shall be able to be accessed without the use of a ladder.

~~**3206.7.4**~~**3206.7.3 Marking on fire department access doors.** Fire department access doors shall be labeled on the exterior side with the following sign or other *approved* sign:

FIRE DEPARTMENT ACCESS DOOR
DO NOT BLOCK

The lettering shall be in a contrasting color to the background. Letters shall have a minimum height of 2 inches (51 mm) with a minimum stroke of $^{3}/_{8}$ inch (10 mm).

~~**3206.7.5**~~**3206.7.4 Number of doors required.** The required fire department access doors shall be distributed such that the lineal distance between adjacent fire department access doors does not exceed 125 feet (38 100 mm) measured center to center.

Exception: The linear distance between adjacent access doors shall not exceed 200 feet (60 960 mm) in existing buildings where change in occupancy is not proposed.

~~3206.7.6~~3206.7.5 **Door size and type.** Fire department access doors shall be not less than 3 feet (914 mm) in width and 6 feet 8 inches (2032 mm) in height. Roll-up doors shall not be considered fire department access doors unless *approved*.

~~3206.7.7~~3206.7.6 **Locking devices.** Locking devices on fire department access doors shall be *approved*.

~~3206.7.8~~3206.7. Key box.

Where fire department access doors are required, a key box shall be installed in accordance with Section 506.1. The key box shall contain keys or devices to allow for entry through the fire department access doors.

Reason: This code change accomplishes two things: 1) reorders the requirements for fire department access doors, and 2) clarifies where FD access can be eliminated.

These sections are reordered to place the requirement to provide FD access doors as the initial provision in Section 3206.7.1. Then Section 3206.7.2 becomes an exception for where FD access doors are not required.

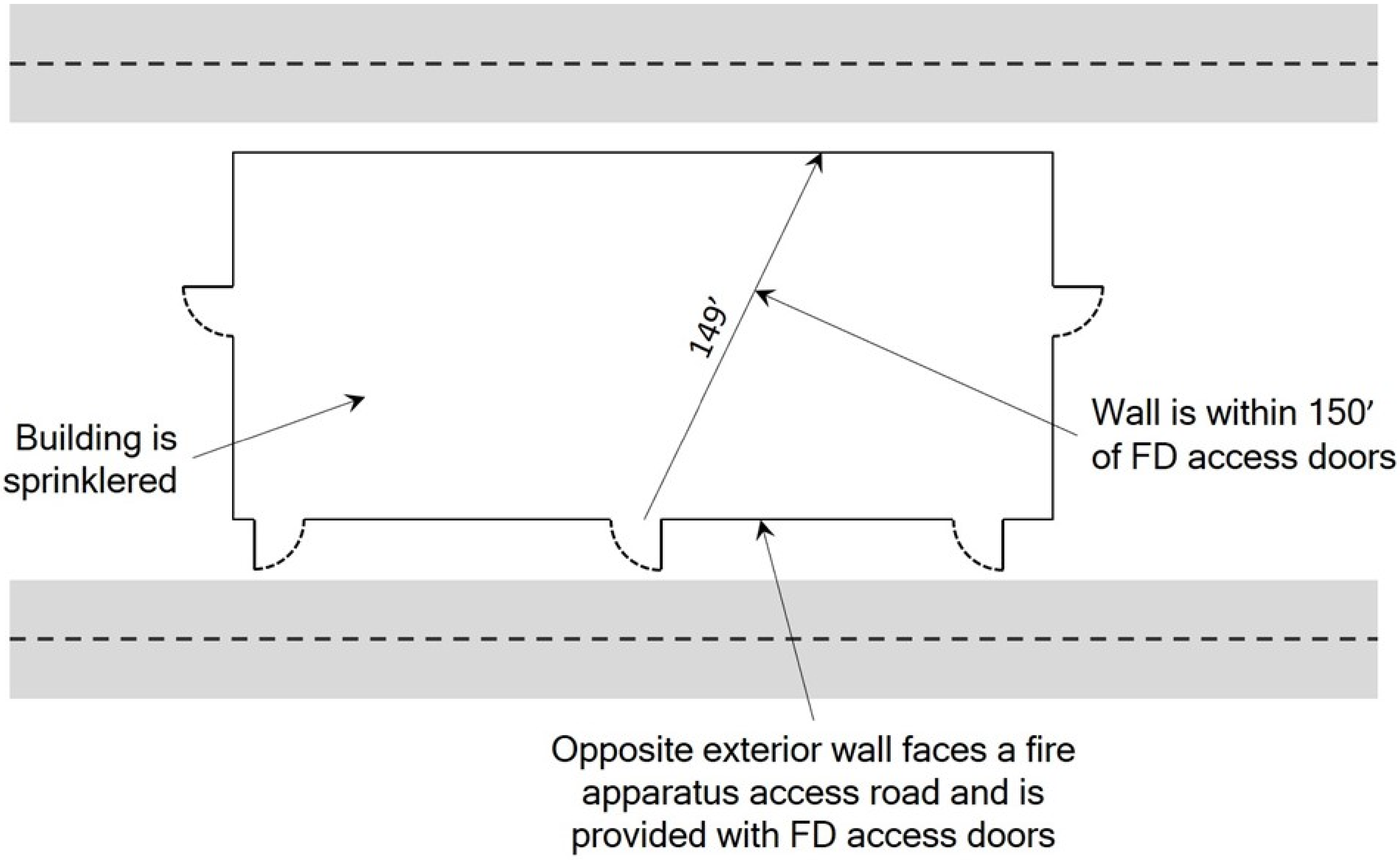
The current language in these two sections is confusing. It states that exterior walls facing a fire apparatus access road must have FD access doors. In other words, if the exterior wall does not face a fire apparatus access road, the FD access doors are not required. But the current requirements in Section 3206.7.1 of the 2024 IFC state that walls that don't face a fire apparatus road can only eliminate doors if the four criteria are met. These two sections contradict each other. The proposal specifies where the FD access doors are required, and where they can be eliminated.

With this proposal, Section 3206.7.1 states that all exterior walls surrounding high-piled storage areas must be provided with FD access doors. The exception indicates where FD access doors are not required.

As a result, the provisions as a whole will be applied as follows:

1. Section 3206.7.1 – exterior wall facing a fire apparatus access road shall be provided with FD access doors.
2. Exception – even where the exterior wall faces a fire apparatus access road, FD access doors are not required if the building is narrow and the four criteria are met.

The criteria specify that a wall does not need FD access doors if the opposite wall is provided with FD access doors and that wall faces a fire apparatus access road. Additionally, all portions of the wall without FD access doors must be within 150' of a fire department access door located in the opposite wall, and the building must be sprinklered. See graphic.



Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is a section reordering to place the requirement to provide FD access doors as the initial provision in Section 3206.7.1.

F209-24

F210-24

IFC: 3303.1.1, 3303.5, 3303.5.1, 3303.5.2, 3303.5.2.1, 3303.5.2.2, 3303.5.2.3, 3303.5.3, 3303.5.4; IBC: 3302.1.1; IEBC: [F] 1502.1.1

Proponents: Steven Orlowski, Sundowne Building Code Consultants, LLC, Self (sorlowski@sbcc.codes)

2024 International Fire Code

Revise as follows:

3303.1.1 Components of site safety plans.
Site safety plans shall include the following as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where *approved*, and signage locations in accordance with Section 3305.7.
7. Location and safety considerations for temporary heating equipment.
8. Hot work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of *flammable* and *combustible liquids* and other hazardous materials.
11. Provisions for site security ~~and where required, for a fire watch~~.
12. Changes that affect this plan.
13. Other site-specific information required by the *fire code official*.
14. Provision for a fire watch, where required.

3303.5 Fire watch.
Where required by the *fire code official* or the *site safety plan* established in accordance withSection 3303.1, a fire watch shall be provided for building construction, alteration, or demolition and in accordance with Section 3303.6 ~~for building construction~~.

3303.5.1 Fire watch during construction. A fire watch shall be provided during nonworking hours for ~~new construction~~ that exceeds 40 feet (12 192 mm) in height above the lowest adjacent grade at any point along the building perimeter, for new multistory construction with an aggregate area exceeding 50,000 square feet (4645 m^2) per story or as required by the *fire code official.*

~~3303.5.2~~ 3303.6 **Fire watch personnel.** Fire watch personnel shall be ~~provided~~ in accordance with this section.

~~3303.5.2.1~~3303.6.1 **Duties.** ~~The primary duty~~ Duties of the fire watch personnel shall be to perform constant patrols, ~~and~~ watch for the occurrence of fire, attempt to control an an incipient stage fire and report the fire in accordance with the site safety plan. The combination of fire watch duties and site security duties shall be permissible. ~~is acceptable.~~

~~3303.5.2.2~~ 3303.6.2 **Training.**
Personnel shall be trained to serve as a~~n on-site~~ fire watch. Training shall include the appropriate type and use of portable fire extinguishers. ~~Fire extinguishers and fire reporting shall be in accordance with Section 3303.6.~~

~~3303.5.2.3~~3303.6.3 **Means of notification.** Fire watch personnel shall be provided with not fewer than one *approved* means for notifying the fire department.

~~3303.5.3~~ 3303.6.4 Fire watch location ~~and records~~.
The fire watch shall include areas specified by the *site safety plan* established in accordance with Section 3303.

~~3303.5.4~~3303.6.5 **Fire watch records.** Fire watch personnel shall keep a record of all time periods of duty, including the log entry for each time the site was patrolled and each time a structure was entered and inspected. Records shall be made available for review by the *fire code official* upon request.

2024 International Building Code

Revise as follows:

3302.1.1 Components of site safety plans.
Site safety plans shall include the following, as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, *standpipes*, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where *approved*, and signage locations in accordance with the *International Fire Code.*
7. Location and safety considerations for temporary heating equipment.
8. Hot-work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of *flammable* and *combustible liquids* and other *hazardous materials*.
11. Provisions for site security ~~and, where required, for a fire watch.~~
12. Changes that affect this plan.
13. Other site-specific information required by the *International Fire Code* .
14. Provision for a fire watch, where required.

2024 International Existing Building Code

Revise as follows:

[F] 1502.1.1 Components of site safety plans.
Site safety plans shall include the following as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.

6. Smoking and cooking policies, designated areas to be used where approved and signage locations in accordance with the International Fire Code.
7. Location and safety considerations for temporary heating equipment.
8. Hot work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of flammable and combustible liquids and other hazardous materials.
11. Provisions for site security ~~and, where required, for a fire watch~~.
12. Changes that affect this plan.
13. Other site-specific information required by the International Fire Code.
14. <u>Provision for a fire watch, where required.</u>

Reason: The intent of this proposal is to provide additional information and clarification for the duties of the fire watch, when it is required by the AHJ or the site safety plan. Currently, the fire watch is listed as a subset of the site security under the site safety plan list of components, which to some didn't seem like an appropriate place for it to be listed. It is important to note, that while the term alterations is being added to section 3303.5, the entire chapter already applies to alterations so there is no substantive changes being made in this proposal. The remaining editorial changes to section 3303.5 through 3303.6.5 are to coordinate with other changes that are being proposed to Chapter 33 of both the International Building Code and the International Fire Code and to clarify the duties and responsibilities of the fire watch personnel.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As stated in the reason statement, the changes in this proposal are editorial in nature.

F210-24

F211-24

IFC: 3303.1.1, 3307.2; IBC: [A] 112.2, 3302.1.1, [F] 3313.1; IEBC: [F] 1502.1.1, [F] 1512.1

Proponents: Jeffrey M Hugo, CBO, NFSA, National Fire Sprinkler Association (hugo@nfsa.org)

2024 International Fire Code

Revise as follows:

3303.1.1 Components of site safety plans.
Site safety plans shall include the following as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where *approved*, and signage locations in accordance with Section 3305.7.
7. Location and safety considerations for temporary provisions, including heating equipment and utility connections.
8. Hot work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of *flammable* and *combustible liquids* and other hazardous materials.
11. Provisions for site security and where required, for a fire watch.
12. Changes that affect this plan.
13. Other site-specific information required by the *fire code official*.

3307.2 Water supply for fire protection.
A~~n *approved*~~ water supply for fire protection, *approved* by the fire code official, either temporary or permanent, shall be made available as soon as combustible building materials arrive on the site, on commencement of vertical combustible construction and on installation of a standpipe system in buildings under construction, in accordance with Sections 3307.2.1through 3307.4.

Exception: The *fire code official* is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

2024 International Building Code

Revise as follows:

[A] 112.2 Temporary connection.
The *building official* shall have the authority to authorize the temporary connection of the building or system to the utility, the source of energy, fuel, or power, or the water system or sewer system for the purpose of testing systems or for use under a temporary approval. Temporary connections for construction shall be indicated on the site safety plan in Section 3302.1.

3302.1.1 Components of site safety plans.
Site safety plans shall include the following, as applicable:

1. Name and contact information of site safety director.

2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, *standpipes*, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where *approved*, and signage locations in accordance with the *International Fire Code.*
7. Location and safety considerations for temporary provisions, including heating equipment and utility connections.
8. Hot-work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of *flammable* and *combustible liquids* and other *hazardous materials*.
11. Provisions for site security and, where required, for a fire watch.
12. Changes that affect this plan.
13. Other site-specific information required by the *International Fire Code* .

[F] 3313.1 Where required.
A~~n *approved*~~ water supply for fire protection, approved by the fire code official, either temporary or permanent, shall be made available as soon as combustible *building* materials arrive on the site, on commencement of vertical combustible construction, and on installation of a *standpipe system* in *buildings* under construction, in accordance with Sections 3313.2 through 3313.5.

Exception: The *fire code official* is authorized to reduce the fire-flow requirements for isolated *buildings* or a group of *buildings* in rural areas or small communities where the development of full fire-flow requirements is impractical.

2024 International Existing Building Code

[F] 1502.1.1 Components of site safety plans.
Site safety plans shall include the following as applicable:

1. Name and contact information of site safety director.
2. Documentation of the training of the site safety director and fire watch personnel.
3. Procedures for reporting emergencies.
4. Fire department vehicle access routes.
5. Location of fire protection equipment, including portable fire extinguishers, standpipes, fire department connections and fire hydrants.
6. Smoking and cooking policies, designated areas to be used where approved and signage locations in accordance with the International Fire Code.
7. Location and safety considerations for temporary heating equipment.
8. Hot work permit plan.
9. Plans for control of combustible waste material.
10. Locations and methods for storage and use of flammable and combustible liquids and other hazardous materials.
11. Provisions for site security and, where required, for a fire watch.
12. Changes that affect this plan.
13. Other site-specific information required by the International Fire Code.

Revise as follows:

[F] 1512.1 When required.
A~~n~~ ~~*approved*~~ water supply for fire protection approved by the fire code official, either temporary or permanent, shall be made available as soon as combustible building material arrives on the site, on commencement of vertical combustible construction, and on installation of a standpipe system in buildings under construction, in accordance with Sections 1512.1 through 1512.5.

> **Exception:** The fire code official is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

Reason: Currently there is no link for the service utility connections and the safeguards during construction in the IBC, IFC, and IEBC. This proposal adds the temporary utility connections to the site safety plan in IBC 3302.1.1, IFC, 3303.1.1, and IEBC 1502.1.1. These sections should address any temporary connections and locations on site. In the proposed change to IBC Section 3313.1, IFC Section 3307.2 and IEBC 1512.1, the fire code official is specifically addressed because of their authority, during construction, to approve either temporary or permanent water supplies for temporary or permanent fire protection systems.

The other portion of this gang of proposals will be in Group B under the Admin Committee. This committee will address the proposed changes to IBC, Section 112.2. The proposed language for the IBC, Group B is:

[A] 112.2 Temporary connection. The building official shall have the authority to authorize the temporary connection of the building or system to the utility, the source of energy, fuel, or power, or the water system or sewer system for the purpose of testing systems or for use under a temporary approval.
Temporary connections for construction shall be indicated on the site safety plan in Section 3302.1.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Utilities, such as the water supply is part of the construction process. The code already allows for temporary means, or the installation of the permanent utility connection.

F211-24

F212-24

IFC: 3303.6 (New), 3303.6

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new text as follows:

3303.6 Fire department emergency contact information.. The fire department emergency telephone number and construction site address shall be posted at the main entrance to the site, in guard shacks, in the construction site office and adjacent to an emergency telephone, where provided in accordance with Section 3303.6.1.

Revise as follows:

~~3303.6~~ 3303.6.1 Emergency telephone. Emergency telephone facilities with *ready access* shall be provided in an *approved* location ~~at the construction site,~~ or an *approved* equivalent means of communication shall be provided. ~~The street address of the construction site and the emergency telephone number of the fire department shall be posted adjacent to the telephone. Alternatively, where an equivalent means of communication has been *approved*, the site address and fire department emergency telephone number shall be posted at the main entrance to the site, in guard shacks and in the construction site office.~~

Reason: The existing paragraph has been revised to focus primarily on the need the fire department emergency contact information to be posted in key areas of the job site. In its current form of the 2024 IFC, the information is located in a section focusing on the emergency telephone and is not as prevalent as it should be for the user. The task group believes that the emergency contact information should be listed separately and that the emergency telephone requirements is a subset of the emergency contact information.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As stated in the reason statement, this is an editorial change moving existing language from one section into its own section and renumbering the remaining existing content. No new requirements have been added to the code.

F212-24

F213-24

IFC: 3304.1.3

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

~~3304.1.3~~3304.1.2.1 ~~Rubbish~~Combustible waste material containers.
Where provided rubbish containers with a capacity exceeding 5.33 cubic feet (40 gallons) (0.15 m^3) ~~are~~ used during work shift for temporary storage of combustible debris, rubbish and waste material~~, they~~ shall have tight-fitting or self-closing lids. Such rubbish containers shall be constructed entirely of materials that comply with either of the following:

1. Noncombustible materials.
2. Materials that meet a peak rate of heat release not exceeding 300 kW/m^2 when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation.

Reason: The proposal was developed to clarify that the containers referenced in this section are those containers that are used by construction workers that are emptied throughout the day and at the end of every shift. The requirement in this section are not intended to apply to the combustible waster container outside of the building and this added language clarifies that the section applies to the temporary containers used inside the building during work hours. The other editorial change made was to renumber section and revise the title, to continue to use the terms combustible waster material as mentioned in the preceding sections.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There are no anticipated additional costs associated with this change as it is editorial only. This simply clarifies which containers are to be used and is only applicable for combustible debris, rubbish and waste materials that are required to be removed after each work shift.

F213-24

F214-24

IFC: 3305.1, 3305.5, 3305.10.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

3305.1 Listed. Temporary heating devices shall be *listed* and *labeled* for the intended use. ~~The installation, maintenance and use of temporary~~ Temporary heating devices shall be installed, used and maintained in accordance with the listing and the manufacturer's instructions.

3305.5 ~~Cutting and welding~~ Welding and other hot work.
Welding, cutting, open torches and other hot work operations and equipment shall comply with Chapter 35.

3305.10.2 Fire extinguishers for roofing operations.
Fire extinguishers shall comply with Section 906. There shall be not less than one multiple-purpose portable fire extinguisher with a minimum ~~3-A 40-B:C~~ 2A 20 BC rating on the roof being covered or repaired.

Reason: The first two changes are editorial clean up of the language in section 3305.1 to clarify that the temporary heating devices must be listed and labeled for their intended use and restructured the second sentence to match the first sentence, leading off with the temporary heating devices. The next editorial change is retitling 3305.5 to hot works, instead of cutting and welding, as the section talks about more than just the two actions. The last change, is changing the fire extinguisher rating from a 3-A 40 B:C to the 2 A 20BC rating to correlate the requirements with fire extinguishers rating requirements for ordinary hazards in accordance with Table 906.3(1) and Table 906.3(2).

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: Increase

Estimated Immediate Cost Impact:

The cost increase is focused on the cost increase for a different extinguisher type which would be an increase of $25-$50 dollars per extinguisher.

Estimated Immediate Cost Impact Justification (methodology and variables):

Most of the proposed changes are purely editorial in nature, except for the change from requiring a 3-A 40 B:C to now referencing a 2A 20BC fire Extinguisher. Based on an internet search, the cost difference between the two types would be an increase of $25-$50 dollars per extinguisher. The total impact to the cost of construction would vary on the number of extinguishers needed to comply based on the size and number of stories being constructed.

F214-24

F215-24

IFC: 3305.10, 3305.10.1, 3305.10.2 (New), 3305.10.2

Proponents: Mark S. Graham, National Roofing Contractors Association (NRCA) (mgraham@nrca.net)

2024 International Fire Code

3305.10 Safeguarding roofing operations.
Roofing operations utilizing heat-producing systems or other ignition sources shall be conducted in accordance with Sections 3305.10.1 and 3305.10.2 and Chapter 35.

3305.10.1 Asphalt and tar kettles.
Asphalt and tar kettles shall be operated in accordance with Section 303.

Add new text as follows:

<u>**3305.10.2** **Open-flame roof torch devices.** Roofing operations utilizing open-flame roof torch devices shall be conducted in accordance with *approved* open-flame torch device safety training and Section 105.5.25. There shall be lot less than two multiple-purpose portable fire extinguishers with a minimum 3-A 40-B:C rating within 10 feet (3 m) of each lit torch.</u>

Revise as follows:

~~3305.10.2~~ <u>3305.10.3</u> Fire extinguishers for roofing operations.
Fire extinguishers shall comply with Section 906. There shall be not less than one multiple-purpose portable fire extinguisher with a minimum 3-A 40-B:C rating on the roof being covered or repaired.

Reason: This code change proposal is intended to add additional safety requirements for open-flame roof torch devices used in the application of torch-applied, polymer-modified bitumen membrane roof systems and membrane flashings. Use of these membranes is permitted in IBC Section 1507.11 and IRC Section R905.11.

Various safety training programs exist for the use of open-flame roof torch devices, including training by torch device manufacturers, roof membrane product manufacturers, roofing apprentice and labor union programs, and roofing industry trade associations. For example, the Midwest Roofing Contractors Association/National Roofing Contractors Association's CERTA (certified roof torch applicator) program has trained more than 42,000 roofing workers on the safe use of open-flame roof torch devices since the program's inception in 2004. In that time, the fire safety record for torch-applied polymer-modified bitumen membrane roof systems and membrane flashings has improved dramatically. The CERTA program includes a 3-year re-training requirement and trained applicators carry a "CERTA card" documenting their training and current status.

The proposed code change also references an existing requirement in Section 105.5.25 for an operational permit for hot work.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The cost of complying with the additional training requirement will vary based on the specific training program implemented. Some of the training is available free-of-charge, built into the cost of purchasing open-flame roof troch devices or torch applied, polymer-modified bitumen membrane and membrane flashing products. The cost of the CERTA program is $210 per applicator for three-years of training recognition. Re-training cost for additional three years is $210 per applicator.

Estimated Immediate Cost Impact Justification (methodology and variables):

Assuming a six person roofing crew installing torch applied, polymer-modified bitumen membrane and membrane flashing products, only two of the crew members will likely concentrate their efforts on torch application. Assuming that crew performs 20 torch-applied, polymer-modified bitumen membrane and membrane flashing product job installations per year, 60 over the three-year training period, the training cost is only $7 per job.

F216-24

IFC: 3306.1, 3306.3, 3306.5, 3306.5.1; IBC: SECTION 3312, [F] 3312.1, [F] 3312.2; IEBC: SECTION 1510, [F] 1510.1, [F] 1510.2

Proponents: Steven Orlowski, Sundowne Building Code Consultants, LLC, Self (sorlowski@sbcc.codes)

2024 International Fire Code

Revise as follows:

3306.1 Fire protection devices. The site safety director shall ensure that all fire protection equipment is maintained, ~~and~~ serviced, and inspected in accordance with this code. ~~Fire protection equipment shall be inspected in accordance with the fire protection program.~~

3306.3 Smoke detectors and smoke alarms. Smoke detectors and smoke alarms located in an area where airborne construction dust is expected shall be ~~covered~~ protected in accordance with the manufacturer's instructions and NFPA 72 to prevent exposure to dust or shall be temporarily removed. Smoke detectors and alarms that were removed shall be replaced upon conclusion of dust-producing work. Smoke detectors and smoke alarms that were ~~covered~~ protected shall be inspected and cleaned, as necessary, upon conclusion of dust-producing work.

3306.5 Automatic sprinkler system.
In buildings where an *automatic sprinkler system* is required by this code or the *International Building Code*, it shall be ~~unlawful~~ prohibited to occupy any portion of a building or structure until the *automatic sprinkler system* installation has been tested and *approved*, except as provided in Section 105.3.4.

3306.5.1 Operation of valves. Operation of sprinkler control valves shall be allowed only by properly authorized personnel and shall be accompanied by notification of duly designated parties. Where the sprinkler protection is being ~~regularly turned off and on~~ impaired to facilitate connection of newly completed segments, the sprinkler control valves shall be checked at the end of each work period to ascertain that protection is in service.

2024 International Building Code

SECTION 3312
AUTOMATIC SPRINKLER SYSTEM

Revise as follows:

[F] 3312.1 Completion before occupancy.
In *buildings* where an *automatic sprinkler system* is required by this code, it shall be ~~unlawful~~ prohibited to occupy any portion of a *building* or *structure* until the *automatic sprinkler system* installation has been tested and *approved*, except as provided in Section 111.3.

[F] 3312.2 Operation of valves.
Operation of sprinkler control valves shall be permitted only by properly authorized personnel and shall be accompanied by notification of duly designated parties. When the sprinkler protection is being ~~regularly turned off and on~~ impaired to facilitate connection of newly completed segments, the sprinkler control valves shall be checked at the end of each work period to ascertain that protection is in service.

2024 International Existing Building Code

SECTION 1510
AUTOMATIC SPRINKLER SYSTEM

Revise as follows:

[F] 1510.1 Completion before occupancy.
In buildings where an automatic sprinkler system is required by this code or the *International Building Code*, it shall be ~~unlawful~~ prohibited to occupy any portions of a building or structure until the automatic sprinkler system installation has been tested and *approved*, except as provided in Section 110.3.

[F] 1510.2 Operation of valves.
Operation of sprinkler control valves shall be permitted only by properly authorized personnel and shall be accompanied by notification of duly designated parties. When the sprinkler protection is being ~~regularly turned off and on~~ impaired to facilitate connection of newly completed segments, the sprinkler control valves shall be checked at the end of each work period to ascertain that protection is in service.

Reason: The intent of this code change is to clarify for the site safety director the applicable NFPA standards and other pertinent information that they should use for reference when maintaining, servicing and inspecting fire protection devices. For example, the codes require smoke alarms and smoke detectors to comply with both NFPA 72 and the manufacturer's installation, both of which outline how to protect the devices from airborne dust during construction. Likewise, the code currently references the use of NFPA 10 when selecting the location and size of portable fire extinguishers. The remaining proposed changes are editorial in nature and do not add any substantive change to the code.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The changes being proposed are editorial in nature and will have no impact on the cost of construction. See reason statement.

F216-24

F217-24 Part I

PART I - IFC: 3307.1, 3307.1.3, 3307.5, 3307.5.1, 3307.5.2; IBC: SECTION 3310, [F] 3310.2, SECTION 3311, [F] 3311.1, [F] 3311.2, [F] 3311.3; IEBC: SECTION 1508, [F] 1508.2, SECTION 1509, [F] 1509.1, [F] 1509.2, [F] 1509.3

PART II - IFC: [BE] 3307.1.2; IBC: 3310.1; IEBC: [BE] 1508.1

Proponents: Steven Orlowski, Sundowne Building Code Consultants, LLC, Self (sorlowski@sbcc.codes)

THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE INTERNATIONAL FIRE CODE COMMITTEE AND PART II WILL BE HEARD BY THE INTERNATIONAL BUILDING CODE MEANS OF EGRESS COMMITTEE.

2024 International Fire Code

Revise as follows:

3307.1 Required access.
Approved vehicle access for firefighting shall be provided to all construction or demolition sites. Vehicle access shall be provided to within 100 feet (30 480 mm) of temporary or permanent fire department connections. Vehicle access shall be provided and maintained by either temporary or permanent roads, capable of supporting vehicle loading under all weather conditions. ~~Vehicle access shall be maintained until permanent fire apparatus access roads are available.~~

3307.1.3 Maintenance.
Required *means of egress* and required *accessible means of egress* shall be maintained during construction and demolition, ~~remodeling or~~ *alterations*, and additions to any building.

Exception: *Approved* temporary *means of egress* and *accessible means of egress systems* and facilities.

3307.5 Standpipes.
In buildings required to have standpipes by Section 905.3.1, not less than one functional standpipe for use by the fire service shall be provided for use during construction. ~~Such~~ Each functional *standpipe* ~~standpipes~~ shall be installed with the building as it progresses and prior to construction exceeding 40 feet (12 192 mm) in height above or below the lowest level of fire department vehicle access. Such standpipes shall be provided with fire department hose connections at approved locations in or adjacent to *stairways* complying with Section 3307.1.2. As construction continues to progress ~~progresses~~, ~~such~~ the standpipes shall be extended to within one floor of the highest point ~~of construction~~ having secured decking or flooring.

3307.5.1 Buildings being demolished. Where a building is being demolished and a standpipe is existing within such a building, such standpipe shall be maintained in an operable condition ~~so as~~ to be available for use by the fire department. Such standpipe shall be demolished with the building ~~but~~ and shall not be demolished more than one floor below the floor being demolished. Where more than one standpipe exists in the building, the contractor shall coordinate with the fire code official which standpipe shall remain functional.

Exception: Where the existing standpipe is found to be inoperable, damaged, or required to be removed as part of the site safety plan, a temporary standpipe shall be installed in accordance with Section 905.

Delete without substitution:

~~**3307.5.2 Detailed requirements**~~**.**
~~Standpipes shall be installed in accordance with the provisions of Section 905.~~

~~**Exception:** Standpipes shall be either temporary or permanent in nature, and with or without a water supply, provided that such standpipes comply with the requirements of Section 905 as to capacity, outlets and materials.~~

2024 International Building Code

SECTION 3310
MEANS OF EGRESS

Revise as follows:

[F] 3310.2 Maintenance of means of egress. *Means of egress* and required *accessible means of egress* shall be maintained at all times during construction, demolition, ~~remodeling or~~ *alterations* and *additions* to any *building*.

Exception: Existing *means of egress* need not be maintained where *approved* temporary *means of egress* systems and *facilities* are provided.

SECTION 3311
STANDPIPES

Revise as follows:

[F] 3311.1 Where required. In *buildings* required to have *standpipes* by Section 905.3.1, not fewer than one functional standpipe for use by the fire service shall be provided for use during construction. ~~Such~~ Each functional *standpipe* ~~*standpipes*~~ shall be installed with the building as it progresses and prior to construction exceeding 40 feet (12 192 mm) in height above or below the lowest level of fire department vehicle access. Such *standpipes* shall be provided with fire department hose connections at approved locations in or adjacent to *stairways* complying with Section 3310.1. As construction continues to progress ~~progresses~~, ~~such~~ the *standpipes* shall be extended to within one floor of the highest point ~~of construction~~ having secured decking or flooring.

[F] 3311.2 Buildings being demolished.
Where a *building* is being demolished and a standpipe exists within such a *building*, such standpipe shall be maintained in an operable condition ~~so as~~ to be available for use by the fire department. Such standpipe shall be demolished with the *building* ~~but~~ and shall not be demolished more than one floor below the floor being demolished. Where more than one standpipe exists in the building, the contractor shall coordinate with the fire code official which standpipe shall remain functional.

Exception: Where the existing standpipe is found to be inoperable, damaged, or required to be removed as part of the site safety plan, a temporary standpipe shall be installed in accordance with Section 905.

Delete without substitution:

~~**[F] 3311.3 Detailed requirements.**~~
~~*Standpipes* shall be installed in accordance with the provisions of Chapter 9.~~

~~**Exception:** *Standpipes* shall be either temporary or permanent in nature, and with or without a water supply, provided that such *standpipes* conform to the requirements of Section 905 as to capacity, outlets and materials.~~

2024 International Existing Building Code

SECTION 1508
MEANS OF EGRESS

Revise as follows:

[F] 1508.2 Maintenance of means of egress.
Means of egress and required accessible means of egress shall be maintained at all times during construction, demolition, ~~remodeling or~~ *alterations* and *additions* to any building.

Exception: Existing means of egress need not be maintained where *approved* temporary means of egress and accessible means of egress systems and facilities are provided.

SECTION 1509 STANDPIPES

Revise as follows:

[F] 1509.1 Where required.
In buildings required to have standpipes by Section 905.3.1 of the *International Building Code*, not less than one functional standpipe for use by the fire service shall be provided for use during construction. ~~Such~~ Each functional standpipe ~~standpipes~~ shall be installed with the building as it progresses and prior to construction exceeding 40 feet (12 192 mm) in height above or below the lowest level of fire department vehicle access. Such standpipes shall be provided with fire department hose connections at approved locations in or adjacent to *stairways*, complying with Section 1508.1. As construction ~~progresses~~ continues to progress, ~~such~~ the standpipes shall be extended to within one floor of the highest point ~~of construction~~ having secured decking or flooring.

[F] 1509.2 Buildings being demolished.
Where a building or portion of a building is being demolished and a standpipe is existing within such a building, such standpipe shall be maintained in an operable condition ~~so as~~ to be available for use by the fire department. Such standpipe shall be demolished with the building and ~~but~~ shall not be demolished more than one floor below the floor being demolished. Where more than one standpipe exists in the building, the contractor shall coordinate with the fire code official which standpipe shall remain functional.

Exception: Where the existing standpipe is found to be inoperable, damaged, or required to be removed as part of the site safety plan, a temporary standpipe shall be installed in accordance with Section 905 of the *International Building Code*.

Delete without substitution:

~~**[F] 1509.3 Detailed requirements.**~~
~~Standpipes shall be installed in accordance with the provisions of Chapter 9 of the International Building Code.~~

~~**Exception:** Standpipes shall be either temporary or permanent in nature, and with or without a water supply, provided that such standpipes conform to the requirements of Section 905 of the International Building Code as to capacity, outlets and materials.~~

F217-24 Part I

F217-24 Part II

PART II - IFC: [BE] 3307.1.2; IBC: 3310.1; IEBC: [BE] 1508.1

Proponents: Steven Orlowski, Sundowne Building Code Consultants, LLC, Self (sorlowski@sbcc.codes)

2024 International Fire Code

Revise as follows:

[BE] 3307.1.2 Stairways required. Where building construction exceeds 40 feet (12 192 mm) in height above or below the lowest level of fire department vehicle access, apermanent *stairway* or an approved temporary ~~or permanent~~ *stairway* shall be provided. As construction progresses, such *stairway* shall be extended to within one floor of the highest point of construction having secured decking or flooring.

2024 International Building Code

Revise as follows:

3310.1 Stairways required. Where *building* construction exceeds 40 feet (12 192 mm) in height above or below the lowest level of fire department vehicle access, a permanent *stairway* or an approved temporary ~~or permanent~~ *stairway* shall be provided. As construction progresses, such *stairway* shall be extended to within one floor of the highest point of construction having secured decking or flooring.

2024 International Existing Building Code

Revise as follows:

[BE] 1508.1 Stairways required.
Where building construction exceeds 40 feet (12 192 mm) in height above or below the lowest level of fire department vehicle access, a permanent stairwayor an *approved* temporary ~~or permanent~~ stairway shall be provided. As construction progresses, such stairway shall be extended to within one floor of the highest point of construction having secured decking or flooring.

Reason: Most of the changes in this proposal are editorial clean up, for example:

- Adding the word maintenance to vehicle access in the second sentence of section 3307.1 allows for the complete deletion of the last sentence.

- Both temporary and permanent stairways need to be approved, in section 3307.1.3.

- Section 3307.1.4 removing remodeling as it is a form of an alteration to a building.

- Section 3307.5 needed some additional clarification that as the building progresses in its vertical construction, that a minimum of one functioning standpipe needs to be available to the fire service, once the building reaches 40 feet in height above or below fire department vehicle access.

-Section 3307.5.1 added clarification that in buildings being demolished with mutliple standpipes, at least one standpipe must remain functional as demolition progresses and the contractor shall coordinate with the fire code official. The new exception was also added to this section to signify where the existing standpipe is found to be damaged , inoperable or needs to be removed, than a temporary standpipe shall be installed. Adding the exception allows for the deletion of section 3307.5.2 as it states the temporary or permanent standpipes must comply with section 905 which is in the new exception.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As stated in the reason statement, the proposed changes to this section is purely editorial in nature and does not add any new requirements which would have an impact on the cost of construction.

F218-24

IFC: 3307.1.1 (New)

Proponents: James Carver, Self, Southern California Fire Prevention Officer's Association (james90245@pacbell.net)

2024 International Fire Code

Add new text as follows:

<u>**3307.1.1** **Address Identification.** Construction sites shall be provided with approved address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. The address identification and location shall be in a form approved by the Fire Chief. Where access is by means of a private road and the building cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the structure. Address identification shall be maintained.</u>

Reason: Chapter 33 does not have a prescriptive requirement for the address to be posted at the construction site. The requirement is identified only in the site safety plan. Although some construction sites are large and easily distinguishable, it is necessary for all construction sites to have the address posted for emergency responders.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The address posting requirement is not include in Chapter 33. This proposal brings the requirement to the Chapter, in the section reserved for fire department site access. There is no anticipated increase cost to construction, the posting would be included with the other site sign costs.

F218-24

F219-24

IFC: 3307.2; IBC: [F] 3313.1; IEBC: [F] 1512.1

Proponents: Steven Orlowski, Sundowne Building Code Consultants, LLC, Self (sorlowski@sbcc.codes)

2024 International Fire Code

Revise as follows:

3307.2 Water supply for fire protection.
An *approved* water supply for fire protection, either temporary or permanent, ~~shall be made available as soon as combustible building materials arrive on the site, on commencement of vertical combustible construction and on installation of a standpipe system in buildings under construction,~~meeting the fire flow requirements in this section shall be provided in accordance with Sections 3307.2.1through 3307.4, when any of the following occur:

1. Combustible building materials arrive on the site.
2. Commencement of vertical combustible construction.
3. Installation of standpipe systems in buildings under construction.

Exception: The *fire code official* is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

2024 International Building Code

Revise as follows:

[F] 3313.1 ~~Where~~ When required. An *approved* water supply for fire protection, either temporary or permanent, ~~shall be made available as soon as combustible *building* materials arrive on the site, on commencement of vertical combustible construction, and on installation of a *standpipe system* in *buildings* under construction,~~
meeting the fire flow requirements in this section shall be provided in accordance with Sections 3313.2 through 3313.5~~.~~ when any of the following occur:

1. Combustible building materials arrive on the site.
2. Commencement of vertical combustible construction.
3. Installation of standpipe systems in buildings under construction.

Exception: The *fire code official* is authorized to reduce the fire-flow requirements for isolated *buildings* or a group of *buildings* in rural areas or small communities where the development of full fire-flow requirements is impractical.

2024 International Existing Building Code

Revise as follows:

[F] 1512.1 When required.
An *approved* water supply for fire protection, either temporary or permanent, ~~shall be made available as soon as combustible building material arrives on the site, on commencement of vertical combustible construction, and on installation of a standpipe system in buildings under construction,~~ meeting the fire flow requirements in this section shall be provdied in accordance with Sections 1512.1 through 1512.5 when any of the following occur:~~.~~

1. Combustible building materials arrive on the site,
2. Commencement of vertical combustible construction.

3. Installation of standpipe systems in buildings under construction.

Exception: The fire code official is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

Reason: This editorial code change improves the readability of the section on water supply, by listing the three conditions when water supply on the job site is required individually. No new requirements have been added to the section.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As stated in the reason statement, this code change is purely editorial and does not introduce any new requirements.

F219-24

F220-24

IFC: 3308.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

3308.1 Conditions of use. Internal-combustion-powered construction equipment shall be used in accordance with all of the following conditions:

1. Equipment shall be located so that exhausts do not discharge against combustible material.
2. Exhausts for stationary equipment shall be piped to the outside of the building.
3. Equipment shall not be refueled while in operation.
4. Fuel for equipment shall be stored in an *approved* area in accordance with Section 3309.2 ~~outside of the building~~.

Reason: This proposal intends to clean up the section on motorized construction equipment to clarify that stationary equipment should be exhausted outside of the building, where as mobile motorized equipment such as portable gas powered saws or compressors do not have the capability to connect to an exhaust piping system. The proposal also ties the use of fuel for equipment to be stored in a approved area in accordance with section 3309.2, which covers storage of flammable liquids.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There are no anticipated additional cost associated with this change as it is editorial only. If there is any change in the cost of construction, it would most likely be a decrease as it would be expensive to try to exhaust portable/moveable equipment.

F220-24

F221-24

IFC: 3309.1.1, 3309.1.4, 3309.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

3309.1.1 Class I and Class II liquids.
The storage, use and handling of *flammable* and *combustible liquids* ~~at construction sites~~ shall be in accordance with Section 5706.2. Ventilation shall be provided for operations involving the application of materials containing flammable solvents.

3309.1.4 Handling ~~at point of final use.~~ Class I and II liquids shall be kept in *approved* safety containers. Portable safety containers shall not be left unattended and shall be returned to their approved storage location after use.

3309.2 Storage, use and handling.
The storage, use and handling of flammable gases shall comply with Chapter 58.

Reason: Editorial clean up of the section on hazardous materials and provided clarification that handling of Class I and II liquids in their approved container shall be permitted during the use of the liquids, provided that they are not left unattended on the job site and a returned to the approved storage location after use.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As stated in the reason statement, this is an editorial change that has no impact on the cost of construction.

F221-24

F222-24

IFC: 3310.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

3310.1 Storage. Combustible materials associated with construction, demolition, ~~remodeling~~ or *alterations* to an occupied structure shall not be stored in *exits*, enclosures for *stairways* and *ramps*, or *exit access corridors* serving an *occupant load* of 30 or more.

Exceptions:

1. Where the only occupants are construction workers <u>and an alternative egress is provided in accordance with Section 3307.1.3</u>.
2. Combustible materials that are temporarily accumulated to support work being performed when workers are present.

Reason: This proposed change address a concern that the code needs to be specific when it comes to providing construction workers with a safe egress path, even when the area of work may be along the means of egress path. Many times construction activities occur in the egress path and combustible materials may accumulate temporarily in stairwells, corridors and ramps during the scheduled activity. If the activity is coordinated properly with the site safety plan, the safety of the construction workers will be provided and all construction workers will know how to properly egress the construction site using the alternative egress path or paths.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As stated in the reason statement, alternative egress is already a requirement according to Section 3307.1.4. The new language in the exception clarifies that the alternative egress for construction workers needs to be in accordance section 3307.1.4 as approved in the site safety plan.

F222-24

F223-24

IFC: 3311.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

3311.1 Separations between construction areas.
~~Separations used in~~In buildings of Type I and Type II construction, materials used in assemblies to separate construction areas from occupied portions of the building shall ~~be constructed of materials that~~ comply with one of the following:

1. Noncombustible materials.
2. Materials that exhibit a flame spread index not exceeding 25 when tested in accordance with ASTM E84 or UL 723.
3. Materials exhibiting a peak heat release rate not exceeding 300 kW/m^2 when tested in accordance with ASTM E1354 at an incident heat flux of 50 kW/m^2 in the horizontal orientation on specimens at the thickness intended for use.

Reason: This is an editorial change to improve the readability of the charging section on separations between construction areas. No new requirements have been introduced in this code change.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As stated in the reason statement, this is an editorial change to improve the readability of the section.

F223-24

F224-24

IFC: 3312.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

3312.1 Fire safety requirements ~~for buildings of Types IV-A, IV-B and IV-C construction~~.
Buildings of <u>type</u>~~Types~~ IV-A, IV-B and IV-C construction designed to be greater than six stories above *grade plane* shall comply with the following requirements during construction unless otherwise *approved* by the *fire code official*:

1. Standpipes shall be provided in accordance with Section 3307.2.
2. A<u>n approved</u> water supply for fire department operations~~, as *approved* by the *fire code official* and the *fire chief*~~.
3. ~~Where building construction exceeds six stories above *grade plane* and~~<u>At least one layer of</u> noncombustible protection <u>as</u> ~~is~~ required by Section 602.4 of the *International Building Code*, ~~at least one layer of noncombustible protection~~ shall be installed on all building elements on floor levels, including mezzanines, more than four levels below active mass timber construction before additional floor levels can be erected.

   Exceptions:
   1. Shafts and vertical exit enclosures shall not be considered part of the active mass timber construction.
   2. Noncombustible material on the top of mass timber floor assemblies shall not be required before erecting additional floor levels.

4. ~~Where building construction exceeds six stories above *grade plane*, required~~<u>Required</u> *exterior wall* coverings shall be installed on floor levels, including mezzanines, more than four levels below active mass timber construction before additional floor levels can be erected.

   Exception: Shafts and vertical exit enclosures shall not be considered part of the active mass timber construction.

Reason: This code change cleans up redundant language in the section to improve the readability of the section without changing the requirements of the existing language.
FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof.

In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There are no anticipated additional costs associated with this change as it is editorial only and simplifies the wording to the section without changing the meaning. The qualifier as to when protection is required has not changed.

F224-24

F225-24

IFC: SECTION 3313 (New), 3313.1 (New)

Proponents: James Carver, Self, Southern California Fire Prevention Officer's Association (james90245@pacbell.net); Joseph Cervantes, Space Age Electronics, Space Age Electronics (joseph.cervantes@1sae.com)

2024 International Fire Code

Add new text as follows:

SECTION 3313
TEMPORARY DETECTION AND NOTIFICATION

3313.1 General. Buildings under construction greater than 3 stories in height, where the square footage of construction is greater than 100,000 square feet, shall be provided with an approved temporary notification and detection system during construction. The system shall report to a constantly attended location and be installed in accordance with the manufacturer's instructions.

Reason: The recent tragic incident in Charlotte, North Carolina, where two construction workers lost their lives in a significant fire, underscores the urgent need to revise the International Building Code to include mandatory advanced notification and detection systems on construction sites. This proposal is driven by several critical factors:

1. Immediate Notification for Enhanced Worker Safety: In environments like construction sites, where hazards are ever-present, the danger is magnified by the risk of fire. The Charlotte incident painfully illustrates this, as workers, hindered by mandatory hearing protection and ambient noise, were unable to hear verbal fire warnings. A formalized fire detection and notification system ensures that all workers are alerted promptly, significantly decreasing the likelihood of injury or loss of life.
2. Community Safety and Rapid Emergency Response: Fires on construction sites pose a significant threat not just to workers but also to nearby communities. An effective detection system allows for quicker mobilization of emergency services, thereby preventing the spread of fire and protecting local residents.
3. Minimizing Property Damage and Economic Loss: Early fire detection plays a crucial role in limiting property damage. By reducing the extent of the damage, these systems not only save costs but also prevent delays in construction projects.
4. Adherence to Evolving Safety Standards: The integration of fire detection and notification systems aligns construction practices with global safety trends, demonstrating a commitment to the highest safety standards for workers and the community.
5. Valuable Data for Ongoing Safety Enhancements: Such systems also serve as a vital source of data on fire incidents, contributing to the continuous improvement of fire safety standards and practices in the construction industry.

In conclusion, the implementation of temporary notification and detection systems on construction sites is a necessary measure. This proposal aims to provide early fire detection and efficient notification to construction workers, addressing a critical safety gap highlighted by recent catastrophic events. This change is not merely reactive but a proactive step toward enhancing overall safety and aligning with progressive construction management standards.

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Cost Impact: Increase

Estimated Immediate Cost Impact:

This cost impact statement is hypothetical and serves as a template. Actual figures should be derived using detailed cost analysis specific to the region, type of construction sites, and the specific technology used in the notification and detection systems.

Total Immediate Cost per construction site:

- Wireless notification and detection systems - $20,000 - $100,000
- Wired notification and detection systems - $35,000- $150,000

If through alternative means and methods, these systems are approved to replaces fire watch, the cost impact will be negative.

Estimated Immediate Cost Impact Justification (methodology and variables):

Equipment Costs: Includes the purchase of smoke sensors, heat sensors, and notification devices.

Installation Costs: Professional fees for installing and integrating the system into existing construction site infrastructure.

Training Costs: Expenses related to training site personnel in system operation and emergency response protocols.

Maintenance Costs: Initial maintenance and testing costs for the first year.

Administrative and Compliance Costs: Expenses associated with ensuring compliance with the new code, including any required certifications and inspections.

Variables include the size of the construction site, the complexity of the installation (which may vary based on site layout), and the level of technology chosen for the system.

Estimated Life Cycle Cost Impact:

Given the provided baseline cost ranges for wireless and wired notification and detection systems in the per project impact, this would be an estimated life cycle cost impact for each. Using a midpoint value within each range for the calculation to provide a balanced estimate.

Wireless Notification and Detection Systems

Initial Costs

Average Cost: $60,000 (midpoint of $20,000 - $100,000 range)

Installation Costs: Assumed at 10% of system cost = $6,000

Training Costs: $2,000

Total Initial Cost: $68,000

Operational Costs (Annually)

Maintenance: $1,500 (annual)

Energy Consumption: $300 (annual)

Total Annual Operational Cost: $1,800

Long-Term Costs (Over 10 Years)

System Upgrades (every 5 years): $10,000

Decommissioning Costs: $5,000

Total Long-Term Cost: $15,000

Indirect Costs and Savings

Insurance Premium Reductions: $1,000 (annual)

Reduced Accident Costs: $20,000 (over 10 years)

Total Indirect Savings (10 years): $30,000

Total Estimated Life Cycle Cost for Wireless System (10 years):

Initial Costs: $68,000

Operational Costs (10 years): $18,000

Long-Term Costs: $15,000

Indirect Savings: -$30,000

Net Cost: $71,000

Wired Notification and Detection Systems

Initial Costs

Average Cost: $92,500 (midpoint of $35,000 - $150,000 range)

Installation Costs: Assumed at 15% of system cost = $13,875

Training Costs: $2,000

Total Initial Cost: $108,375

Operational Costs (Annually)

Maintenance: $2,000 (annual)

Energy Consumption: $400 (annual)

Total Annual Operational Cost: $2,400

Long-Term Costs (Over 10 Years)

System Upgrades (every 5 years): $15,000

Decommissioning Costs: $7,000

Total Long-Term Cost: $22,000

Indirect Costs and Savings

Insurance Premium Reductions: $1,200 (annual)

Reduced Accident Costs: $25,000 (over 10 years)

Total Indirect Savings (10 years): $37,000

Total Estimated Life Cycle Cost for Wired System (10 years):

Initial Costs: $108,375

Operational Costs (10 years): $24,000

Long-Term Costs: $22,000

Indirect Savings: -$37,000

Net Cost: $117,375

These estimates are based on the provided cost ranges and average industry figures. Actual costs may vary based on specific site requirements, regional cost differences, and technology choices. Detailed, site-specific analysis is recommended for accurate budgeting.

Estimated Life Cycle Cost Impact Justification (methodology and variables):

Long-term Maintenance and Servicing: Regular checks and repairs over the system's lifespan.

Technology Upgrades: Potential costs for upgrading the system to keep up with technological advancements.

Energy Usage: Operational costs including electricity usage of the system.

Potential Insurance Premium Reductions: Reduction in insurance premiums due to improved fire safety measures, contributing to cost savings over the life cycle.

Depreciation: The decrease in the value of the equipment over time.

Variables include the anticipated lifespan of the equipment, estimated frequency of maintenance and upgrades, and expected trends in energy costs and insurance premiums.

F225-24

F226-24

IFC: 3903.2

Proponents: Steve Thomas, Shums Coda Associates, Himself (sthomas@coloradocode.net)

2024 International Fire Code

Revise as follows:

3903.2 Prohibited occupancies. Extraction processes utilizing flammable gases or flammable *cryogenic fluids* shall not be located in any building containing a Group A, E, I ~~or~~ R occupancy, or one- and two-family dwelling units and townhouses regulated under the *International Residential Code*.

Reason: The current language does not prohibit extraction operations within a one- or two-family dwelling or townhouse. Those uses are not classified as Group R Occupancies. There is no occupancy classification language in the IRC. It is only located within the IBC and the two codes are stand-alone codes. You cannot apply provisions in the IBC to buildings regulated by the IRC. This language was previously submitted and the committee disapproved the item because they stated that the fire code does not apply to buildings regulated by the IRC. That is an incorrect statement. IFC Section 102.5 states the following:

> Where structures are designed and constructed in accordance with the International Residential Code, the provisions of this code shall apply as follows:

1. Construction and design provisions of this code pertaining to the exterior of the structure shall apply including, but not limited to, premises identification, fire apparatus access and water supplies. Where interior or exterior systems or devices are installed, construction permits required by Section 105.6 shall apply.
2. Administrative, operational and maintenance provisions of this code shall apply.

The extraction process is covered under operational permits in Section 105.5.42. Therefore, the process is covered by the fire code. This proposal will give the fire department the language to legally prohibit the extraction process within one- and two-family dwellings and townhouses. The current language will not hold up in court if the language of the codes is used.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The proposal clarifies the intent of the code language. See reason statement.

F226-24

F227-24

IFC: 4003.4

Proponents: Jonathan Roberts, UL Solutions, UL Solutions (jonathan.roberts@ul.com)

2024 International Fire Code

Revise as follows:

4003.4 Lightning.
Structures containing barrel storage shall ~~should~~ be protected from lightning. The lightning protection equipment shall be installed in accordance with NFPA 70 and NFPA 780.

Reason: This proposal changes should to shall and serves to remove non mandatory language.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This editorial change from should to shall to align with the necessary enforceable language found throughout the code.

F227-24

F228-24

IFC: 105.5.34, CHAPTER 41, SECTION 4106, 4106.1

Proponents: Scott Eckstein, Richardson Fire Department, Richardson Fire Department (scott.eckstein@cor.gov)

2024 International Fire Code

Revise as follows:

105.5.34 Mobile food preparation vehicles and trailers. An operational permit is required for mobile food preparation vehicles and trailers equipped with appliances that produce smoke or grease-laden vapors.

CHAPTER 41 TEMPORARY HEATING AND MOBILE COOKING OPERATIONS

SECTION 4106 MOBILE FOOD PREPARATION VEHICLES AND TRAILERS

4106.1 General. Mobile food preparation vehicles and occupiable trailers that are equipped with appliances that produce smoke or grease-laden vapors for the purpose of preparing, cooking or serving food shall comply with NFPA 96 and this section. Indoor use of mobile food preparation vehicles is prohibited unless *approved* by the *fire code official*.

Reason: Mobile cooking operations have frequently used mobile food trucks and occupied trailers. Trailers are not typically defined as vehicles. The context of the code should also include occupied trailers that are used as a mobile cooking apparatus. The permit required for mobile food preparation should also accurately include vehicles and trailers when they are occupied or meant to be used as an occupied mobile kitchen.

Bibliography: Proposal affects textual and conceptual changes. No other documentation submitted.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no change in cost as many new trailers that have cooking appliances already have many features installed that are required by IFC and NFPA.

F228-24

F229-24

IFC: SECTION 202 (New), SECTION 202, SECTION 4106, 4106.1, 4106.2, 4106.3, 4106.4, 4106.4.1, 4106.4.2, 4106.4.3, 4106.4.3.1, 4106.4.3.2, 4106.4.3.3, 4106.4.3.4, 4106.5

Proponents: John Thomas, Fire Inspector Services LLC, Fire Inspector Services LLC (fireinspectorservices@outlook.com)

2024 International Fire Code

Add new definition as follows:

FOOD CART. A cart or other movable device used on the public sidewalks or in public places, in which ready to eat food is cooked, wrapped, packaged, processed or portioned for sale or distribution, and which is not licensed as a food truck or food trailer.

FOOD TRAILER. A nonmotorized vehicle designed to be towed by a motorized vehicle that is registered and is able to be operated on the public streets in which ready to eat food is cooked, wrapped, packaged, processed or portioned for sale or distribution.

FOOD TRUCK. A motorized vehicle that is registered and is able to be operated on the public streets, in which ready to eat food is cooked, wrapped, packaged, processed or portioned for sale or distribution.

FOOD VEHICLE. Vehicles including food trucks, food trailers and food carts.

Revise as follows:

MOBILE FOOD PREPARATION VEHICLES. Vehicles that contain cooking equipment that produce smoke or grease-laden vapors for the purpose of preparing and serving food to the public. This definition includes food vehicles. Vehicles intended for private recreation shall not be considered mobile food preparation vehicles.

SECTION 4106
MOBILE FOOD PREPARATION VEHICLES

Revise as follows:

4106.1 General. Mobile food preparation vehicles, that are equipped with appliances that produce smoke or grease-laden vapors for the purpose of preparing, cooking or serving food or contain LP-containers for heating food shall comply with NFPA 96 and this section. Indoor use of mobile food preparation vehicles, is prohibited unless *approved* by the *fire code official*.

4106.2 Permit required.
Permits shall be required as set forth in Section 105.5.

4106.3 Exhaust hood.
Cooking equipment that produces grease-laden vapors shall be provided with a kitchen exhaust hood constructed in accordance with Section 606.

4106.4 Maintenance.
Maintenance of systems on mobile food preparation vehicles shall be in accordance with Sections 4106.4.1 through 4106.4.3.

4106.4.1 Exhaust system.
The exhaust system, including hood, grease-removal devices, fans, ducts and other appurtenances, shall be inspected and cleaned in accordance with NFPA 96.

4106.4.2 Fire protection systems and devices.
Fire protection systems and devices shall be maintained in accordance with Section 901.6.

4106.4.3 Fuel gas systems.
Fuel gas systems shall be maintained in accordance with Sections 4106.4.3.1 through 4106.4.3.4.

4106.4.3.1 Lp-gas systems. LP-gas containers installed on the vehicle and fuel gas piping systems shall be inspected annually by an *approved* inspection agency, person or special expert who is qualified to ensure that system components are free from damage, suitable for the intended service and not subject to leaking.

4106.4.3.2 CNG systems.
CNG containers and fuel gas piping systems shall be inspected annually by an *approved* inspection agency, person or special expert who is qualified to ensure that system components are free from damage, suitable for the intended service and not subject to leaking.

4106.4.3.3 Annual leakage test.
All fuel gas piping systems and appliances shall be checked annually for leakage at the operating pressure of the system using a manometer or pressure gauge. Where leakage is indicated, the gas supply shall be turned off until repairs have been made and the system no longer leaks.

4106.4.3.4 Inspection tag.
Upon a satisfactory annual inspection, the *approved* inspection agency, person or special expert shall affix a tag on the fuel gas system or within the vehicle indicating the name of the inspection agency and the date of the satisfactory inspection.

4106.5 Manual system operation for the automatic fire extinguishing system(s).
A manual actuation device shall be provided for the *automatic fire extinguishing system(s)* provided for the cooking appliance(s). The manual actuation device shall be unobstructed and in view from the means of egress, located at or near a means of egress from the cooking area, and at a location acceptable to the *fire code official*. The manual actuation device shall be installed not more than 48 inches (1200 mm) nor less than 42 inches (1067 mm) above the walking surface of the means of egress and shall clearly identify the hazard protected. The manual actuation shall require a maximum force of 40 pounds (178 N) and a maximum movement of 14 inches (356 mm) to actuate the fire suppression system.

Reason: The primary reason that these definitions are needed is to acknowledge the different types of “Food Trucks” that are on the road. This will give the fire code official the ability to conduct inspections on all mobile food vendors. Some Mobile Food Vendors don’t produce grease laden vapors but are using propane or large generators that can create different types of hazards.

To provide perspective my background with Mobile Food Vendors began before my retirement 2021 from the Fire Department. My last 9 years I was the Fire Marshal in charge of two townships. I had mobile food vendors parked by my high school every day plus mobile food vendors around my transit lots. We never conducted any inspections until we passed a local ordinance requiring them to have permits and to be inspected. I worked with NFPA on the Task Force in 2016 to develop some standards for NFPA 96. I have developed a safety and inspection training course that we have conducted all over NJ where we caused a code change that will be coming out in 2024 and in Virginia. When we started teaching the course in the State of NY we noticed the issues with the codes. I am a licensed Inspector/ Fire official here in NJ since 1987 and have written articles about Mobile Food vendors in Fire Engineering Magazine (Sept 20, 2019). Last, I have been working with the New Jersey Food Truck Association to keep the Mobile Food Vendors safe.

Bibliography:
This a link to the podcast we did on Mobile Food Vendors https://www.fireinspectorsservicesllc.com/blog/mobile-food-vendor-safety

Cost Impact: Increase

Estimated Immediate Cost Impact:

Approximately $1,000 -$2,000 to the Mobile Food vendor. These costs are not related to construction.

Estimated Immediate Cost Impact Justification (methodology and variables):

These costs relate to the potential need for type-1 hood suppression systems which will give the operator time to exit the vehicle in case of a fire.

The links should be changed twice a year instead of once a year because of the excessive wear due to the motion of the vehicle.

F230-24

IFC: CHAPTER 42 (New), SECTION 4201 (New), 4201.1 (New), 4201.1.1 (New), 4201.2 (New), 4201.3 (New), SECTION 4202 (New), 4202.1 (New), SECTION 320, 320.1, 320.2, 320.3, 320.4, 320.4.1, 320.4.2, 320.4.2.1, 320.4.2.2, 320.4.2.3, 320.4.2.4, 320.4.2.5, 320.4.2.6, 320.4.3, 320.4.3.1, 320.4.3.2, 320.4.3.3, SECTION 322, 322.1, 322.1.1, 322.2, 322.3, 322.4, 322.5

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

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Add new text as follows:

CHAPTER 42 BATTERIES

SECTION 4201 GENERAL

4201.1 Scope. The provisions of this chapter shall apply to research, testing, manufacturing, recycling, use or storage of the battery types defined in Chapter 2.

Exception: Installed energy storage systems regulated by Section 1207.

4201.1.1 Hazardous Materials Applicability.. Battery types other than those types defined in Chapter 2 shall also be in compliance with Chapters 50 through 67 as applicable.

4201.2 Electrical wiring and equipment.. Electrical wiring and equipment used in connection with batteries shall be installed and maintained in accordance with this chapter, Section 603 and NFPA 70, as applicable.

4201.3 Permits.. Permits shall be required, as applicable, in accordance with Section 105.5 and 105.6.

SECTION 4202 DEFINITIONS

4202.1 Definitions.. The following terms are defined in Chapter 2.

BATTERY

BATTERY TYPES.

Revise as follows:

SECTION ~~320~~ 4203
LITHIUM-ION AND LITHIUM METAL BATTERY STORAGE

~~320.1~~ 4203.1 General. The storage of lithium-ion and lithium metal batteries shall comply with Section ~~320~~4203.

Exceptions:

1. New or refurbished batteries installed in the equipment, devices or vehicles they are designed to power.
2. New or refurbished batteries packed for use with the equipment, devices or vehicles they are designed to power.
3. Batteries in original retail packaging that are rated at not more than 300 watt-hours for lithium-ion batteries or contain not more than 25 grams of lithium metal for lithium metal batteries.
4. Temporary storage of batteries or battery components during the battery manufacturing process prior to completion of final quality control checks.

5. Temporary storage of batteries during the vehicle manufacturing or repair process.

~~320.2~~ 4203.2 Permits.
Permits shall be required for an accumulation of more than 15 cubic feet (0.42 m^3) of lithium-ion and lithium metal batteries, other than batteries listed in the exceptions to Section ~~321.1~~ 4203.1, as set forth in Section 105.5.29.

~~320.3~~ 4203.3 Fire safety plan.
A fire safety plan shall be provided in accordance with Section 404. In addition, the fire safety plan shall include emergency response actions to be taken upon detection of a fire or possible fire involving lithium-ion or lithium metal battery storage.

~~320.4~~ 4203.4 Storage requirements.
Lithium-ion and lithium metal batteries shall be stored in accordance with Section ~~320.4.1~~4203.4.1, ~~320.4.2~~4203.4.2 or ~~320.4.3~~4203.4.3, as applicable.

~~320.4.1~~ 4203.4.1 Limited indoor storage in containers. Not more than 15 cubic feet (0.42 m^3) of lithium-ion or lithium metal batteries shall be permitted to be stored in containers in accordance with all of the following:

1. Containers shall be open top and constructed of noncombustible materials or shall be *approved* for battery collection.
2. Individual containers and groups of containers shall not exceed a capacity of 7.5 cubic feet (0.21 m^3).
3. A second container or group of containers shall be separated by not less than 3 feet (914 mm) of open space or 10 feet (3048 mm) of space that contains combustible materials.
4. Containers shall be located not less than 5 feet (1524 mm) from *exits* or *exit access* doors.

~~320.4.2~~ 4203.4.2 Indoor storage areas.
Indoor storage areas for lithium-ion and lithium metal batteries, other than those complying with Section ~~320.4.1~~4203.4.1, shall comply with Sections ~~320.4.2.1~~4203.4.2.1 through ~~320.4.2.6~~4203.2.6.

~~320.4.2.1~~ 4203.4.2.1 Technical opinion and report. A technical opinion and report complying with Section 104.2.2 shall be prepared to evaluate the fire and explosion risks associated with the indoor storage area and to make recommendations for fire and explosion protection. The report shall be submitted to the *fire code official* and shall require the *fire code official 's* approval prior to issuance of a permit. In addition to the requirements of Section 104.2.2, the technical opinion and report shall specifically evaluate the following:

1. The potential for *deflagration* of flammable gases released during a thermal runaway event.
2. The basis of design for an *automatic sprinkler system* or other *approved* fire suppression system. Such design basis shall reference relevant full-scale fire testing or another *approved* method of demonstrating sufficiency of the recommended design.

~~320.4.2.2~~ 4203.4.2.2 Construction requirements. Where indoor storage areas for lithium-ion and lithium metal batteries are located in a building with other uses, battery storage areas shall be separated from the remainder of the building by 2-hour rated *fire barriers* or *horizontal assemblies*. *Fire barriers* shall be constructed in accordance with Section 707 of the *International Building Code*, and *horizontal assemblies* shall be constructed in accordance with Section 711 of the *International Building Code*.

Exceptions:

1. Where battery storage is contained in one or more *approved* prefabricated portable structures providing a complete 2-hour fire-resistance-rated enclosure, *fire barriers* and *horizontal assemblies* are not required.
2. Where battery storage is limited to new batteries in packaging that has been demonstrated to and *approved* by the *fire code official* as sufficient to isolate a fire in packaging to the package interior, *fire barriers* and *horizontal assemblies* are not required.

~~320.4.2.3~~ 4203.4.2.3 Fire protection systems.
Indoor storage areas for lithium-ion and lithium metal batteries shall be protected by an *automatic sprinkler system* complying with Section 903.3.1.1 or an *approved* alternative fire suppression system. The system design shall be based on recommendations in the

approved technical opinion and report required by Section ~~320.4.2.1~~4203.4.2.1.

~~320.4.2.4~~ 4203.4.2.4 Fire alarm systems.

Indoor storage areas for lithium-ion and lithium metal batteries shall be provided with an *approved* automatic fire detection and alarm system complying with Section 907. The fire detection system shall use air-aspirating smoke detection, radiant energy-sensing fire detection or both.

~~320.4.2.5~~ 4203.4.2.5 Explosion control.

Where the *approved* technical opinion and report required by Section ~~320.4.2.1~~4203.4.2.1 recommends explosion control, explosion control complying with Section 911 shall be provided.

~~320.4.2.6~~ 4203.4.2.6 Reduced requirements for storage of partially charged batteries.

Indoor storage areas for lithium-ion and lithium metal batteries with a demonstrated state of charge not exceeding 30 percent shall not be required to comply with Sections ~~320.4.2.1~~4203.4.2.1, ~~320.4.2.2~~4203.4.2.2 and ~~320.4.2.5~~4203.4.2.5, provided that procedures for limiting and verifying that the state of charge will not exceed 30 percent have been *approved*.

~~320.4.3~~ 4203.4.3 Outdoor storage.

Outdoor storage of lithium-ion or lithium metal batteries shall comply with Sections ~~320.4.3.1~~4203.4.3.1 through ~~320.4.3.3~~4203.4.3.3.

~~320.4.3.1~~4203.4.3.1 Distance from storage to exposures. Outdoor storage of lithium-ion or lithium metal batteries, including storage beneath weather protection in accordance with Section 414.6.1 of the *International Building Code*, shall comply with one of the following:

1. Battery storage shall be located not less than 20 feet (6096 mm) from any building, *lot line*, public street, public alley, public way or *means of egress*.
2. Battery storage shall be located not less than 3 feet (914 mm) from any building, *lot line*, public street, public alley, public way or *means of egress*, where the battery storage is separated by a 2-hour fire-resistance-rated assembly without openings or penetrations and extending 5 feet (1524 mm) above and to the sides of the battery storage area.
3. Battery storage shall be located not less than 3 feet (914 mm) from any building, *lot line*, public street, public alley, public way or *means of egress*, where batteries are contained in *approved,* prefabricated portable structures providing a complete 2-hour fire-resistance-rated enclosure.

~~320.4.3.2~~4203.4.3.2 Storage area size limits and separation.

Outdoor storage areas for lithium-ion or lithium metal batteries, including storage beneath weather protection in accordance with Section 414.6.1 of the *International Building Code*, shall not exceed 900 square feet (83.6 m^2). The height of battery storage in such areas shall not exceed 10 feet (3048 mm). Multiple battery storage areas shall be separated from each other by not less than 10 feet (3048 mm) of open space.

~~320.4.3.3~~4203.4.3.3 Fire detection.

Outdoor storage areas for lithium-ion or lithium metal batteries, regardless of whether such areas are open, under weather protection or in a prefabricated portable structure, shall be provided with an *approved* automatic fire detection and alarm system complying with Section 907. The fire detection system shall use radiant energy-sensing fire detection.

SECTION ~~322~~ 4204
POWERED MICROMOBILITY DEVICES

~~322.1~~4204.1 General.

Lithium-ion and lithium metal battery *powered micromobility devices* shall be operated and maintained in accordance with this section.

Exceptions:

1. Storage, repair and charging in residential occupancies of *powered mobility devices*, provided that such devices are for personal use by its owner.

2. Charging of a single *powered mobility device* in any occupancy by its owner.

~~322.1.1~~4204.1.1 Prohibited locations.
The use of a residential occupancy as a business for the charging of commercially owned *powered micromobility devices* as part of a rental or sales service shall not be permitted.

~~322.2~~4204.2 Battery chargers and equipment.
Powered micromobility devices shall be charged in accordance with their listing and the manufacturer's instructions using only the original equipment manufacturer-supplied charging equipment or charging equipment in accordance with the listing and manufacturer's instructions.

~~322.3~~4204.3 Listing.
Powered micromobility devices shall be *listed* and *labeled* in accordance with UL 2272 or UL 2849, as applicable.

~~322.4~~4204.4 Battery charging areas.
Where *approved*, *powered micromobility devices* shall permitted to be charged in a room or area that complies with all of the following:

1. Only *listed* devices utilizing *listed* charging equipment shall be permitted to be charged.
2. Is provided with sufficient electrical receptacles to allow the charging equipment for each device to be directly connected to a receptacle. Extension cords and relocatable power taps shall not be used.
3. Storage of combustible materials, combustible waste or hazardous materials shall not be permitted.
4. The charging operation shall not be conducted in or obstruct any required means of egress.
5. Removable storage batteries shall not be stacked or charged in an enclosed cabinet unless the cabinet is specially designed and *approved* for such purpose.
6. A minimum distance of 18 inches (457.2 mm) shall be maintained between each removable storage battery during charging operations unless each battery is isolated from neighboring batteries by an *approved* fire-resistant material.
7. A minimum of 18 inches (457.2 mm) shall be maintained between the location of the battery on each *powered micromobility device* during charging operations.
8. The indoor room or area shall be protected by a *fire alarm system* utilizing air-aspirating smoke detectors or radiant energy-sensing fire detection.

~~322.5~~4204.5 Fire safety plan.
A fire safety plan shall be provided in accordance with Section 403.10.6. In addition, the fire safety plan shall include emergency response actions to be taken upon detection of a fire or possible fire involving lithium-ion or lithium metal battery storage.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

With the growing number of sections and language addressing batteries from manufacture, R&D, storage and use in devices in the IFC it appears the time is appropriate to create a new chapter to gather the battery related language other than Section 1207 ESS. This proposal provides the initial structure of this chapter moving current Sections 320 and 322 to this chapter. The intent is that revisions made in Sections 320 and 322 would be made in this chapter as well. In addition there are other proposals adding to the requirements in the IFC on batteries. It is intended that all those new topics would be placed in this chapter as outlined below

- **Section 4201 General**
- **Section 4202 Definitions**
- **Section 4203 Lithium-Ion and Lithium Metal Research, Testing, Manufacturing and Recycling**
- **Section 4204 Lithium-Ion and Lithium Metal Battery Storage**

- **Section 4205 Battery-Powered Devices, Industrial Trucks, Equipment and Appliances (Note: Current Section 322 is proposal to expand scope to include the additional items)**
- **Section 4206 Other Battery Types**

Having a Chapter for batteries eases finding the technical language for designers, building owners/operators and code officials.

It is expected that some items from the other sections could be merged into a general requirement such as requirements for fire safety plans with the language specific to the subtopics remaining in the designated subsections.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is to establish a structure for moving other existing and proposed sections of the IFC related to batteries that are being heard separately into one chapter.

F230-24

F231-24

IFC: CHAPTER 42 (New), SECTION 4201 (New), 4201.1 (New), 4201.2 (New), SECTION 4202 (New), 4202.1 (New), SECTION 202 (New), SECTION 4203 (New), 4203.1 (New), 4203.1.1 (New), 4203.1.2 (New), 4203.2 (New), 4203.3 (New), 4203.3.1 (New), 4203.3.2 (New), 4203.4 (New), 4203.5 (New), 4203.5.1 (New), 4203.5.2 (New), 4203.5.3 (New), SECTION 4204 (New), 4204.1 (New), 4204.2 (New), 4204.3 (New), 4204.4 (New), 903.2.2, 903.2.2.3 (New), 903.2.7, 903.2.7.4 (New), TABLE 906.1, 1103.7, 1103.7.1 (New), 1103.7.1, 1103.7.2, 1103.7.3, 1103.7.4, 1103.7.6 (New), 1103.9, 105.5.41 (New); IBC: [F] 903.2.2, 903.2.2.3 (New), [F] 903.2.7, 903.2.7.4 (New), [F] TABLE 906.1

Proponents: Jeffrey Shapiro, International Code Consultants, Lake Travis Fire Rescue (jshapiro@LTFR.org)

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Add new text as follows:

CHAPTER 42 PET BOARDING

SECTION 4201 GENERAL

4201.1 Scope. Occupancies containing *pet boarding* shall comply with this chapter.

4201.2 Permit. A permit shall be required for *pet boarding* as set forth in Section 105.5.

SECTION 4202 DEFINITIONS

4202.1 Definitions. The following terms are defined in Chapter 2:
PET BOARDING.

Add new definition as follows:

PET BOARDING.
Use of a Group B or Group M Occupancy to house a cumulative total of 10 or more dogs or cats for more than 12 hours per day that are available for sale or housed inside of a building as a service to the dog or cat owner.

Add new text as follows:

SECTION 4203 FIRE SAFETY PRECAUTIONS

4203.1 Fire safety plan. An *approved* fire safety and evacuation plan in accordance with Section 404 shall be prepared and maintained for *pet boarding*.

4203.1.1 Fire safety plan additions. In addition to the requirements of Section 404.2.2, fire safety plans for pet boarding shall include all of the following:

1. Sequence of procedures to be followed in the event of a fire.
2. Procedures for evacuating pets, including the location of any special keys or tools required to evacuate pets.
3. Items to be inspected when conducting daily safety inspections.

4. Procedures for training employees to know the locations of portable fire extinguishers and how to properly use them.
5. Procedures for maintaining proper clearances between combustibles and ignition sources in a *pet boarding* area in accordance with Section 305.
6. Procedures to ensure that there are no open flames in a *pet boarding* area.
7. Procedures to ensure that cooking and heating in a *pet boarding* area are conducted in accordance with Chapter 41.
8. Procedures to ensure that use of current taps, relocatable power taps and extension cords in a *pet boarding* area is done in a safe manner and complies with Sections 603.5 and 603.6.
9. Procedures for ensuring that trash and other combustible waste are removed from *pet boarding* areas not less than once per day.
10. Procedures for ensuring that clothes dryer vents are kept clear of lint accumulation in accordance with Section 610.1.2.
11. Procedures for maintaining a staffing plan that specifies hours of operation, minimum staffing, staff names, and staff contact information.

4203.1.2 Posting of fire safety plan. The sequence of procedures to be followed in the event of a fire shall be prominently posted next to each egress door or opening leading out of the *pet boarding* area.

4203.2 Removal of combustible waste. Trash and other combustible waste shall be removed from pet boarding areas not less than once per day.

4203.3 Staffing. Staffing for *pet boarding* shall comply with Sections 4203.3.1 and 4203.3.2.

4203.3.1 Staffing plan. A staffing plan shall be prepared and maintained that includes current hours of operation, minimum staffing, staff names, and staff contact information.

4203.3.2 Minimum staffing. At least one staff member shall be responsible for boarded pets, remaining in or immediately adjacent to pet boarding areas and awake at all times when a cumulative total of 10 or more dogs and cats are present, including overnight, for *pet boarding* in a *fire area* that is not equipped with an *automatic sprinkler system* in accordance with Section 4204.4

4203.4 Safety inspections. Safety inspections specified in the approved fire safety plan shall be conducted at least once per day. A record of such safety inspection shall be maintained on the premises to document the date and time of each inspection and shall include the name of the individual who conducted the inspection.

4203.5 Sources of ignition. Sources of ignition in *pet boarding* areas shall comply with Sections 4203.5.1 through 4203.5.3.

4203.5.1 Cooking and heating. Cooking and heating in *pet boarding* areas shall comply with Chapter 41. Heating pads used for warming animals shall be listed and labeled by a nationally recognized testing laboratory.

4203.5.2 Open flames. Open flames shall be prohibited in *pet boarding* areas.

4203.5.3 Smoking. Smoking shall be prohibited in occupancies containing a *pet boarding* area. “No Smoking” signs shall be provided in accordance with Section 310.

SECTION 4204
FIRE PROTECTION AND LIFE SAFETY SYSTEMS

4204.1 Portable fire extinguishers. Portable fire extinguishers rated 2-A:10-B:C and mounted in accordance with Section 906.9 shall be placed adjacent to each egress door or opening leading out of a *pet boarding* area, with additional extinguishers provided as necessary so that the travel distance to an extinguisher from anywhere in a *fire area* containing a *pet boarding* area does not exceed 50 feet (15240 mm).

4204.2 Smoke detection system. An automatic smoke detection system that activates occupant notification in accordance with Section 907.5 and is monitored in accordance with Section 907.6.6 shall be installed in new and existing *fire areas* containing *pet boarding*. In locations where ambient conditions are incompatible with *smoke detectors*, *heat detectors* with a response time index of 50 $(m \times s)^{1/2}$ shall be permitted.

> **Exception:** An automatic smoke detection system is not required in *fire areas* equipped with an *automatic sprinkler system* complying with Section 4204.4.

4204.3 Carbon monoxide detection. In addition to the requirements in Section 915, carbon monoxide detection shall be provided in new and existing *pet boarding* areas where a *carbon monoxide source* is present.

4204.4 Automatic sprinkler system. An *automatic sprinkler system* with quick-response sprinklers complying with Section 903.3.1 or a limited area *automatic sprinkler system* complying with Section 903.3.8 with quick-response sprinklers shall be installed in *fire areas* containing *pet boarding*.

Revise as follows:

903.2.2 Group B.
An *automatic sprinkler system* shall be provided for Group B occupancies as required in Sections 903.2.2.1 through 903.2.2.3 ~~and 903.2.2.2~~.

Add new text as follows:

903.2.2.3 Pet boarding. An *automatic sprinkler system* shall be installed in *fire areas* containing *pet boarding.*

Revise as follows:

903.2.7 Group M.
An *automatic sprinkler system* shall be provided throughout buildings containing a Group M occupancy where required by Sections 903.2.7.1 through 903.2.7.4 or where any~~one~~ of the following conditions exist~~s~~:

1. A Group M *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group M *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group M *fire areas* on all floors, including any mezzanines, exceeds 24,000 square feet (2230 m^2).

Add new text as follows:

903.2.7.4 Pet boarding. An *automatic sprinkler system* shall be installed in *fire areas* containing *pet boarding.*

Revise as follows:

TABLE 906.1 ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS

Portions of table not shown remain unchanged.

SECTION	SUBJECT
4204.1	Pet boarding

1103.7 Fire alarm systems.
An *approved fire alarm system* shall be installed in existing buildings and structures in accordance with Sections 1103.7.1 through

1103.7.8~~1103.7.6~~ and provide occupant notification in accordance with Section 907.5 unless other requirements are provided by other sections of this code.

Exception: Occupancies with an existing, previously *approved fire alarm system*.

Add new text as follows:

1103.7.1 Group B pet boarding. An *automatic smoke detection system* shall be installed in *fire areas* containing *pet boarding* in accordance with Section 4204.2.

Revise as follows:

1103.7.2~~1103.7.1~~ Group E.
A *fire alarm system* shall be installed in existing Group E occupancies in accordance with Section 907.2.3.

Exceptions:

1. A manual *fire alarm system* is not required in a building with a maximum area of 1,000 square feet (93 m^2) that contains a single classroom and is located not closer than 50 feet (15 240 mm) from another building.
2. A manual *fire alarm system* is not required in Group E occupancies with an *occupant load* less than 50.

1103.7.3~~1103.7.2~~ Group I-1.
An automatic *fire alarm system* shall be installed in existing Group I-1 facilities in accordance with Section 907.2.6.1.

Exception: Where each sleeping room has a *means of egress* door opening directly to an exterior egress balcony that leads directly to the *exits* in accordance with Section 1021, and the building is not more than three stories in height.

1103.7.4~~1103.7.3~~ Group I-2.
In Group I-2, an automatic *fire alarm system* shall be installed in accordance with Section 1105.10.

1103.7.5~~1103.7.4~~ Group I-3.
An automatic and manual *fire alarm system* shall be installed in existing Group I-3 occupancies in accordance with Section 907.2.6.3.

Add new text as follows:

1103.7.6 Group M pet boarding.
An *automatic smoke detection system* shall be installed in *fire areas* containing *pet boarding* in accordance with Section 4204.2.

Revise as follows:

1103.9 Carbon monoxide detection.
Carbon monoxide detection shall be installed in existing buildings where any of the conditions identified in Section 915.1.1 exist and in *pet boarding* areas as specified in Section 4204.3. Carbon monoxide alarms shall be installed in the locations specified in Section 915.2 and the installation shall be in accordance with Section 915.4.

Exceptions:

1. Carbon monoxide alarms are permitted to be solely battery operated where the code that was in effect at the time of construction did not require carbon monoxide detectors to be provided.
2. Carbon monoxide alarms are permitted to be solely battery operated in *dwelling units* that are not served from a commercial power source.
3. A carbon monoxide detection system in accordance with Section 915.5 shall be an acceptable alternative to carbon monoxide alarms.

Add new text as follows:

105.5.41 Pet boarding. An operational permit is required to for *pet boarding*.

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[F] 903.2.2 Group B.
An *automatic sprinkler system* shall be provided for Group B occupancies as required in Sections 903.2.2.1 and 903.2.2.2.

Add new text as follows:

903.2.2.3 Pet boarding. An *automatic sprinkler system* shall be installed in *fire areas* containing *pet boarding.*

Revise as follows:

[F] 903.2.7 Group M.
An *automatic sprinkler system* shall be provided throughout buildings containing a Group M occupancy where required by Sections 903.2.7.1 through 903.2.7.4 or where any~~one~~ of the following conditions exist~~s~~:

1. A Group M *fire area* exceeds 12,000 square feet (1115 m^2).
2. A Group M *fire area* is located more than three stories above *grade plane*.
3. The combined area of all Group M *fire areas* on all floors, including any *mezzanines*, exceeds 24,000 square feet (2230 m^2).

Add new text as follows:

903.2.7.4 Pet boarding. An *automatic sprinkler system* shall be installed in *fire areas* containing *pet boarding.*

Revise as follows:

[F] TABLE 906.1 ADDITIONAL REQUIRED PORTABLE FIRE EXTINGUISHERS IN THE INTERNATIONAL FIRE CODE
Portions of table not shown remain unchanged.

IFC SECTION	SUBJECT
4204.1	Pet boarding

Reason: Unlike past proposals related to animal housing that broadly prescribed a minimum level of safety for all animal housing facilities based on NFPA 150 (Proposals G216-07/08, F277-18, and F69-21), this proposal takes a more targeted approach that focuses exclusively on pet safety in commercial occupancies where 10 or more dogs and cats are kept overnight. The focus on dogs and cats is not meant to diminish the value of other pets. Instead, it promotes incremental progress in the code to directly respond to numerous catastrophic fire losses in facilities that boarded dogs and cats. Most notable to me is the recent loss of 75 dogs in the Ponderosa Pet Resort fire in Georgetown, Texas on September 18, 2021. This incident led several jurisdictions in central Texas to enact ordinances that improve fire protection in new and existing pet boarding facilities. The love and care that dog and cat owners offer their pets is said by many to be on a par with children or family members. In fact, it's long been known that pet owners may delay evacuation or go back into a burning building after safely evacuating to rescue a pet. Likewise, there are recorded instances of employees of pet boarding facilities and firefighters entering burning buildings for the sole purpose of rescuing pets, putting their own lives at risk in the process. With proper safety plans and built-in protection features, these acts of desperation can be avoided.

A pet owner who entrusts a dog or cat to a business offering overnight care should have a reasonable expectation of safety for the pet based on due diligence of the business and building safety laws that govern the business. Likewise, dogs and cats in pet stores awaiting a forever home should be reasonably protected from the risk of dying unattended in an after-hours fire. Accordingly, this proposal adds new administrative requirements for a fire safety plan to be developed and maintained by dog and cat boarding occupancies, expanding the base requirements in Section 404 to address unique safety considerations related to pet boarding. The recommended safety plan additions and fire protection requirements were developed after consideration of relevant content in NFPA 150 (fire extinguisher provisions are correlated with those in NFPA 150), Illinois' 225 ILCS 605 Animal Welfare Act, California Health and Safety Code 122385, and several Texas jurisdiction ordinances.

The "10 or more" threshold is believed to be a reasonable basis for achieving consensus in the 2027 edition code development process. It seems fair that a facility with a smaller number of dogs and cats would occupy a small floor area in a personal environment with closer supervision. The larger number of 10 or more cumulative dogs and cats better reflects a commercial business that should be expected to comply with minimum safety considerations. I expect that there will be recommendations to expand the scope of this proposal, perhaps to include fire protection requirements for buildings where breeders keep dogs or cats or to include other types of animals or uses. Notably, in early January, a fire in a small breeder building killed 25 puppies in Milton, WI. Nevertheless, pet breeding facilities have not been included in this proposal, recognizing that dogs and cats in such facilities are owned by the breeder on private property, essentially no different than private party pet owners having multiple pets on their own property, who are likewise not included. I am sympathetic to additional discussion as part of the code development process, but my objective is to not let "the perfect become the enemy of the good." It is important that consensus be reached to approve some baseline for animal housing facilities as part of the 2027 code, and more controversial topics can be revisited in a later cycle if necessary to achieve that objective.

Although the value of fire sprinklers in pet boarding occupancies cannot be overstated (demonstrated as recently as December 2023, when a fire at Animal & Medical Hospital of Frisco, Texas was controlled by a single sprinkler, saving 20 pets and resulting in no human injuries), this proposal does not recommend retrofitting existing occupancies with sprinklers. A number of individuals testified in opposition to the code requiring a higher level of protection for animals than people in past code cycles, and in deference to that viewpoint, this proposal suggests a level of protection that parallels Group R-1. Although new Group R-1 Occupancies require sprinkler protection, existing Group R-1 Occupancies need only have fire alarm systems. Recognizing that boarded dogs and cats may be restrained or, even if unrestrained with a path of egress cannot be relied upon to have an evacuation response in the event of a fire, the baseline for existing occupancies should be early warning with onsite staff and rapid notification of emergency responders.

Although I serve as a consultant to the National Fire Sprinkler Association, this proposal has not been reviewed or endorsed by NFSA, and I am not representing NFSA on this issue.

Cost Impact: Increase

Estimated Immediate Cost Impact:

Administrative requirements, such as fire safety plans, are de minimis, and are mostly providing a means to ensure that existing code requirements are complied with. There will be a cost increase associated with adding a monitored smoke alarm system to existing occupancies, perhaps in the range of $1 to $5 per square foot, and sprinkler systems to new occupancies, perhaps in the range of $1 to $2 per square foot.

Estimated Immediate Cost Impact Justification (methodology and variables):

Various Web sites suggested the quoted price ranges, which will obviously vary greatly depending on conditions associated with any specific installation. ChatGPT generally agreed with these estimates, and given that it is entirely unreasonable to ask someone to better quantify the cost impact of a proposal of this breadth, that's as good a basis as any.

F231-24

F232-24

IFC: 105.5.18, 5001.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Jeff O'Neil, Chair, Committee on Healthcare (ahc@iccsafe.org)

2024 International Fire Code

Revise as follows:

105.5.18 Flammable and combustible liquids.
An operational permit is required:

1. To use or operate a pipeline for the transportation within facilities of *flammable* or *combustible liquids*. This requirement shall not apply to the off-site transportation in pipelines regulated by the Department of Transportation (DOTn) nor does it apply to piping systems.
2. To store, handle or use Class I liquids in excess of 5 gallons (19 L) in a building or in excess of 10 gallons (37.9 L) outside of a building, except that a permit is not required for the following:
    - 2.1. The storage or use of Class I liquids in the fuel tank of a motor vehicle, aircraft, motorboat, mobile power plant or mobile heating plant, unless such storage, in the opinion of the *fire code official*, would cause an unsafe condition.
    - 2.2. The storage or use of paints, oils, varnishes or similar flammable mixtures where such liquids are stored for maintenance, painting or similar purposes for a period of not more than 30 days.
    - 2.3. The storage, use or handling of alcohol-based handrub solutions in dispensers or containers where in compliance with Section 5705.5.
3. To store, handle or use Class II or Class IIIA liquids in excess of 25 gallons (95 L) in a building or in excess of 60 gallons (227 L) outside a building, except for the following:
    - 3.1 Fuel ~~fuel~~ oil used in connection with oil-burning equipment.
    - 3.2 The storage, use or handling of alcohol-based hand rub solution in dispensers or containers where in compliance with Section 5705.5.
4. To store, handle or use Class IIIB liquids in tanks or portable tanks for fueling motor vehicles at motor fuel-dispensing facilities or where connected to fuel-burning equipment.

    Exception: Fuel oil and used motor oil used for space heating or water heating.
5. To remove Class I or II liquids from an underground storage tank used for fueling motor vehicles by any means other than the *approved*, stationary on-site pumps normally used for dispensing purposes.
6. To operate tank vehicles, equipment, tanks, plants, terminals, wells, fuel-dispensing stations, refineries, distilleries and similar facilities where *flammable* and *combustible liquids* are produced, processed, transported, stored, dispensed or used.
7. To place temporarily out of service (for more than 90 days) an underground, protected above-ground or above-ground *flammable* or *combustible liquid* tank.
8. To change the type of contents stored in a *flammable* or *combustible liquid* tank to a material that poses a greater hazard than that for which the tank was designed and constructed.
9. To manufacture, process, blend or refine *flammable* or *combustible liquids*.
10. To engage in the dispensing of liquid fuels into the fuel tanks of motor vehicles at commercial, industrial, governmental or manufacturing establishments in accordance with Section 5706.5.4 or to engage in on-demand *mobile fueling* operations in accordance with Section 5707.

11. To utilize a site for the dispensing of liquid fuels from tank vehicles into the fuel tanks of motor vehicles, marine craft and other special equipment at commercial, industrial, governmental or manufacturing establishments in accordance with Section 5706.5.4 or, where required by the *fire code official*, to utilize a site for on-demand *mobile fueling* operations in accordance with Section 5707.

5001.1 Scope.
Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.
This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that where specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1. In retail or wholesale sales occupancies, medicines, foodstuff, cosmetics and commercial or institutional products containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, provided that such materials are packaged in individual containers not exceeding 1.3 gallons (5 L).
2. Alcoholic beverages in retail or wholesale sales occupancies, provided that the liquids are packaged in individual containers not exceeding 1.3 gallons (5 L).
3. Application and release of pesticide and agricultural products and materials intended for use in weed abatement, erosion control, soil amendment or similar applications where applied in accordance with the manufacturer's instructions and label directions.
4. The off-site transportation of hazardous materials where in accordance with Department of Transportation (DOTn) regulations.
5. Building materials not otherwise regulated by this code.
6. Refrigeration systems (see Section 608).
7. Stationary storage battery systems regulated by Section 1207.
8. The display, storage, sale or use of fireworks and *explosives* in accordance with Chapter 56.
9. *Corrosives* utilized in personal and household products in the manufacturer's original consumer packaging in Group M occupancies.
10. The storage of beer, distilled spirits and wines in barrels and casks.
11. The installation and use~~, storage or both~~ of dispensers containing alcohol-based hand rubs, replacement alcohol-based hand rub solution and dispensers in storage classified as Class I or II liquids where in accordance with Section 5705.5.
12. Specific provisions for flammable liquids in motor fuel-dispensing facilities, repair garages, airports and marinas in Chapter 23.
13. Storage and use of fuel oil in tanks and containers connected to oil-burning equipment. Such storage and use shall be in accordance with Section 605. For abandonment of fuel oil tanks, Chapter 57 applies.
14. Storage and display of aerosol products complying with Chapter 51.
15. Storage and use of *flammable* or *combustible liquids* that do not have a fire point when tested in accordance with ASTM D92, not otherwise regulated by this code.
16. *Flammable* or *combustible liquids* with a *flash point* greater than 95°F (35°C) in a water-miscible solution or dispersion with a water and inert (noncombustible) solids content of more than 80 percent by weight, which do not sustain combustion, not otherwise regulated by this code.
17. Commercial cooking oil storage tank systems located within a building and designed and installed in accordance with Section 607 and NFPA 30.

Reason: This proposal clarifies that an operational permit is not required when the use or storage of alcohol-based hand rub dispensers and replacement solution is in compliance with requirements specifies in Section 5705.5. The intent of creating the requirements and limitation in 5705.5 was never intended to also require an operational permit. The addition of “storage” in Exception 11 of Section 5001.1 (Scope) simply ensures that the intention of the exception is for both the alcohol-based hand rub dispensers and the storage of alcohol-based sanitizer solutions awaiting use.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC), ICC Committee for Healthcare (CHC) and the Pandemic Task Force Code Development Work Group (PTF CDWG)

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

The ICC/NEHA Pandemic Task Force (PTF) was organized and tasked with researching the effects of the COVID-19 pandemic on the built environment and developing a roadmap and proposing needed resources – including guidelines, recommended practices, publications and updates to the International Codes® (I-Codes®) – that are necessary to overcome the numerous challenges that may be faced during future pandemics and to construct and manage safe, sustainable and affordable occupancy of the built environment. The ICC Pandemic Task Force Code Development Work Group (PTF CDWG) has conducted a comprehensive review of current code requirements as they relate to the prevention of the transmission of diseases and other serious health concerns and suggested revisions to current code requirements based on this assessment.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal does not impose any requirements that would increase construction cost. It is a clarification of an administrative requirement related to an operational permit.

F232-24

F233-24

IFC: 5001.1, TABLE 5003.1.1(5); IBC: [F] 307.1.1, TABLE 307.1.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com)

2024 International Fire Code

Revise as follows:

5001.1 Scope.
Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials shall be in accordance with this chapter.
This chapter shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that where specific requirements are provided in other chapters, those specific requirements shall apply in accordance with the applicable chapter. Where a material has multiple hazards, all hazards shall be addressed.

Exceptions:

1. In retail or wholesale sales occupancies, medicines, foodstuff, cosmetics and commercial or institutional products containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, provided that such materials are packaged in individual containers not exceeding 1.3 gallons (5 L).
2. Alcoholic beverages in retail or wholesale sales occupancies, provided that the liquids are packaged in individual containers not exceeding 1.3 gallons (5 L).
3. Application and release of pesticide and agricultural products and materials intended for use in weed abatement, erosion control, soil amendment or similar applications where applied in accordance with the manufacturer's instructions and label directions.
4. The off-site transportation of hazardous materials where in accordance with Department of Transportation (DOTn) regulations.
5. Building materials not otherwise regulated by this code.
6. Refrigeration systems (see Section 608).
7. Stationary storage battery systems regulated by Section 1207.
8. The display, storage, sale or use of fireworks and *explosives* in accordance with Chapter 56.
9. *Corrosives* utilized in personal and household products in the manufacturer's original consumer packaging in Group M occupancies.
10. The storage of beer, distilled spirits and wines in barrels and casks.
11. The use, storage or both of dispensers containing alcohol-based hand rubs classified as Class I or II liquids where in accordance with Section 5705.5.
12. Specific provisions for flammable liquids in motor fuel-dispensing facilities, repair garages, airports and marinas in Chapter 23.
13. Storage and use of fuel oil in tanks and containers connected to oil-burning equipment. Such storage and use shall be in accordance with Section 605. For abandonment of fuel oil tanks, Chapter 57 applies.
14. Storage and display of aerosol products complying with Chapter 51.
15. Storage and use of *flammable* or *combustible liquids* that do not have a fire point when tested in accordance with ASTM D92, not otherwise regulated by this code.

16. *Flammable* or *combustible liquids* with a *flash point* greater than 95°F (35°C) in a water-miscible solution or dispersion with a water and inert (noncombustible) solids content of more than 80 percent by weight, which do not sustain combustion, not otherwise regulated by this code.

17. Commercial cooking oil storage tank systems located within a building and designed and installed in accordance with Section 607 and NFPA 30.

18. Storage of *battery types* defined in Section 202.

TABLE 5003.1.1(5) HAZARDOUS MATERIALS EXEMPTIONS[a]

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.
Corrosive	Building materials	The quantity of commonly used building materials that are classified as corrosive materials is not limited.
	Personal and household products	The quantity of personal and household products that are classified as corrosive materials is not limited in retail displays, provided that the products are in original packaging.
	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
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	Aerosols	Buildings and structures occupied for the storage of aerosol products, aerosol cooking spray products, or plastic aerosol 3 products shall be classified as Group S-1.
	Alcoholic beverages	The 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 not exceeding 1.3 gallons.
	Cleaning establishments with combustible liquid solvents	The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140°F is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers or 1-hour horizontal assemblies, or both, constructed in accordance with the *International Building Code* .
		The quantity of combustible liquid solvents having a flash point at or above 200°F is not limited.
	Closed piping systems	The quantity of flammable and combustible liquids and gases utilized for the operation of machinery or equipment is not limited.
	Flammable finishing operations using flammable and combustible liquids	Buildings and structures occupied for the application of flammable finishes shall comply with Section 416.
	Fuel	The quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited.
		The quantity of gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code* is not limited.
		The quantity of liquid fuels in piping systems and fixed appliances regulated by the *International Mechanical Code* is not limited.
	Fuel oil	The quantity of fuel oil storage complying with Section 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 shall be provided in the construction documents.
	Retail and wholesale sales occupancies with flammable and combustible liquids	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.

Highly toxic and toxic materials	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Any	Agricultural materials	The quantity of agricultural materials stored or utilized for agricultural purposes on the premises is not limited.
	Batteries	The storage of battery types defined in Section 202 is not limited.
	Energy storage	The quantity of hazardous materials in stationary storage battery systems is not limited.
		The quantity of hazardous materials in stationary fuel cell power systems is not limited.
		The quantity of hazardous materials in capacitor energy storage systems is not limited.
	Refrigeration systems	The quantity of refrigerants in refrigeration systems is not limited.

For SI: 1 gallon = 3.785 L, °C = (°F – 32)/1.8.

a. Exempted materials and conditions listed in this table are required to comply with provisions of this code that are not based on exceeding maximum allowable quantities in Section 5003.

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[F] 307.1.1 Occupancy Exemptions.

Storage, use and *handling* of *hazardous materials* in accordance with Table 307.1.1 shall not be counted as contributing to Maximum Allowable Quantities and shall not cause classification of an occupancy to be Group H. Such storage, use and *handling* shall comply with applicable provisions of the *International Fire Code* .

Revise as follows:

TABLE 307.1.1 HAZARDOUS MATERIALS EXEMPTIONS[a]

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.	
Corrosive	Building materials	The quantity of commonly used building materials that are classified as corrosive materials is not limited.	
	Personal and household products	The quantity of personal and household products that are classified as corrosive materials is not limited in retail displays, provided that the products are in original packaging.	
	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.	
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	Aerosols	Buildings and structures occupied for the storage of aerosol products, aerosol cooking spray products, or plastic aerosol 3 products shall be classified as Group S-1.	
	Alcoholic beverages	The 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 not exceeding 1.3 gallons.	
	Cleaning establishments with combustible liquid solvents	The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140ºF is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both	

		The quantity of combustible liquid solvents having a flash point at or above 200ºF is not limited.	
	Closed piping systems	The quantity of flammable and combustible liquids and gases utilized for the operation of machinery or equipment is not limited.	
	Fuel	The quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited.	
		The quantity of gaseous fuels in piping systems and fixed appliances regulated by the International Fuel Gas Code is not limited.	
		The quantity of liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code is not limited.	
	Flammable finishing operations using flammable and combustible liquids	Buildings and structures occupied for the application of flammable finishes shall comply with Section 416.	
	Fuel oil	The quantity of fuel oil storage complying with Section 605.4.2 of the *International Fire Code* 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 of the *International Fire Code* is not limited. The location of the ABHR dispensers shall be provided in the construction documents.	
	Retail and wholesale sales occupancies with flammable and combustible liquids	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.	
Highly toxic and toxic materials	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.	
Any	Agricultural materials	The quantity of agricultural materials stored or utilized for agricultural purposes on the premises is not limited.	
	Batteries	The storage of battery types defined in Section 202 of the *International Fire Code* is not limited.	
	Energy storage	The quantity of hazardous materials in stationary storage battery systems is not limited.	
		The quantity of hazardous materials in stationary fuel cell power systems is not limited.	
		The quantity of hazardous materials in capacitor energy storage systems is not limited.	
	Refrigeration Systems	The quantity of refrigerants in refrigeration systems is not limited.	

For SI: 1 gallon = 3.785L, °C = (°F - 32)/1.8.

a. Exempted materials and conditions listed in this table are required to comply with applicable provisions of the International Fire Code.

Reason: FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

There is confusion as to whether electrolyte, cathodes, anodes, lead or other materials inside of batteries are supposed to be identified, classified, quantified, and reported as hazardous materials, as well as be subject to IFC Chapter 50 – 67 and IBC Group H Occupancy requirements. The concept of regulating MAQs addresses what an emergency responder may be faced with when responding to an event, i.e., an amount of hazardous material physically present upon arrival. The hazard in an amount exceeding the MAQ does not present itself when the material is confined in manufactured articles and devices containing amounts less than the MAQ.

An example of the problem is if I have an entire existing floor of a building occupied by a lead-acid battery energy storage system the electrolyte in the batteries is not added up for MAQs because there is an existing carve out for ESS. But if I have the same amount of floor area and number of lead-acid batteries in storage in a warehouse, something presenting a lower event hazard than those in use, some jurisdictions require the electrolyte from the individual batteries to be added up and if the aggregate is over the MAQ they force an H-4 Group classification on the facility. The same activity has occurred with Lithium-ion cells and batteries where the amount of electrolyte per cell is minimal, in some cases you need a centrifuge to get it out.

This exception clarifies that storage of those *battery types* defined in Chapter 2, which have been vetted through the IFC or NFPA 855 process as to hazards presented are not subject to IFC Chapter 50-67 regulations or IBC 307.1 Group H-Occupancy requirements but may be regulated elsewhere in the code.

If the separate proposal for a new Chapter 42 Battery in the IFC is approved by the committee, it is our intent to modify the exception language to include reference to that new chapter where code application guidance will exist.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal will eliminate inappropriate application of IFC requirements and high-hazard group designations for the storage of batteries. This will reduce the cost of construction and overall compliance.

Reducing code requirements reduces cost.

F233-24

F234-24

IFC: 5003.1.1, 5003.1.1.1 (New); IBC: [F] 307.1, 307.1.1 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

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5003.1.1 Maximum allowable quantity per control area.
The *maximum allowable quantity per control area* shall be as specified in Tables 5003.1.1(1) through 5003.1.1(4). For retail and wholesale storage and display in Group M occupancies and Group S storage, see Section 5003.11.

Add new text as follows:

5003.1.1.1 Physical states. Where a hazard class includes solids, liquids, gases (gaseous) and gases (liquefied), the maximum allowable quantity for each shall be permitted.

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[F] 307.1 High-hazard Group H.
High-hazard Group H occupancy includes, among others, the use of a *building* or *structure*, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or *health hazard* in quantities in excess of those allowed in *control areas* complying with Section 414, based on the maximum allowable quantity limits for *control areas* set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the *International Fire Code* . *Hazardous materials* stored or used on top of roofs or *canopies* shall be classified as rooftop storage or use and shall comply with the *International Fire Code* .

Add new text as follows:

307.1.1 Physical states. Where a hazard class includes solids, liquids, gases (gaseous) and gases (liquefied), the maximum allowable quantity for each shall be permitted.

Reason: The purpose of this code change is to clarify the intent of the IFC and IBC to allow up to the MAQ for each physical state as listed in the MAQ tables.

For example, the Table 5003.1.1(1) would allow up to 5 pounds of solid **and** 5 pounds (~1/2 gallon) of a liquid Class 1 Organic Peroxide.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no impact to construction cost as this proposal simply clarifies the intent as to how the table is to be applied. It has always been the intent that each material state be counted separately.

F234-24

F235-24

IFC: TABLE 5003.1.1(1), TABLE 5003.1.1(2), TABLE 5003.1.1(3), TABLE 5003.1.1(4); IBC: [F] TABLE 307.1(1), [F] TABLE 307.1(2)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

TABLE 5003.1.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, i, l, m, o]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]				USE-CLOSED SYSTEMS[b]				USE-OPEN SYSTEMS[b]	
					Gas				Gas			
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous ~~(~~cubic feet at NTP~~)~~	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous ~~(~~cubic feet at NTP~~)~~	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note p	NA	NA	NA	See Note p	NA	NA	NA	See Note p	NA
Combustible fibers [p]	Loose	H-3	(100)	NA	NA	NA	(100)	NA	NA	NA	(20)	NA
	Baled		(1,000)				(1,000)				(200)	
Combustible liquid	II	H-2 or H-3	NA	120[d, e]	NA	NA	NA	120[d]	NA	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]				330[d]				80[d]
	IIIB	NA		13,200[e, f]				13,200[f]				3,300[f]
CryogenicFlammable	NA	H-2	NA	45[d]	NA	NA	NA	45[d]	NA	NA	NA	10[d]
CryogenicInert	NA	NA	NA	~~NA~~ NL	~~NL~~ NA	NA	NA	~~NA~~ NL	~~NL~~ NA	NA	NA	NA
CryogenicOxidizing	NA	H-3	NA	45[d]	NA	NA	NA	45[d]	NA	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	NA	0.25[g]	(0.25)[g]	NA	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]			0.25[g]	(0.25)[g]			0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]			1[g]	(1)[g]			1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]			50[g]	(50)[g]			NA	NA
	Division 1.4G	H-3	125[e, k]	NA			NA	NA			NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]			0.25[g]	(0.25)[g]			0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA			NA	NA			NA	NA
Flammable gas	~~Gaseous~~											
	1A and 1B (High BV)[q]	H-2	NA	NA	1,000[d, e]	150[d, e]	NA	NA	1,000[d, e]	150[d, e]	NA	NA
	1B (Low BV)[q]				162,500[d, e]	10,000[d, e]			162,500[d, e]	10,000[d, e]		
	~~Liquefied~~		~~NA~~		~~NA~~		~~NA~~		~~NA~~		~~NA~~	~~NA~~
	~~1A and 1B (High BV)[q]~~			~~(150)[d, e]~~				~~(150)[d, e]~~				
	~~1B (Low BV)[q]~~			~~(10,000)[d, e]~~				~~(10,000)[d, e]~~				
Flammable liquid[n]	IA	H-2 or H-3	NA	30[d, e]	NA	NA	NA	30[d]	NA	NA	NA	10d
	IB and IC			120[d, e]				120[d]				30d
Flammable liquid, combination ~~(IA, IB, IC)~~ [n]	~~NA~~ IA, IB, IC	H-2 or H-3	NA	120[d, e, h]	NA	NA	NA	120[d, h]	NA	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	NA	125[d]	NA	NA	NA	25[d]	NA
Inert gas	~~Gaseous~~ NA	NA	NA	NA	NL	NL	NA	NA	NL	NL	NA	NA
	~~Liquefied~~	~~NA~~	~~NA~~	~~NA~~	~~NL~~		~~NA~~	~~NA~~	~~NL~~		~~NA~~	~~NA~~
Organic peroxide	UD	H-1	1[e, g]	(1)[e, g]	NA	NA	0.25[g]	(0.25)[g]	NA	NA	0.25[g]	(0.25)[g]
	I	H-2	5[d, e]	(5)[d, e]			1[d]	(1)[d]			1[d]	(1)[d]
	II	H-3	50[d, e]	(50)[d, e]			50[d]	(50)[d]			10[d]	(10)[d]
	III	H-3	125[d, e]	(125)[d, e]			125[d]	(125)[d]			25[d]	(25)[d]
	IV	NA	NL	NL			NL	NL			NL	NL
	V	NA	NL	NL			NL	NL			NL	NL
Oxidizer	4	H-1	1[g]	(1)[e, g]	NA	NA	0.25[g]	(0.25)[g]	NA	NA	0.25[g]	(0.25)[g]
	3[j]	H-2 or H-3	10[d, e]	(10)[d, e]			2[d]	(2)[d]			2[d]	(2)[d]
	2	H-3	250[d, e]	(250)[d, e]			250[d]	(250)[d]			50[d]	(50)[d]
	1	NA	4,000[e, f]	(4,000)[e, f]			4,000[f]	(4,000)[f]			1,000[f]	(1,000)[f]
Oxidizing gas	~~Gaseous~~ NA	H-3	NA	NA	1,500[d,e]	150[d,e]	NA	NA	1,500[d, e]	150[d,e]	NA	NA
	~~Liquefied~~			~~(150)[d, e]~~	~~NA~~			~~(150)[d, e]~~	~~NA~~			
Pyrophoric	NA	H-2	4[e, g]	(4)[e, g]	50[e, g]	4[e, g]	1[g]	(1)[g]	10[e, g]	1[e, g]	0	0
Unstable (reactive)	4	H-1	1[e, g]	(1)[e, g]	10[e, g]	1[e, g]	0.25[g]	(0.25)[g]	2[e, g]	1[e, g]	0.25[g]	(0.25)[g]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE				USE-CLOSED SYSTEMS				USE-OPEN SYSTEMS	
					Gas				Gas			
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous ~~(~~cubic feet at NTP~~)~~	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous ~~(~~cubic feet at NTP~~)~~	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)
	3 Detonable	H-1	1[d, e]	(1)[d, e]	10[d, e]	1[d, e]	0.25[d]	(0.25)[d]	2[d, e]	1[d, e]	0.25[d]	(0.25)[d]
	3 Nondetonable	~~H-1 or~~ H-2	5[d, e]	(5)[d, e]	50[d, e]	1[d, e]	1[d]	(1)[d]	10[d, e]	2[d, e]	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]	750[d, e]	150[d, e]	50[d]	(50)[d]	750[d, e]	150[d, e]	10[d]	(10)[d]
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5[d, e]	(5)[d, e]	NA	NA	5[d]	(5)[d]	NA	NA	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]			50[d]	(50)[d]			10[d]	(10)[d]
	1	NA	NL	NL			NL	NL			NL	NL

For SI: 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NA = Not Applicable, NL = Not Limited, UD = Unclassified Detonable.

a. For use of control areas, see Section 5003.8.3.

b. The aggregate quantity in use and storage shall not exceed the maximum allowance quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of the *International Building Code* and Chapter 38.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, day boxes, gas cabinets, gas rooms, exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10. Where Note d applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an approved automatic sprinkler system.

h. Containing not more than the maximum allowable quantity per control area of Class IA, Class IB or Class IC flammable liquids.

i. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

j. A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed where such materials are necessary for maintenance purposes, operation or sanitation of equipment where the storage containers and the manner of storage are approved.

k. Net weight of pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks including packaging shall be used.

l. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

m. For oxidizers, unstable (reactive) materials and water-reactive materials stored or displayed in Group M occupancies or storedin Group S occupancies, see Section 5003.11..

n. For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 5704.3.6.

o. Quantities in this table shall be modified in accordance with Table 5003.1.1(5).

p. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.2.2.

q. "High BV" Category 1B flammable gas has a burning velocity greater than 3.9 in/s (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 in/s (10 cm/s) or less. Where the fundamental burning velocity for a gas is not known, the gas will be treated as Category 1A flammable gas.

TABLE 5003.1.1(2) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A HEALTH HAZARD[a, c, h, i, j]

MATERIAL	STORAGE[b]				USE-CLOSED SYSTEMS[b]				USE-OPEN SYSTEMS[b]	
			Gas				Gas			
	Solid pounds[d, e, f]	Liquid gallons (pounds)[d, e, f]	Gaseous cubic feet at NTP ~~(pounds)~~[d]	Liquefied pounds[d]	Solid pounds[d]	Liquid gallons (pounds)[d]	Gaseous cubic feet at NTP ~~(pounds)~~[d]	Liquefied pounds[d]	Solid pounds[d]	Liquid gallons (pounds)[d]
Corrosives	5,000	500	~~Gaseous~~ 810[e] ~~Liquefied (150)~~	150[e]	5,000	500	~~Gaseous~~ 810[e] ~~Liquefied (150)~~	150[e]	1,000	100
Highly toxics	10	(10)	~~Gaseous~~ 20[g] ~~Liquefied (4)[g]~~	4[g]	10	(10)	~~Gaseous~~ 20[g] ~~Liquefied (4)[g]~~	4[g]	3	(3)
Toxics	500	(500)	~~Gaseous~~ 810[e] ~~Liquefied (150)[e]~~	150[e]	500	(500)	~~Gaseous~~ 810[e] ~~Liquefied (150)[e]~~	150[e]	125	(125)

For SI: 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. For use of control areas, see Section 5003.8.3.

b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.

c. In retail and wholesale sales occupancies, the quantities of medicines, foodstuff or consumer products and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an *approved* automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in *approved* storage cabinets, gas cabinets or exhausted enclosures. Where Note d applies, the increase for both notes shall be applied accumulatively.

f. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 5003.11, see Table 5003.11.1.

g. Allowed only where stored in *approved* exhausted gas cabinets or exhausted enclosures.

h. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

i. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

j. Quantities in this table shall be modified in accordance with Table 5003.1.1(5).

TABLE 5003.1.1(3) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD IN AN OUTDOOR CONTROL AREA[a, b, c, d]

MATERIAL	CLASS	STORAGE[b]				USE-CLOSED SYSTEMS[b]				USE-OPEN SYSTEMS[b]	
				Gas				Gas			
		Solid pounds (cubic feet)	Liquid gallons (pounds)[d]	Gaseous cubic feet at NTP	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)[d]	Gaseous cubic feet at NTP	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)[d]
Flammable gas	~~Gaseous~~										

MATERIAL	CLASS	STORAGE				USE-CLOSED SYSTEMS				USE-OPEN SYSTEMS	
				Gas				Gas			
		Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous cubic feet at NTP	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous cubic feet at NTP	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)
	1A and 1B (High BV)[e]	NA	NA	3,000	300	NA	NA	1,500	150	NA	NA
	1B (Low BV)[e]			195,000	20,000			97,500	10,000		
	~~Liquefied~~										
	~~1A and 1B (High BV)[e]~~	~~NA~~	~~(300)~~	~~NA~~		~~NA~~	~~(150)~~	~~NA~~		~~NA~~	~~NA~~
	~~1B (Low BV)[e]~~		~~(20,000)~~				~~(10,000)~~				
Flammable solid	NA	500	NA	NA	NA	250	NA	NA		50	NA
Inert Gas	~~Gaseous~~NA	NA	NA	NL	NL	NA	NA	NL	NL	NA	NA
	~~Liquefied~~	~~NA~~	~~NA~~	~~NL~~		~~NA~~	~~NA~~	~~NL~~		~~NA~~	~~NA~~
Cryogenic inert	NA	NA	~~NA~~NL	~~NL~~NA	NA	NA	~~NA~~NL	~~NL~~ NA	NA	NA	NA
Organic peroxide	Unclassified Detonable	1	(1)	NA	NA	0.25	(0.25)	NA	NA	0.25	(0.25)
Organic peroxide	I	20	(20)	NA	NA	10	(10)	NA	NA	2	(2)
	II	200	(200)	NA	NA	100	(100)	NA	NA	20	(20)
	III	500	(500)	NA	NA	250	(250)	NA	NA	50	(50)
	IV	NL	NL	NA	NA	NL	NL	NA	NA	NL	NL
	V	NL	NL	NA	NA	NL	NL	NA	NA	NL	NL
Oxidizer	4	2	(2)	NA	NA	1	(1)	NA	NA	0.25	(0.25)
	3	40	(40)	NA	NA	20	(20)	NA	NA	4	(4)
	2	1,000	(1,000)	NA	NA	500	(500)	NA	NA	100	(100)
	1	NL	NL	NA	NA	NL	NL	NA	NA	NL	NL
Oxidizing gas	~~Gaseous~~ NA	NA	NA	6,000	600	NA	NA	1,500	300	NA	NA
	~~Liquefied~~	~~NA~~	~~(600)~~	~~NA~~		~~NA~~	~~(300)~~	~~NA~~		~~NA~~	~~NA~~
Pyrophoric ~~materials~~	NA	8	(8)	100	8	4	(4)	10	4	0	0
Unstable (reactive)	4	2	(2)	20	2	1	(1)	2	0.2	0.25	(0.25)
	3 Detonable	2	(2)	20	2	1	(1)	2	0.2	0.25	(0.25)
	3 Nondetonable	20	(20)	200	20	10	(10)	10	1	1	(1)
	2	200	(200)	1,000	100	100	(100)	250	25	10	(10)
	1	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	20	(20)	NA	NA	10	(10)	NA	NA	1	(1)
	2	200	(200)	NA	NA	100	(100)	NA	NA	10	(10)
	1	NL	NL	NA	NA	NL	NL	NA	NA	NL	NL

For SI: 1 pound = 0.454 kg, 1 gallon = 3.785 L, 1 cubic foot = 0.02832 m^3.

Na = Not Applicable, NL = Not Limited.

a. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

b. The aggregate quantities in storage and use shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials allowed in outdoor storage per single property under the same ownership or control used for retail or wholesale sales is allowed to exceed the maximum allowable quantity per control area where such storage is in accordance with Section 5003.11.

d. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

e. "High BV" Category 1B flammable gas has a burning velocity greater than 3.9 in/s (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 in/s (10 cm/s) or less. Where the fundamental burning velocity for a gas is not known, the gas will be treated as Category 1A flammable gas.

TABLE 5003.1.1(4) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A HEALTH HAZARD IN AN OUTDOOR CONTROL AREA[a, b, c, f]

MATERIAL	STORAGE				USE-CLOSED SYSTEMS				USE-OPEN SYSTEMS	
			Gas				Gas			
	Solid pounds	Liquid gallons (pounds)	Gaseous cubic feet at NTP ~~(pounds)~~	Liquefied pounds	Solid pounds	Liquid gallons (pounds)	Gaseous cubic feet at NTP ~~(pounds)~~	Liquefied pounds	Solid pounds	Liquid gallons (pounds)
Corrosives	20,000	2,000	~~Gaseous~~ 1,620 ~~Liquefied (300)~~	300	10,000	1,000	~~Gaseous~~ 810 ~~Liquefied (150)~~	150	1,000	100
Highly toxics	20	(20)	~~Gaseous~~ 40[d] ~~Liquefied (8)[d]~~	8[d]	10	(10)	~~Gaseous~~ 20[d] ~~Liquefied (4)[d]~~	4[d]	3	(3)
Toxics	1,000	(1,000)[e]	~~Gaseous~~ 1,620 ~~Liquefied (300)~~	300	500	50[e]	~~Gaseous~~ 810 ~~Liquefied (150)~~	150	125	(125)[e]

For SI: 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L, 1 pound per square inch absolute = 6.895 kPa, °C = (°F – 32)/1.8.

a. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

b. The aggregate quantities in storage and use shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials allowed in outdoor storage per single property under the same ownership or control used for retail or wholesale sales is allowed to exceed the maximum allowable quantity per control area where such storage is in accordance with Section 5003.11.

d. Allowed only where used in *approved* exhausted gas cabinets, exhausted enclosures or under fume hoods.

e. The maximum allowable quantity per control area for toxic liquids with vapor pressures in excess of 1 psia at 77°F shall be the maximum allowable quantity per control area listed for highly toxic liquids.

f. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

2024 International Building Code

Revise as follows:

[F] TABLE 307.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, i, l, m]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]				USE-CLOSED SYSTEMS[b]				USE-OPEN SYSTEMS[b]	
					Gas				Gas			
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous ~~(~~ cubic feet at NTP~~)~~	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous ~~(~~ cubic feet at NTP~~)~~	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note o	NA	NA	NA	See Note o	NA	NA	NA	See Note o	NA
Combustible fiber[o]	Loose	H-3	(100)	NA	NA	NA	(100)	NA	NA	NA	(20)	NA
	Baled		(1,000)				(1,000)				(200)	
Combustible liquid[n]	II	H-2 or H-3	NA	120[d, e]	NA	NA	NA	120[d]	NA	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]				330[d]				80[d]
	IIIB	NA		13,200[e, f]				13,200[f]				3,300[f]
Cryogenic flammable	NA	H-2	NA	45[d]	NA	NA	NA	45[d]	NA	NA	NA	10[d]
Cryogenic inert	NA	NA	NA	~~NA~~ NL	~~NL~~ NA	NA	NA	~~NA~~ NL	~~NL~~ NA	NA	NA	NA
Cryogenic oxidizing	NA	H-3	NA	45[d]	NA	NA	NA	45[d]	NA	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	NA	0.25[g]	(0.25)[g]	NA	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]			0.25[g]	(0.25)[g]			0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]			1[g]	(1)[g]			1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]			50[g]	(50)[g]			NA	NA
	Division 1.4G	H-3	125[e, k]	NA			NA	NA			NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]			0.25[g]	(0.25)[g]			0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA			NA	NA			NA	NA
Flammable gas	~~Gaseous~~											
	1A and 1B (High BV)[p]	H-2	NA	NA	1,000[d, e]	150[d, e]	NA	NA	1,000[d, e]	150[d, e]	NA	NA
	1B (Low BV)[p]				162,500[d, e]	10,000[d, e]			162,500[d, e]	10,000[d, e]		
	~~Liquefied~~						~~NA~~					

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE				USE-CLOSED SYSTEMS				USE-OPEN SYSTEMS	
					Gas				Gas			
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous ~~(~~ cubic feet at NTP~~)~~	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gaseous ~~(~~ cubic feet at NTP~~)~~	Liquefied pounds	Solid pounds (cubic feet)	Liquid gallons (pounds)
	~~1A and 1B (High BV)[p]~~			~~(150)[d, e]~~	~~NA~~			~~(150)[d, e]~~	~~NA~~		~~NA~~	~~NA~~
	~~1B (Low BV)[p]~~			~~(10,000)[d, e]~~				~~(10,000)[d, e]~~				
Flammable liquid[n]	IA	H-2 or H-3	NA	30[d, e]	NA	NA	NA	30[d]	NA	NA	NA	10[d]
	IB and IC			120[d, e]				120[d]				30[d]
Flammable liquid, combination ~~(IA, IB, IC)~~[n]	~~NA~~ IA, IB, IC	H-2 or H-3	NA	120[d, e, h]	NA	NA	NA	120[d, h]	NA	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	NA	125[d]	NA	NA	NA	25[d]	NA
Inert gas	~~Gaseous~~ NA	NA	NA	NA	NL	NL	NA	NA	NL	NL	NA	NA
	~~Liquefied~~	~~NA~~	~~NA~~	~~NA~~	~~NL~~		~~NA~~	~~NA~~	~~NL~~		~~NA~~	~~NA~~
Organic peroxide	UD	H-1	1[e, g]	(1)[e, g]	NA	NA	0.25[g]	(0.25)[g]	NA	NA	0.25[g]	(0.25)[g]
	I	H-2	5[d, e]	(5)[d, e]			1[d]	(1)[d]			1[d]	(1)[d]
	II	H-3	50[d, e]	(50)[d, e]			50[d]	(50)[d]			10[d]	(10)[d]
	III	H-3	125[d, e]	(125)[d, e]			125[d]	(125)[d]			25[d]	(25)[d]
	IV	NA	NL	NL			NL	NL			NL	NL
	V	NA	NL	NL			NL	NL			NL	NL
Oxidizer	4	H-1	1[g]	(1)[e, g]	NA	NA	0.25[g]	(0.25)[g]	NA	NA	0.25[g]	(0.25)[g]
	3~~[j]~~	H-2 or H-3	10[d, e]	(10)[d, e]			2[d]	(2)[d]			2[d]	(2)[d]
	2	H-3	250[d, e]	(250)[d, e]			250[d]	(250)[d]			50[d]	(50)[d]
	1	NA	4,000[e, f]	(4,000)[e, f]			4,000[f]	(4,000)[f]			1,000[f]	(1,000)[f]
Oxidizing gas	~~Gaseous~~ NA	H-3	NA	NA	1,500[d, e]	150[d, e]	NA	NA	1,500[d,e]	150[d, e]	NA	NA
	~~Liquefied~~			~~(150)[d, e]~~	~~NA~~			~~(150)[d,e]~~	~~NA~~			
Pyrophoric	NA	H-2	4[e, g]	(4)[e, g]	50[e, g]	4[e, g]	1[g]	(1)[g]	10[e, g]	1[e, g]	0	0
Unstable (reactive)	4	H-1	1[e, g]	(1)[e, g]	10[e, g]	1[e, g]	0.25[g]	(0.25)[g]	2[e, g]	1[e, g]	0.25[g]	(0.25)[g]
	3 Detonable	H-1	1[d, e]	(1)[d, e]	10[d, e]	1[d, e]	0.25[d]	(0.25)[d]	2[d, e]	1[d, e]	0.25[d]	(0.25)[d]
	3 Nondetonable	~~H-1 or~~ H-2	5[d, e]	(5)[d, e]	50[d, e]	2[d, e]	1[d]	(1)[d]	10[d, e]	2[d, e]	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]	750[d, e]	150[d, e]	50[d]	(50)[d]	750[d, e]	150[d, e]	10[d]	(10)[d]
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5[d, e]	(5)[d, e]	NA	NA	5[d]	(5)[d]	NA	NA	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]			50[d]	(50)[d]			10[d]	(10)[d]
	1	NA	NL	NL			NL	NL			NL	NL

For SI: 1 cubic foot = 0.028 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NL = Not Limited; NA = Not Applicable; UD = Unclassified Detonable.

a. For use of control areas, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of this code and Chapter 38 of the *International Fire Code*.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms or exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10 of the International Fire Code. Where Note d also applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

h. Containing not more than the maximum allowable quantity per control area of Class IA, IB or IC flammable liquids.

i . Quantities in parentheses indicate quantity units in parentheses at the head of each column.

j . A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment when the storage containers and the manner of storage are approved.

k . Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.

l . For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.

m . For oxidizers, unstable (reactive) materials, and water-reactive materials stored or displayed in Group M occupancies or stored in Group S occupancies, see Section 414.2.5.1.

n . For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 414.2.5.2.

o . Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

p. “High BV” Category 1B flammable gas has a burning velocity greater than 3.9 inches per second (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 inches per second (10 cm/s) or less. Where the fundamental burning velocity for a gas is not known, the gas will be treated as Category 1A flammable gas.

[F] TABLE 307.1(2) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A HEALTH HAZARD[a, c, h, i]

MATERIAL	STORAGE[b]				USE-CLOSED SYSTEMS[b]				USE-OPEN SYSTEMS[b]	
			Gas				Gas			
	Solid pounds[d, e, f]	Liquid gallons (pounds)[d, e, f]	Gaseous cubic feet at NTP ~~(pounds)~~[d]	Liquefied pounds[d]	Solid pounds[d]	Liquid gallons (pounds)[d]	Gaseous cubic feet at NTP ~~(pounds)~~[d]	Liquefied pounds[d]	Solid pounds[d]	Liquid gallons (pounds)[d]
Corrosives	5,000	500	~~Gaseous~~ 810[e] ~~Liquefied (150)~~	150[e]	5,000	500	~~Gaseous~~ 810[e] ~~Liquefied (150)~~	150[e]	1,000	100
Highly Toxic	10	(10)	~~Gaseous~~ 20[g] ~~Liquefied (4)~~[g]	4[g]	10	(10)	~~Gaseous~~ 20[g] ~~Liquefied (4)~~[g]	4[g]	3	(3)
Toxic	500	(500)	~~Gaseous~~ 810[e] ~~Liquefied (150)~~[e]	150[e]	500	(500)	~~Gaseous~~ 810[e] ~~Liquefied (150)~~[e]	150[e]	125	(125)

For SI: 1 cubic foot = 0.028 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. For use of control areas, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of this code and Chapter 38 of the *International Fire Code*.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *International Fire Code*. Where Note d also applies, the increase for both notes shall be applied accumulatively.

f. For corrosive, highly toxic and toxic materials stored or displayed in Group M occupancies or stored in Group S occupancies, see Section 414.2.5.1.

g. Allowed only where stored in approved exhausted gas cabinets or exhausted enclosures as specified in the *International Fire Code*.

h. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

i. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.

Reason: The intent of this proposal is to clarify the MAQ tables and to insert new columns for "liquefied gases" under Storage and Use-Closed Systems. Several line entries for gases in the tables specify an MAQ for compressed gases in a gaseous state and in a liquefied state. See Table 503.1.1.1(1) for Flammable Gas, Inert Gas, and Oxidizing Gas. However, not all materials are listed in this fashion. For those other materials, the applicant must attempt to determine an equivalency for liquefied gases as compared to compressed gases. The inclusion of these new columns in the table resolves this issue and provides the appropriate MAQ.

The MAQ for each class of material is already allowed to include both compressed gases and liquefied gases. This is demonstrated in the reason statement for F169-06/07 which initially added liquefied gas MAQs into the tables where previously the tables only listed gaseous MAQs. The following is a portion of the reason statement indicating that the intent was to allow an MAQ for compressed gases in a gaseous state and in a liquefied state, and that both were allowed. “It may be argued that by recognizing the common forms of gases, e.g., liquefied and nonliquefied allows a defacto increase in the threshold levels applied. It is possible that one could have a toxic gas that is liquefied and also one that is nonliquefied in the same area therefore doubling the aggregate quantity of gas if all was considered. While this is theoretically possible, it is not considered to be the norm. In addition, there is precedent in using the approach as established in Table 2703.1.1(1) *[Table 5003.1.1(1) in the 2024 IFC]* for flammable and oxidizing gases.”

This proposal is simply separating out the gaseous MAQ from the liquefied MAQ to provide clarity to the table and to reinforce the fact that a control area is allowed to contain both gaseous and liquefied gases provided the individual MAQs are not exceeded.

General comments that apply to all of the tables:

- In the header, the column "Gas" is split into gaseous and liquefied. The units for Gaseous are cubic feet at NTP; the units for liquefied is pounds.
- Cryogenic Flammable: the MAQ of 45 gallons is *NOT* relocated under liquefied gas. The definition of compressed gases, gaseous does not include Cryogenic fluids. This reinforces the fact that cryogenic fluids are not included with liquefied gases.
- Cryogenic Inert: the MAQ of not limited is relocated to the column for liquids. This is consistent with all the other cryogenic fluid entries.
- Cryogenic Oxidizing: treated the same as cryogenic flammable noted above.
- Oxidizing Gas: the MAQ for liquefied is relocated under liquefied gas.

Specific comments for each table are below.

IFC Table 5003.1.1(1) and IBC Table 307.1(1)

- Parenthesis around “cubic feet at NTP” are removed from the heading for Gas in storage and Use-Closed Systems. Footnote i states that where values in the cells are in parentheses, then the units in parentheses in the header will apply. For liquids, the table has values with or without parentheses. However, the values for gases are all without parentheses even though the unit of cubic feet is parenthetical. The table currently has a discrepancy and this revision will clarify the use of cubic feet.
- Pyrophoric: MAQs for liquefied gas storage are from NFPA 55 Table 6.3.1.1, NFPA 1 Table 61.4.2.1.1.3 and NFPA 400 Table 5.2.1.1.3.
- Pyrophoric: Table 6.3.1.1 in NFPA 55 shows 4 lbs for use-closed for liquefied pyrophoric gas. However, the IFC reduces the use-closed for gaseous pyrophoric gas from 50 to 10, so the liquefied MAQ is reduced to 1 gallon. 1 gallon is also the MAQ for use-closed liquid pyrophorics.
- Unstable (reactive): this category includes Class 1 through 4, but Class 3 indicates that the occupancy might be Group H-1 or H-2. The problem is that no guidance is provided to determine if Group H-1 is appropriate or if H-2 is correct. This proposal separates out Class 3 Detonable and places it in Group H-1; while Class 3 Nondetonable will result in Group H-2 classification. This is clarification as to how to apply the proper occupancy classification when the MAQ is exceeded. MAQs assigned to Class 3 detonable are the same as Class 4, which is also detonable; however, the Footnote d (increase for sprinklers) that previously

applied to all Class 3 materials is applied to Class 3 detonable, and Footnote g which requires a sprinklered building for Class 4 does not apply to Class 3 detonable. This provides a separation between the requirements for Class 4 and Class 3 detonable.

- Unstable (reactive) gas: MAQs for liquefied gas come from NFPA 55 Table 6.3.1.1, NFPA 1 Table 61.4.2.1.1.3 and NFPA 400 Table 5.2.1.1.3.
- Footnote q is revised to clarify that flammable gases that do not have supporting data to justify reducing the classification to Category 1B shall be classified as Category 1A. This is consistent with GHS 7 guidance and provides clarity that the default is Category 1A.

IFC Table 5003.1.1(2) and IBC Table 307.1(2)

- Under storage and use-closed systems for gaseous in the header, the unit of measure "(pounds)" is relocated to liquefied.

Table 5003.1.1(3)

- Pyrophoric: the category of “pyrophoric materials” is simply listed as “pyrophoric”. This is consistent with terminology in Table 5003.1.1(1).
- Pyrophoric: MAQs for liquefied gas are the same as the MAQ for liquid in pounds.
- Unstable (reactive): this category includes Class 1 through 4, but Class 3 indicates that the occupancy might be Group H-1 or H-2. The problem is that no guidance is provided to determine if Group H-1 is appropriate or if H-2 is correct. This proposal separates out Class 3 Detonable and places it in Group H-1; while Class 3 Nondetonable will result in Group H-2 classification. This is clarification as to how to apply the proper occupancy classification when the MAQ is exceeded.
- Unstable (reactive) gas: MAQs for liquefied gas are based on 10% of the MAQ for Unstable (reactive) compressed gas.

IFC Table 5003.1.1(4)

- Under storage and use-closed systems for gaseous in the header, the unit of measure "(pounds)" is relocated to liquefied.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This code change reformats the MAQ tables and includes provisions found elsewhere in the code or referenced standards.

F235-24

F236-24

IFC: TABLE 5003.1.1(1); IBC: [F] TABLE 307.1(1)

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2024 International Fire Code

Revise as follows:

TABLE 5003.1.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, i, l, m, o]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note p	NA	NA	See Note p	NA	NA	See Note p	NA
Combustible fibers [p]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled		(1,000)			(1,000)			(200)	
Combustible liquid	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]
CryogenicFlammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
CryogenicInert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
CryogenicOxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]		1[g]	(1)[g]		1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]		50[g]	(50)[g]		NA	NA
	Division 1.4G	H-3	125[e, k]	NA		NA	NA		NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA		NA	NA		NA	NA
Flammable gas	Gaseous	H-2 or H-3	NA	NA		NA	NA		NA	NA
	1A and 1B (High BV)[q]				1,000[d, e]			1,000[d, e]		
	1B (Low BV)[q]				162,500[d, e]			162,500[d, e]		
	Liquefied				NA			NA		
	1A and 1B (High BV)[q]			(150)[d, e]			(150)[d, e]			
	1B (Low BV)[q]			(10,000)[d, e]			(10,000)[d, e]			
Flammable liquid[n]	IA	H-2	NA	30[d, e]	NA	NA	30[d]	NA	NA	10d
		or		120[d, e]			120[d]			30d
	IB and IC	H-3								
Flammable liquid, combination (IA, IB, IC) [n]	NA	H-2 or H-3	NA	120[d, e, h]	NA	NA	120[d, h]	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	125[d]	NA	NA	25[d]	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	UD	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	I	H-2	5[d, e]	(5)[d, e]		1[d]	(1)[d]		1[d]	(1)[d]
	II	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	III	H-3	125[d, e]	(125)[d, e]		125[d]	(125)[d]		25[d]	(25)[d]
	IV	NA	NL	NL		NL	NL		NL	NL
	V	NA	NL	NL		NL	NL		NL	NL
Oxidizer	4	H-1	1[g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	3[j]	H-2 or H-3	10[d, e]	(10)[d, e]		2[d]	(2)[d]		2[d]	(2)[d]
	2	H-3	250[d, e]	(250)[d, e]		250[d]	(250)[d]		50[d]	(50)[d]
	1	NA	4,000[e, f]	(4,000)[e, f]		4,000[f]	(4,000)[f]		1,000[f]	(1,000)[f]
Oxidizing gas	Gaseous	H-3	NA	NA	1,500[d,e]	NA	NA	1,500[d, e]	NA	NA
	Liquefied			(150)[d, e]	NA		(150)[d, e]	NA		
Pyrophoric	NA	H-2	4[e, g]	(4)[e, g]	50[e, g]	1[g]	(1)[g]	10[e, g]	0	0
Unstable (reactive)	4	H-1	1[e, g]	(1)[e, g]	10[e, g]	0.25[g]	(0.25)[g]	2[e, g]	0.25[g]	(0.25)[g]
	3	H-1 or H-2	5[d, e]	(5)[d, e]	50[d, e]	1[d]	(1)[d]	10[d, e]	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]	750[d, e]	50[d]	(50)[d]	750[d, e]	10[d]	(10)[d]
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL

			STORAGE			USE-CLOSED SYSTEMS			USE-OPEN SYSTEMS	
MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Water reactive	3	H-2	5[d, e]	(5)[d, e]	NA	5[d]	(5)[d]	NA	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	1	NA	NL	NL		NL	NL		NL	NL

For SI: 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NA = Not Applicable, NL = Not Limited, UD = Unclassified Detonable.

a. For use of control areas, see Section 5003.8.3.

b. The aggregate quantity in use and storage shall not exceed the maximum allowance quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of the *International Building Code* and Chapter 38.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, day boxes, gas cabinets, gas rooms, exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10. Where Note d applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an approved automatic sprinkler system.

h. Containing not more than the maximum allowable quantity per control area of Class IA, Class IB or Class IC flammable liquids.

i. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

j. A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed where such materials are necessary for maintenance purposes, operation or sanitation of equipment where the storage containers and the manner of storage are approved.

k. Net weight of pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks including packaging shall be used.

l. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

m. For oxidizers, unstable (reactive) materials and water-reactive materials stored or displayed in Group M occupancies or storedin Group S occupancies, see Section 5003.11..

n. For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 5704.3.6.

o. Quantities in this table shall be modified in accordance with Table 5003.1.1(5).

p. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.2.2.

q. "High BV" Category 1B flammable gas has a burning velocity greater than 3.9 in/s (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 in/s (10 cm/s) or less.

2024 International Building Code

Revise as follows:

[F] TABLE 307.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, i, l, m]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note o	NA	NA	See Note o	NA	NA	See Note o	NA
Combustible fiber[o]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled		(1,000)			(1,000)			(200)	
Combustible liquid[n]	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]
Cryogenic flammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Cryogenic inert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
Cryogenic oxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]		1[g]	(1)[g]		1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]		50[g]	(50)[g]		NA	NA
	Division 1.4G	H-3	125[e, k]	NA		NA	NA		NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA		NA	NA		NA	NA
Flammable gas	Gaseous	H-2 or H-3	NA	NA		NA	NA		NA	NA
	1A and 1B (High BV)[p]				1,000[d, e]			1,000[d, e]		
	1B (Low BV)[p]				162,500[d, e]			162,500[d, e]		
	Liquefied				NA			NA		
	1A and 1B (High BV)[p]			(150)[d, e]			(150)[d, e]			
	1B (Low BV)[p]			(10,000)[d, e]			(10,000)[d, e]			
Flammable liquid[n]	IA	H-2 or H-3	NA	30[d, e]	NA	NA	30[d]	NA	NA	10[d]
	IB and IC			120[d, e]			120[d]			30[d]
Flammable liquid, combination (IA, IB, IC)[n]	NA	H-2 or H-3	NA	120[d, e, h]	NA	NA	120[d, h]	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	125[d]	NA	NA	25[d]	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	UD	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	I	H-2	5[d, e]	(5)[d, e]		1[d]	(1)[d]		1[d]	(1)[d]
	II	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	III	H-3	125[d, e]	(125)[d, e]		125[d]	(125)[d]		25[d]	(25)[d]
	IV	NA	NL	NL		NL	NL		NL	NL
	V	NA	NL	NL		NL	NL		NL	NL
Oxidizer	4	H-1	1[g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	3[j]	H-2 or H-3	10[d, e]	(10)[d, e]		2[d]	(2)[d]		2[d]	(2)[d]
	2	H-3	250[d, e]	(250)[d, e]		250[d]	(250)[d]		50[d]	(50)[d]
	1	NA	4,000[e, f]	(4,000)[e, f]		4,000[f]	(4,000)[f]		1,000[f]	(1,000)[f]
Oxidizing gas	Gaseous	H-3	NA	NA	1,500[d, e]	NA	NA	1,500[d,e]	NA	NA
	Liquefied			(150)[d, e]	NA		(150)[d,e]	NA		
Pyrophoric	NA	H-2	4[e, g]	(4)[e, g]	50[e, g]	1[g]	(1)[g]	10[e, g]	0	0
Unstable (reactive)	4	H-1	1[e, g]	(1)[e, g]	10[e, g]	0.25[g]	(0.25)[g]	2[e, g]	0.25[g]	(0.25)[g]
	3	H-1 or H-2	5[d, e]	(5)[d, e]	50[d, e]	1[d]	(1)[d]	10[d, e]	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]	750[d, e]	50[d]	(50)[d]	750[d, e]	10[d]	(10)[d]
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5[d, e]	(5)[d, e]	NA	5[d]	(5)[d]	NA	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	1	NA	NL	NL		NL	NL		NL	NL

For SI: 1 cubic foot = 0.028 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NL = Not Limited; NA = Not Applicable; UD = Unclassified Detonable.

a. For use of control areas, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of this code and Chapter 38 of the *International Fire Code*.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms or exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10 of the International Fire Code. Where Note d also applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

h. Containing not more than the maximum allowable quantity per control area of Class IA, IB or IC flammable liquids.

i . Quantities in parentheses indicate quantity units in parentheses at the head of each column.

j . A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment when the storage containers and the manner of storage are approved.

k . Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.

l . For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.

m . For oxidizers, unstable (reactive) materials, and water-reactive materials stored or displayed in Group M occupancies or stored in Group S occupancies, see Section 414.2.5.1.

n . For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 414.2.5.2.

o . Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

p. “High BV” Category 1B flammable gas has a burning velocity greater than 3.9 inches per second (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 inches per second (10 cm/s) or less.

Reason: This is an editorial correlation. Adding “or H-3” to the MAQ Tables for flammable gas correlates with what has already been changed in 307.4 and 307.5.

[F] 307.4 High-hazard Group H-2.

Buildings and structures containing materials that pose a deflagration hazard or a hazard from accelerated burning shall be classified as Group H-2. Such materials shall include, but not be limited to, the following:

Category 1B flammable gases having a burning velocity greater than 3.9 inches per second (10 cm/s) *...*

[F] 307.5 High-hazard Group H-3.

Buildings and structures containing materials that readily support combustion or that pose a physical hazard shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:

***Category 1B flammable gases having a burning velocity of 3.9 inches per second (10 cm/s) or less** ...*

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Simply correlates the tables with change already made to the IBC.

F236-24

F237-24

IFC: TABLE 5003.1.1(1), TABLE 5003.1.1(3); IBC: [F] TABLE 307.1(1)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Kris Jaggari, Nouryon/OPPSD Representative (kris.jaggari@nouryon.com)

2024 International Fire Code

Revise as follows:

TABLE 5003.1.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, i, l, m, o]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note p	NA	NA	See Note p	NA	NA	See Note p	NA
Combustible fibers [p]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled		(1,000)			(1,000)			(200)	
Combustible liquid	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]
CryogenicFlammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
CryogenicInert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
CryogenicOxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]		1[g]	(1)[g]		1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]		50[g]	(50)[g]		NA	NA
	Division 1.4G	H-3	125[e, k]	NA		NA	NA		NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA		NA	NA		NA	NA
Flammable gas	Gaseous	H-2	NA	NA		NA	NA		NA	NA
	1A and 1B (High BV)[q]				1,000[d, e]			1,000[d, e]		
	1B (Low BV)[q]				162,500[d, e]			162,500[d, e]		
	Liquefied				NA			NA		
	1A and 1B (High BV)[q]			(150)[d, e]			(150)[d, e]			
	1B (Low BV)[q]			(10,000)[d, e]			(10,000)[d, e]			
Flammable liquid[n]	IA	H-2 or H-3	NA	30[d, e]	NA	NA	30[d]	NA	NA	10d
	IB and IC			120[d, e]			120[d]			30d
Flammable liquid, De combination (IA, IB, IC) [n]	NA	H-2 or H-3	NA	120[d, e, h]	NA	NA	120[d, h]	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	125[d]	NA	NA	25[d]	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	UD	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	I	H-2	16~~5~~[d, e]	(16~~5~~)[d, e]		16~~1~~[d]	(16~~1~~)[d]		8~~1~~[d]	(8~~1~~)[d]
	II	H-3	100~~50~~[d, e]	(100~~50~~)[d, e]		100~~50~~[d]	(100~~50~~)[d]		20~~10~~[d]	(20~~10~~)[d]
	III	H-3	400~~125~~[d, e]	(400~~125~~)[d, e]		400~~125~~[d]	(400~~125~~)[d]		100~~25~~[d]	(100~~25~~)[d]
	IV	NA	NL	NL		NL	NL		NL	NL
	V	NA	NL	NL		NL	NL		NL	NL
Oxidizer	4	H-1	1[g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	3[j]	H-2 or H-3	10[d, e]	(10)[d, e]		2[d]	(2)[d]		2[d]	(2)[d]
	2	H-3	250[d, e]	(250)[d, e]		250[d]	(250)[d]		50[d]	(50)[d]
	1	NA	4,000[e, f]	(4,000)[e, f]		4,000[f]	(4,000)[f]		1,000[f]	(1,000)[f]
Oxidizing gas	Gaseous	H-3	NA	NA	1,500[d,e]	NA	NA	1,500[d, e]	NA	NA
	Liquefied			(150)[d, e]	NA		(150)[d, e]	NA		
Pyrophoric	NA	H-2	4[e, g]	(4)[e, g]	50[e, g]	1[g]	(1)[g]	10[e, g]	0	0
Unstable (reactive)	4	H-1	1[e, g]	(1)[e, g]	10[e, g]	0.25[g]	(0.25)[g]	2[e, g]	0.25[g]	(0.25)[g]
	3	H-1 or H-2	5[d, e]	(5)[d, e]	50[d, e]	1[d]	(1)[d]	10[d, e]	1[d]	(1)[d]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE			USE-CLOSED SYSTEMS			USE-OPEN SYSTEMS	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
	2	H-3	50[d, e]	(50)[d, e]	750[d, e]	50[d]	(50)[d]	750[d, e]	10[d]	(10)[d]
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5[d, e]	(5)[d, e]	NA	5[d]	(5)[d]	NA	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	1	NA	NL	NL		NL	NL		NL	NL

For SI: 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.NA = Not Applicable, NL = Not Limited, UD = Unclassified Detonable.

a. For use of control areas, see Section 5003.8.3.

b. The aggregate quantity in use and storage shall not exceed the maximum allowance quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of the *International Building Code* and Chapter 38.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, day boxes, gas cabinets, gas rooms, exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10. Where Note d applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an approved automatic sprinkler system.

h. Containing not more than the maximum allowable quantity per control area of Class IA, Class IB or Class IC flammable liquids.

i. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

j. A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed where such materials are necessary for maintenance purposes, operation or sanitation of equipment where the storage containers and the manner of storage are approved.

k. Net weight of pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks including packaging shall be used.

l. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

m. For oxidizers, unstable (reactive) materials and water-reactive materials stored or displayed in Group M occupancies or storedin Group S occupancies, see Section 5003.11..

n. For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 5704.3.6.

o. Quantities in this table shall be modified in accordance with Table 5003.1.1(5).

p. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.2.2.

q. "High BV" Category 1B flammable gas has a burning velocity greater than 3.9 in/s (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 in/s (10 cm/s) or less.

TABLE 5003.1.1(3) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD IN AN OUTDOOR CONTROL AREA[a, b, c, d]

MATERIAL	CLASS	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
		Solid pounds (cubic feet)	Liquid gallons (pounds)[d]	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)[d]	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)[d]
Flammable gas	Gaseous	Not Applicable	Not Applicable		Not Applicable	Not Applicable		Not Applicable	Not Applicable
	1A and 1B (High BV)[e]			3,000			1,500		
	1B (Low BV)[e]			195,000			97,500		
	Liquefied			Not Applicable			Not Applicable		
	1A and 1B (High BV)[e]		(300)			(150)			
	1B (Low BV)[e]		(20,000)			(10,000)			
Flammable solid	Not Applicable	500	Not Applicable	Not Applicable	250	Not Applicable	Not Applicable	50	Not Applicable
Inert Gas Cryogenic inert	Gaseous Liquefied Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	Not Limited Not Limited Not Limited	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	Not Limited Not Limited Not Limited	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable
Organic peroxide	Unclassified Detonable	1	(1)	Not Applicable	0.25	(0.25)	Not Applicable	0.25	(0.25)
Organic peroxide	I II III IV V	20 200 840~~500~~ Not Limited Not Limited	(20) (200) (840~~500~~) Not Limited Not Limited	Not Applicable	10 100 400~~250~~ Not Limited Not Limited	(10) (100) (400~~250~~) Not Limited Not Limited	Not Applicable	8~~2~~ 50~~20~~ 200~~50~~ Not Limited Not Limited	(8~~2~~) (50~~20~~) (200~~50~~) Not Limited Not Limited
Oxidizer	4 3 2 1	2 40 1,000 Not Limited	(2) (40) (1,000) Not Limited	Not Applicable	1 20 500 Not Limited	(1) (20) (500) Not Limited	Not Applicable	0.25 4 100 Not Limited	(0.25) (4) (100) Not Limited
Oxidizing gas	Gaseous Liquefied	Not Applicable	Not Applicable (600)	6,000 Not Applicable	Not Applicable	Not Applicable (300)	1,500 Not Applicable	Not Applicable	Not Applicable
Pyrophoric materials	Not Applicable	8	(8)	100	4	(4)	10	0	0
Unstable (reactive)	4 3 2 1	2 20 200 Not Limited	(2) (20) (200) Not Limited	20 200 1,000 Not Limited	1 10 100 Not Limited	(1) (10) (100) Not Limited	2 10 250 Not Limited	0.25 1 10 Not Limited	(0.25) (1) (10) Not Limited
Water reactive	3 2 1	20 200 Not Limited	(20) (200) Not Limited	Not Applicable	10 100 Not Limited	(10) (100) Not Limited	Not Applicable	1 10 Not Limited	(1) (10) Not Limited

For SI: 1 pound = 0.454 kg, 1 gallon = 3.785 L, 1 cubic foot = 0.02832 m^3.

a. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

b. The aggregate quantities in storage and use shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials allowed in outdoor storage per single property under the same ownership or control used for retail or wholesale sales is allowed to exceed the maximum allowable quantity per control area where such storage is in accordance with Section 5003.11.

d. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

e. “High BV” Category 1B flammable gas has a burning velocity greater than 3.9 in/s (10 cm/s). “Low BV” Category 1B flammable gas has a burning velocity of 3.9 in/s (10 cm/s) or less.

2024 International Building Code

Revise as follows:

[F] TABLE 307.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, i, l, m]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note o	NA	NA	See Note o	NA	NA	See Note o	NA
Combustible fiber [o]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled		(1,000)			(1,000)			(200)	
Combustible liquid[n]	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]
Cryogenic flammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Cryogenic inert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
Cryogenic oxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]		1[g]	(1)[g]		1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]		50[g]	(50)[g]		NA	NA
	Division 1.4G	H-3	125[e, k]	NA		NA	NA		NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA		NA	NA		NA	NA
Flammable gas	Gaseous	H-2	NA	NA		NA	NA		NA	NA
	1A and 1B (High BV)[p]				1,000[d, e]			1,000[d, e]		
	1B (Low BV)[p]				162,500[d, e]			162,500[d, e]		
	Liquefied				NA			NA		
	1A and 1B (High BV)[p]			(150)[d, e]			(150)[d, e]			
	1B (Low BV)[p]			(10,000)[d, e]			(10,000)[d, e]			
Flammable liquid [n]	IA	H-2 or H-3	NA	30[d, e]	NA	NA	30[d]	NA	NA	10[d]
	IB and IC			120[d, e]			120[d]			30[d]
Flammable liquid, combination (IA, IB, IC) [n]	NA	H-2 or H-3	NA	120[d, e, h]	NA	NA	120[d, h]	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	125[d]	NA	NA	25[d]	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	UD	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	I	H-2	16 ~~5~~[d, e]	(16 ~~5~~)[d, e]		16 ~~1~~[d]	(16 ~~1~~)[d]		8 ~~1~~[d]	(8 ~~1~~)[d]
	II	H-3	100 ~~50~~[d, e]	(100 ~~50~~)[d, e]		100 ~~50~~[d]	(100 ~~50~~)[d]		20 ~~10~~[d]	(20 ~~10~~)[d]
	III	H-3	400 ~~125~~[d, e]	(400 ~~125~~)[d, e]		400 ~~125~~[d]	(400 ~~125~~)[d]		100 ~~25~~[d]	(100 ~~25~~)[d]
	IV	NA	NL	NL		NL	NL		NL	NL
	V	NA	NL	NL		NL	NL		NL	NL
Oxidizer	4	H-1	1[g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	3[j]	H-2 or H-3	10[d, e]	(10)[d, e]		2[d]	(2)[d]		2[d]	(2)[d]
	2	H-3	250[d, e]	(250)[d, e]		250[d]	(250)[d]		50[d]	(50)[d]
	1	NA	4,000[e, f]	(4,000)[e, f]		4,000[f]	(4,000)[f]		1,000[f]	(1,000)[f]
Oxidizing gas	Gaseous	H-3	NA	NA	1,500[d, e]	NA	NA	1,500[d,e]	NA	NA
	Liquefied			(150)[d, e]	NA		(150)[d,e]	NA		
Pyrophoric	NA	H-2	4[e, g]	(4)[e, g]	50[e, g]	1[g]	(1)[g]	10[e, g]	0	0
Unstable (reactive)	4	H-1	1[e, g]	(1)[e, g]	10[e, g]	0.25[g]	(0.25)[g]	2[e, g]	0.25[g]	(0.25)[g]
	3	H-1 or H-2	5[d, e]	(5)[d, e]	50[d, e]	1[d]	(1)[d]	10[d, e]	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]	750[d, e]	50[d]	(50)[d]	750[d, e]	10[d]	(10)[d]
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5[d, e]	(5)[d, e]	NA	5[d]	(5)[d]	NA	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	1	NA	NL	NL		NL	NL		NL	NL

For SI: 1 cubic foot = 0.028 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NL = Not Limited; NA = Not Applicable; UD = Unclassified Detonable.

a. For use of control areas, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of this code and Chapter 38 of the *International Fire Code*.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms or exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10 of the International Fire Code. Where Note d also applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

h. Containing not more than the maximum allowable quantity per control area of Class IA, IB or IC flammable liquids.

i . Quantities in parentheses indicate quantity units in parentheses at the head of each column.

j . A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment when the storage containers and the manner of storage are approved.

k . Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.

l . For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.

m . For oxidizers, unstable (reactive) materials, and water-reactive materials stored or displayed in Group M occupancies or stored in Group S occupancies, see Section 414.2.5.1.

n . For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 414.2.5.2.

o . Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

p. “High BV” Category 1B flammable gas has a burning velocity greater than 3.9 inches per second (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 inches per second (10 cm/s) or less.

Reason: This code change proposal is to increase the MAQs for organic peroxides. The current MAQs in the control area are very low and have not been reviewed or changed for a very long time. There are many small users in the organic peroxide industry who use small quantities but are over the current MAQs. Small quantities would typically constitute a couple of gallons or a few 5-gallon containers depending on the storage classification of the organic peroxide. A 1-gallon container is an example of a smaller commercial package which typically can contain about 8 lbs of a Class I organic peroxide. An example of a common container for packaging a Class II, III or IV organic peroxide is a 5-gallon container which would contain about 35 lbs of an organic peroxide. Proposed increase in MAQs would allow a control area user to store a couple of 1-gallon containers of Class I organic peroxides or a few 5-gallon containers of other Class organic peroxides. Most importantly, with the proposed code changes in Chapter 62 as part of code change proposal # 9867, control area users shall now comply with applicable requirements of Chapter 62 in addition to Chapter 50 and other requirements. An organic peroxide safety incident can occur even when storing very small quantities. In addition, there are many organic peroxides that are temperature controlled and failure of refrigeration equipment or using improper equipment even when storing small quantities can result in fire and explosion. With the proposed code changes in Chapter 62, control area users would now require following some specific storage requirements outlined in Chapter 62 but not extensive construction requirements that would be required in Group H occupancy. Critical requirements like proper storage equipment, design to vent an overpressure event, separation distance from storage, meeting electrical classification, preventing contamination, using designed containers and quantities, meeting temperature control, monitoring and signs requirements, avoiding open flames, meeting hotwork, heating and cooling requirements, meeting storage tanks and dosing vessels requirements, segregating incompatible, flammable and combustible materials, meeting general requirements for the safe handling and use of organic peroxides and requirements for the safe transfer of organic peroxides including those with low flash points are now required to be followed by the control area users. These storage requirements would be adequate to safely store the proposed MAQs of organic peroxides, without putting undue burden on the small users to meet the other Group H occupancy requirements. Proposed MAQs are now closer to but still lower than quantities in corresponding table in NFPA 400 Chapter 5.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

The cost of construction is expected to decrease with this code change proposal. With the increase in MAQs, the code users can store slight increased quantities in a control area. This would mean the slight increase in MAQs would allow the code user to store these quantities without having to spend on a fire wall barrier and horizontal assemblies with fire-resistance rating in a mixed occupancy storage or having to locate the storage at a separation distance of at least 50 ft which may not be practical for most users who have space/land availability constraints. The exact decrease in cost is dependent on the storage quantity and the cost of fire barriers that the user would otherwise have to spend or the land area cost which varies by region, to accommodate the storage at a separation distance of at least 50 ft.

An example cost of decrease for a fire barrier used in a mixed occupancy building for an organic peroxide storage room size of 10 ft x 10 ft x 10 ft is $6000 for a 1-hour rated fire barrier wall/horizontal assembly construction and $7500 for a 2-hour rated fire barrier wall/horizontal assembly construction.

Cost of construction will not change for the code users that intend to store the current MAQs.

Estimated Immediate Cost Impact Justification (methodology and variables):

The exact immediate cost impact is difficult to arrive at and is dependent on the cost of fire barriers that the user would otherwise have to spend or the land area cost which varies by region, to accommodate the storage at a separation distance of at least 50 ft.

The above cost decrease example is based on the cost of construction of $12/sq ft for 1-hour rated fire barrier wall/horizontal assembly construction and $15/sq ft for a 2-hour rated fire barrier wall/horizontal assembly construction. This information was based on an estimate from a private contractor in the Milwaukee, WI area.

F237-24

F238-24

IFC: 5003.8.2; IBC: [F] 415.6.5

Proponents: William Koffel, Koffel Associates, Inc., Semiconductor Industry Association (wkoffel@koffel.com)

2024 International Fire Code

Revise as follows:

5003.8.2 Required detached buildings.
Group H-1, H-2, and H-3 occupancies containing quantities of hazardous materials in excess of those set forth in Table 5003.8.2 shall be in detached buildings in accordance with the applicable provisions of Sections 415.7 and 415.8 of the *International Building Code*..

Exceptions:

1. Where a minimum of 80 feet separates each H-2 and H-3 occupancy in a Group H-5 mixed-occupancy building each H-2 and H-3 occupancy is allowed to contain quantities of hazardous materials up to, but not exceeding the quantities in Table 5003.8.2.
2. When approved by the fire code official and the quantities comply with Chapter 10 of NFPA 400, compliance with Table 5003.8.2 shall not be required.

2024 International Building Code

Revise as follows:

[F] 415.6.5 Required ~~Detached~~ detached buildings ~~for Group H-1, H-2 or H-3 occupancy~~.
Group H-1, H-2, and H-3 occupancies ~~The storage or use of~~ containing quantities of *hazardous materials* in excess of ~~those~~ amounts specified in Table 415.6.5 shall be in detached buildings in accordance with the applicable provisions of Sections 415.7 and 415.8.

Exceptions:

1. Where a minimum of 80 feet separates each H-2 and H-3 occupancy in a Group H-5 mixed-occupancy building each H-2 and H-3 occupancy is allowed to contain quantities of hazardous materials up to, but not exceeding, the quantities in Table 415.6.5.
2. Where approved by the fire code official and the quantities comply with Chapter 10 of NFPA 400, compliance with Table 415.6.5 shall not be required.

Reason: The two sections in the IBC and IFC should read the same. As they currently exist, the application of the provisions are different.

The quantity limits in the tables are based on smaller factories, typically between 30,000 and 45,000 square feet. Today, HPM manufacturing facilities are much larger (200,000 sq. ft. and larger) with separate HPM rooms to accommodate the tools. Whereas the limits can be interpreted to be a building quantity limit, the proposal adds clarity to other methods of providing the same allocation of the quantity limits by using physical separation or engineering methods. In larger facilities, sufficient distance between groups of hazards within the same building to mitigation reactions between the groups can be considered equivalent to the detached building separation requirements of 50 feet plus 30 feet (80 ft.).

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00. The specific reduction in cost will be project specific.

Estimated Immediate Cost Impact Justification (methodology and variables):

The reduced cost is associated with providing an alternative to detached buildings and providing consistency between the IBC and IFC and providing or a consistent interpretation of the requirements.

F239-24

IFC: 5003.9.10, SECTION 202

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

5003.9.10 Safety cans.
Safety cans ~~shall be *listed* in accordance with UL 30 where~~ used to increase the *maximum allowable quantities per control area* of *flammable* or *combustible liquids* in accordance with Table 5003.1.1(1) shall be metal and *listed* in accordance with UL 30.
~~*Safety*~~Nonmetalic *safety cans* listed in accordance with UL 30 and *safety cans listed* in accordance with UL 1313 are allowed for *flammable* and *combustible liquids* where not used to increase the *maximum allowable quantities per control area* and for other hazardous material liquids in accordance with the listing.

SAFETY CAN. An *approved* container of not more than ~~5-gallon (19 L)~~5.3-gallon (20 L) capacity having a spring-closing lid and spout cover so designed that it will relieve internal pressure when subjected to fire exposure.

Reason: For several editions, the IFC has allowed an increase in the maximum allowable quantity of flammable or combustible liquids when stored in safety cans, provided the safety cans were listed to UL 30. When this provision was added to the code, UL 30 only addressed metal safety cans, as evidenced by the reference to UL 30 in Chapter 80 of the 2021 IFC below:

Chapter 80
UL 30—1995: Metal Safety Cans—with revisions through June 2014
5003.9.10, 5005.1.10, 5705.2.4, 5707.2

The UL standard has been revised and now titled UL 30 Metallic and Nonmetallic Safety Cans for Flammable and Combustible Liquids. It is now possible to obtain a nonmetallic safety can that is listed to UL 30.

The nonmetallic safety can was not intended to be allowed as a method of increasing the MAQ, and that is why the code specified safety cans listed to UL 30. Since the standard has changed, it is appropriate to revise the allowance for increasing the MAQ to specify a metallic safety can listed to UL 30. The nonmetallic safety can is allowed for storage and dispensing and can be listed to either UL 30 or UL 1313.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The initial cost to purchase a safety can will result in about a 50% increase in cost. The annual maintenance cost should not increase. When replacements safety cans are needed, the prices will be similar to the purchase prices.

Estimated Immediate Cost Impact Justification (methodology and variables):

A search of the internet on November 20, 2023 shows a Type I metal safety can with an average cost of $60. A plastic safety can has an average cost of $40.

F239-24

F240-24

IFC: TABLE 5003.11.2; IBC: [F]TABLE 414.2.5.4

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

TABLE 5003.11.2 MAXIMUM ALLOWABLE QUANTITY OF LOW BURNING VELOCITY CATEGORY 1B FLAMMABLE GAS IN GROUP M AND S OCCUPANCIES PER CONTROL AREA[a]

CATEGORY 1B (Low BV)[d]	SPRINKLERED IN ACCORDANCE WITH NOTE B	NONSPRINKLERED
Gaseous	39,000 ft^3	195,000 ft^3
Liquified	40,000 lb[c]	20,000 lb

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.028 m^3.

BV = Fundamental Burning Velocity

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 a 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 is 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 fundamental burning velocity of 3.9 in/s (10 cm/s) or less.

2024 International Building Code

Revise as follows:

[F]TABLE 414.2.5.4 MAXIMUM ALLOWABLE QUANTITY OF LOW BURNING VELOCITY CATEGORY 1B FLAMMABLE GAS IN GROUP M AND S OCCUPANCIES PER CONTROL AREA[a]

CATEGORY 1B (Low BV)[d]	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA	
	Sprinklered[b]	Nonsprinklered
Gaseous	390,000 cu ft	195,000 cu ft
Liquefied	40,000 lb[c]	20,000 lb

For SI: 1 pound = 0.454 kg, 1 square foot = 0.0929 m^2, 1 cubic foot = 0.028 m^3, 1 inch per second = 2.54 cm/s.

BV = Fundamental Burning Velocity

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 a 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 is 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 fundamental burning velocity of 3.9 in/s or less.

Reason: This proposal is an editorial revision to include information on the acronym “BV”. The acronym BV is used in the IFC table and the IBC table, however, there is no indication what BV represents.

BV is the fundamental burning velocity as specified in the definition of flammable gas in Section 202.

This is consistent with the format in other tables where an acronym is utilized in the table.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This is simply an editorial clarification of the term BV.

F240-24

F241-24

IFC: TABLE 5003.11.2, TABLE 5704.3.4.1; IBC: [F]TABLE 414.2.5.2, [F]TABLE 414.2.5.4

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

TABLE 5003.11.2 MAXIMUM ALLOWABLE QUANTITY OF LOW BURNING VELOCITY CATEGORY 1B FLAMMABLE GAS IN GROUP M AND S OCCUPANCIES PER CONTROL AREA[a]

CATEGORY 1B (Low BV)[d]	SPRINKLERED IN ACCORDANCE WITH NOTE B	NONSPRINKLERED
Gaseous	39,000 ft^3	195,000 ft^3
Liquified	40,000 lb[c]	20,000 lb

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.028 m^3.

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 a 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 is 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 in/s (10 cm/s) or less.

TABLE 5704.3.4.1 MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN WHOLESALE AND RETAIL SALES OCCUPANCIES[a]

TYPE OF LIQUID	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA (gallons)		
	Sprinklered[b] in accordance with footnote densities and arrangements	Sprinklered in accordance with Tables 5704.3.6.3(4) through 5704.3.6.3(8) and Table 5704.3.7.5.1	Nonsprinklered
Class IA	60	60	30
Class IB, IC, II and IIIA	7,500[c]	15,000[c]	1,600
Class IIIB	Unlimited	Unlimited	13,200

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 gallon = 3.785 L, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. Control areas shall be separated from each other by not less than a 1-hour fire barrier.

b. To be considered as sprinklered, a building shall be equipped throughout with an *approved* automatic sprinkler system with a design providing minimum densities as follows:

1. For uncartoned commodities on shelves 6 feet or less in height where the ceiling height does not exceed 18 feet, quantities are those allowed with a minimum sprinkler design density of Ordinary Hazard Group 2.

2. For cartoned, palletized or racked commodities where storage is 4 feet 6 inches or less in height and where the ceiling height does not exceed 18 feet, quantities are those allowed with a minimum sprinkler design density of 0.21 gallon per minute per square foot over the most remote 1,500-square-foot area.

c. Where wholesale and retail sales or 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. ~~A control area separation is not required.~~ The cumulative amounts, including amounts attained by having an additional control area, shall not exceed 30,000 gallons.

2024 International Building Code

Revise as follows:

[F]TABLE 414.2.5.2 MAXIMUM ALLOWABLE QUANTITY OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN WHOLESALE AND RETAIL SALES OCCUPANCIES PER CONTROL AREA[a]

TYPE OF LIQUID	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA (gallons)		
	Sprinklered in accordance with Note b densities and arrangements	Sprinklered in accordance with Tables 5704.3.6.3(4) through 5704.3.6.3(8) and 5704.3.7.5.1 of the International Fire Code	Nonsprinklered
Class IA	60	60	30
Class IB, IC, II and IIIA	7,500[c]	15,000[c]	1,600
Class IIIB	Unlimited	Unlimited	13,200

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 gallon = 3.785 L, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. *Control areas* shall be separated from each other by not less than a 1-hour *fire barrier* wall.

b. To be considered as sprinklered, a *building* shall be equipped throughout with an *approved automatic sprinkler system* with a design providing minimum densities as follows:

   1. For uncartoned commodities on shelves 6 feet or less in height where the ceiling height does not exceed 18 feet, quantities are those permitted with a minimum sprinkler design density of Ordinary Hazard Group 2.

   2. For cartoned, palletized or racked commodities where storage is 4 feet 6 inches or less in height and where the ceiling height does not exceed 18 feet, quantities are those permitted with a minimum sprinkler design density of 0.21 gallon per minute per square foot over the most remote 1,500-square-foot area.

c. Where wholesale and retail sales or 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. ~~A control area separation is not required.~~ The cumulative amounts, including amounts attained by having an additional control area, shall not exceed 30,000 gallons.

[F]TABLE 414.2.5.4 MAXIMUM ALLOWABLE QUANTITY OF LOW BURNING VELOCITY CATEGORY 1B FLAMMABLE GAS IN GROUP M AND S OCCUPANCIES PER CONTROL AREA[a]

CATEGORY 1B (Low BV)[d]	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA	
	Sprinklered[b]	Nonsprinklered
Gaseous	390,000 cu ft	195,000 cu ft
Liquefied	40,000 lb[c]	20,000 lb

For SI: 1 pound = 0.454 kg, 1 square foot = 0.0929 m^2, 1 cubic foot = 0.028 m^3, 1 inch per second = 2.54 cm/s.

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 a 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 is 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 in/s or less.

Reason: Footnote c is revised by deleting only one sentence from the Footnote because this sentence creates confusion.

All of these tables, whether in the IFC or IBC, provide the maximum allowable quantity per control area. In other words, the quantities derived from this table represent the maximum in a single control area. This table does not address separation of multiple control areas.

Looking at Table 5704.3.4.1, Footnote c appears in the row addressing Classes IB, IC, II and IIIA liquids. The table provides the maximum quantity in a control area. When Footnote c is utilized, the quantity shown in the table for a single control area can be doubled, provided adequate floor area is available. Keep in mind that the increased quantity becomes the maximum allowed in a single control area—the increased quantity is not in a separate control area. The footnote modifies the maximum allowed quantity for a single control area. If a second control area was constructed and properly separated as required in Table 5003.8.3.2. In that situation with 2 control areas, the allowed quantity from Table 5704.3.4.1 would be allowed in each control area.

The fact that the sentence states “separation is not required” has resulted in the misinterpretation that 2 control areas exist, but they are not separated by 1-hour construction. Since it implies there are 2 control areas, applicants have attempted to double quantities of other hazardous materials by using the MAQ for each control area. While this is allowed for flammable and combustible liquids, there are specific limitations and criteria for the storage and display of those materials. Those provisions would not apply to all classes of hazardous materials.

This same concept is repeated in IFC Table 5003.11.2 and the companion tables in the IBC. Eliminating this sentence in these locations will remove the potential misapplication of code requirements.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The reason statement explains how this proposal is simply clarifying the intended application of the code with regard to control areas.

F241-24

F242-24

IFC: 5005.4.2

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

5005.4.2 Quantities not exceeding the maximum allowable quantity per control area.
Handling of hazardous materials in indoor locations in amounts not exceeding the *maximum allowable quantity per control area* indicated in Tables 5003.1.1(1) and 5003.1.1(2) shall be in accordance with Sections 5001~~,~~ and 5003~~ and 5005.1~~. Handling of hazardous materials in outdoor locations in amounts not exceeding the *maximum allowable quantity per control area* indicated in Tables 5003.1.1(3) and 5003.1.1(4) shall be in accordance with Sections 5001 and 5003.

Reason: This proposal removes an inappropriate reference in Section 5005.4.2 to correlate with Section 5005.1.

Section 5005.1 reads: "Use, dispensing and handling of hazardous materials in amounts exceeding the maximum allowable quantity per control area set forth in Section 5003.1 shall be in accordance with Sections 5001, 5003 and 5005. Use, dispensing and handling of hazardous materials in amounts not exceeding the maximum allowable quantity per control area set forth in Section 5003.1 shall be in accordance with Sections 5001 and 5003."

The second sentence of Section 5005.1 states that for quantities **not** exceeding the MAQ, use Sections 5001 and 5003 for handling provisions.

The first sentence of Section 5005.4.2 states that for quantities **not** exceeding the MAQ, use Sections 5001, 5003 and 5005.1. When you go back to 5005.1 it tells you that you never should have been in Section 5005.4.2. This is an incorrect reference to Section 5005.1 and should be deleted.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal simply correlates Section 5005.1 and Section 5005.4.2 and eliminates an unneeded reference.

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IFC CHAPTER 51

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2024 International Fire Code

CHAPTER 51 AEROSOLS

SECTION 5101 GENERAL

5101.1 Scope.
The provisions of this chapter, the *International Building Code* and NFPA 30B shall apply to the manufacturing, storage and display of aerosol products, aerosol cooking spray products and plastic aerosol 3 products. Manufacturing of aerosol products, aerosol cooking spray products and plastic aerosol 3 products using hazardous materials shall also comply with Chapter 50.

5101.2 Permit required.
Permits shall be required as set forth in Section 105.5.

5101.3 Safety Data Sheets. Safety Data Sheet (SDS) information for aerosol products displayed shall be kept on the premises at an *approved* location.

Delete without substitution:

~~**5101.4 Containers.**~~
~~Metal aerosol containers shall be limited to a maximum size of 33.8 fluid ounces (1000 ml). Plastic aerosol containers shall be limited to a maximum of 4 fluid ounces (118 ml) except as provided in Sections 5104.1.1 and 5104.1.2. Glass aerosol containers shall be limited to a maximum of 4 fluid ounces (118 ml).~~

SECTION 5102 DEFINITIONS

5102.1 Definitions.
The following terms are defined in Chapter 2:
AEROSOL CONTAINER.

AEROSOL PRODUCT.

Level 1 aerosol products.
Level 2 aerosol products.
Level 3 aerosol products.

AEROSOL PRODUCT WAREHOUSE.
PROPELLANT.

RETAIL DISPLAY AREA.

SECTION 5103 CLASSIFICATION OF AEROSOL PRODUCTS

Revise as follows:

5103.1 Classification levels.
Aerosol products shall be classified as Level 1, 2 or 3 in accordance with ~~Table 5103.1 and~~ NFPA 30B. Aerosol products in cartons that are not identified in accordance with this section shall be classified as Level 3.

Delete without substitution:

~~TABLE 5103.1 CLASSIFICATION OF AEROSOL PRODUCTS~~

~~CHEMICAL HEAT OF COMBUSTION~~		~~AEROSOL CLASSIFICATION~~
~~Greater than (Btu/lb)~~	~~Less than or equal to (Btu/lb)~~	
~~0~~	~~8,600~~	~~1~~
~~8,600~~	~~13,000~~	~~2~~
~~13,000~~	~~—~~	~~3~~

~~For SI: 1 British thermal unit per pound = 0.002326 kJ/g.~~

5103.2 Identification. Cartons or outer packaging shall be identified on not fewer than one exterior side with the classification level of the aerosol products contained within the carton.

5103.2.1 Aerosol products. Cartons or outer packaging containing aerosol products in metal containers or glass and plastic containers 4 fluid ounces. (118 ml) or less shall be clearly marked as follows:

LEVEL ________ AEROSOLS

5103.2.2 Aerosol cooking spray products. Cartons or outer packaging containing aerosol cooking spray products in metal containers shall be clearly marked as follows:

AEROSOL COOKING SPRAY

Revise as follows:

5103.2.3 Plastic aerosol products. Cartons or outer packaging containing aerosol products in plastic containers greater than 4 fluid ounces (118 ml) shall be clearly marked as follows:

PLASTIC AEROSOL 1<u>, 2</u>, 3 or X

SECTION 5104
INSIDE STORAGE OF AEROSOL PRODUCTS

Revise as follows:

5104.1 General.
The inside storage of Level 2 and 3 aerosol products , aerosol cooking sprays<u>, plastic aerosol 2 products,</u> and plastic aerosol 3 products shall comply with Section~~s~~ 5104.2~~ through 5104.8 and~~ NFPA 30B. Level 1 aerosol products and those aerosol products covered by Section 5104.1.1 shall be considered to be equivalent to a Class III commodity and shall comply with the requirements for palletized or rack storage in NFPA 13.

Delete without substitution:

~~5104.1.1 Plastic aerosol 1 products.~~
~~Aerosol products in plastic containers larger than 4 fluid ounces (118 ml), but not to exceed 33.8 fluid ounces (1000 ml), shall be allowed~~

~~only where in accordance with this section. The commodity classification shall be Class III commodities, as defined in NFPA 13 where any of the following conditions are met:~~

1. ~~Base product does not have a fire point where tested in accordance with ASTM D92, and nonflammable propellant.~~
2. ~~Base product does not sustain combustion as tested in accordance with DOTn 49 CFR Part 173, Appendix H, and nonflammable propellant.~~
3. ~~Base product contains up to 20 percent by volume (15.8 percent by weight) of ethanol, isopropyl alcohol or a combination thereof in an aqueous mix, and nonflammable propellant.~~
4. ~~Base product contains 4 percent by weight or less of an emulsified flammable liquefied gas propellant within an aqueous base. The propellant shall remain emulsified for the life of the product. Where such propellant is not permanently emulsified, the propellant shall be nonflammable.~~

~~5104.1.2 Plastic aerosol 3 products.~~
~~Plastic aerosol 3 products shall be defined as those that meet one of the following criteria:~~

1. ~~Base product does not have a fire point where tested in accordance with ASTM D92, and there is not more than 10 percent by weight flammable propellant.~~
2. ~~Base product does not sustain combustion as tested in accordance with DOTn 49 CFR 173, Appendix H, and there is not more than 10 percent by weight flammable propellant.~~
3. ~~Base product contains 50 percent by volume or less of flammable or combustible water-miscible alcohols in an aqueous mix, and there is not more than 10 percent by weight of flammable propellant.~~

~~5104.1.3 Plastic aerosol X products.~~
~~Plastic aerosol X products are those products, in containers larger than 4 fluid ounces (118 ml), that do not meet the criteria provided in Section 5104.1.1 or 5104.1.2.~~

Revise as follows:

5104.2 ~~5104.1.3.1~~ Storage, use or handling. The storage, use or handling of plastic aerosol X products shall be prohibited.

Delete without substitution:

~~5104.2 Storage in Groups A, B, E, F, I and R.~~
~~Storage of Level 2 and 3 aerosol and plastic aerosol 3 products in occupancies in Groups A, B, E, F, I and R shall be limited to the following maximum quantities:~~

1. ~~A net weight of 1,000 pounds (454 kg) of Level 2 aerosol products.~~
2. ~~A net weight of 500 pounds (227 kg) of Level 3 aerosol and plastic aerosol 3 products.~~
3. ~~A combined net weight of 1,000 pounds (454 kg) of Level 2 and 3 aerosol and plastic aerosol 3 products.~~

~~The maximum quantity shall be increased 100 percent where the excess quantity is stored in storage cabinets in accordance with Section 5704.3.2.~~

~~5104.2.1 Excess storage.~~
~~Storage of quantities exceeding the maximum quantities indicated in Section 5104.2 shall be stored in separate inside *flammable liquid* storage rooms in accordance with Section 5104.5.~~

~~**5104.2.2 Aerosol cooking spray products.** Storage of aerosol cooking spray products in Group A, B, E, F, I and R occupancies shall not be more than 1,000 pounds (454 kg) net weight.~~

~~**5104.3 Storage in general purpose warehouses.**~~
~~Aerosol product storage in general purpose warehouses utilized only for warehousing-type operations involving mixed commodities shall comply with Section 5104.3.1, 5104.3.2. or 5104.3.3.~~

~~**5104.3.1 Nonsegregated storage**~~**.**
~~Storage consisting of solid pile, palletized or rack storage of Level 2 and 3 aerosol and plastic aerosol 3 products not segregated into areas utilized exclusively for the storage of aerosol products shall comply with Table 5104.3.1.~~

~~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

~~For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg, 1 square foot = 0.0929 m²~~~~.~~

~~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.~~

~~**5104.3.2 Segregated storage**~~**.**
~~Storage of Level 2 and 3 aerosol and plastic aerosol 3 products segregated into areas utilized exclusively for the storage of aerosol products shall comply with Table 5104.3.2 and Sections 5104.3.2.1 and 5104.3.2.2.~~

~~TABLE 5104.3.2 SEGREGATED STORAGE OF LEVEL 2 AND 3 AEROSOL PRODUCTS AND PLASTIC AEROSOL 3 PRODUCTS IN GENERAL PURPOSE WAREHOUSES~~

STORAGE SEPARATION	MAXIMUM SEGREGATED STORAGE AREA[a]		AUTOMATIC SPRINKLER SYSTEM REQUIREMENTS
	Percentage of building area (percent)	Area limitation (square feet)	
Separation area[e, f]	15	20,000	Notes b, c
Chain-link fence enclosure[d]	20	20,000	Notes b, c
1-hour fire-resistance-rated interior walls	20	30,000	Note b
2-hour fire-resistance-rated interior walls	25	40,000	Note b
3-hour fire-resistance-rated interior walls	30	50,000	Note b

~~For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m~~$\cancel{^2}$~~.~~

a. ~~The maximum segregated storage area shall be limited to the smaller of the two areas resulting from the percentage of building area limitation and the area limitation.~~

b. ~~Automatic sprinkler system protection in aerosol product storage areas shall comply with NFPA 30B and be *approved*. Building areas not containing aerosol product storage shall be equipped throughout with an *approved* automatic sprinkler system in accordance with Section 903.3.1.1.~~

c. ~~Automatic sprinkler system protection in aerosol product storage areas shall comply with NFPA 30B and be *approved*. Sprinkler system protection shall extend a minimum 20 feet beyond the aerosol storage area.~~

d. ~~Chain-link fence enclosures shall comply with Section 5104.3.2.1.~~

e. ~~A separation area shall be defined as an area extending outward from the periphery of the segregated aerosol product storage area as follows:~~

   1. ~~The limits of the aerosol product storage shall be clearly marked on the floor.~~

   2. ~~The separation distance shall be not less than 25 feet and maintained clear of all materials with a commodity classification greater than Class III in accordance with Section 903.3.1.1.~~

f. ~~Separation areas shall only be permitted where *approved*.~~

~~5104.3.2.1 Chain-link fence enclosures.~~

~~Chain-link fence enclosures required by Table 5104.3.2 shall comply with the following:~~

1. ~~The fence shall be not less than No. 9 gage steel wire, woven into a maximum 2-inch (51 mm) diamond mesh.~~
2. ~~The fence shall be installed from the floor to the underside of the roof or ceiling above.~~
3. ~~Class IV and high-hazard commodities shall be stored outside of the aerosol storage area and not less than 8 feet (2438 mm) from the fence.~~
4. ~~Access openings in the fence shall be provided with either self- or automatic-closing devices or a labyrinth opening arrangement preventing aerosol containers from rocketing through the access openings.~~
5. ~~Not less than two *means of egress* shall be provided from the fenced enclosure.~~

~~5104.3.2.2 Aisles.~~

~~The minimum aisle requirements for segregated storage in general purpose warehouses shall comply with Table 5104.3.2.2.~~

~~TABLE 5104.3.2.2 SEGREGATED STORAGE AISLE WIDTHS AND DISTANCE TO AISLES IN GENERAL PURPOSE WAREHOUSES~~

STORAGE CONDITION	MINIMUM AISLE WIDTH (feet)	MAXIMUM DISTANCE FROM STORAGE TO AISLE (feet)
Solid pile or palletized[a]	4 feet between piles	25
Racks with ESFR sprinklers[a]	4 feet between racks and adjacent Level 2 and 3 aerosol product storage	25
Racks without ESFR sprinklers[a]	8 feet between racks and adjacent Level 2 and 3 aerosol product storage	25

~~For SI: 1 foot = 304.8 mm.~~

a. ~~Sprinklers shall comply with NFPA 30B.~~

~~5104.3.3 Aerosol cooking spray products~~

~~**5104.3.3 Aerosol cooking spray products.**~~
~~Solid pile, palletized or rack storage of aerosol cooking spray products in a general purpose warehouse shall not be more than 2,500 pounds (1135 kg) net weight, unless protected in accordance with NFPA 30B.~~

~~**5104.4 Storage in aerosol product warehouses.**~~
~~The total quantity of Level 2 and 3 aerosol products, aerosol cooking sprays and plastic aerosol 3 products in a warehouse utilized for the storage, shipping and receiving of aerosol products shall not be restricted in structures complying with Sections 5104.4.1 through 5104.4.4.~~

~~**5104.4.1 Automatic sprinkler system.**~~
~~Aerosol product warehouses shall be protected by an *approved* wet pipe *automatic sprinkler system* in accordance with NFPA 30B. Sprinkler protection shall be designed based on the highest classification level of aerosol product present.~~

~~**5104.4.2 Pile and palletized storage aisles.** Solid pile and palletized storage shall be arranged so the maximum travel distance to an aisle is 25 feet (7620 mm). Aisles shall have a minimum width of 4 feet (1219 mm).~~

~~**5104.4.3 Rack storage aisles.** Rack storage shall be arranged with a minimum aisle width of 8 feet (2438 mm) between rows of racks and 8 feet (2438 mm) between racks and adjacent solid pile or palletized storage. Where early suppression fast response (ESFR) sprinklers provide automatic sprinkler protection, the minimum aisle width shall be 4 feet (1219 mm).~~

~~**5104.4.4 Combustible commodities.** Combustible commodities other than *flammable* and *combustible liquids* shall be permitted to be stored in an aerosol product warehouse.~~

> ~~**Exception:** *Flammable* and *combustible liquids* in 1-quart (946 ml) metal containers and smaller shall be permitted to be stored in an aerosol product warehouse.~~

~~**5104.5 Storage in inside flammable liquid storage rooms.**~~
~~Inside *flammable liquid* storage rooms shall comply with Section 5704.3.7. The maximum quantities of aerosol products shall comply with Section 5104.5.1 or 5104.5.2.~~

~~**5104.5.1 Storage rooms of 500 square feet or less.** The storage of aerosol products in *flammable liquid* storage rooms less than or equal to 500 square feet (46 m²) in area shall not exceed the following quantities:~~

1. ~~A net weight of 1,000 pounds (454 kg) of Level 2 aerosol products.~~
2. ~~A net weight of 500 pounds (227 kg) of Level 3 aerosol and plastic aerosol 3 products.~~
3. ~~A combined net weight of 1,000 pounds (454 kg) of Level 2 and 3 aerosol and plastic aerosol 3 products.~~

~~**5104.5.2 Storage rooms greater than 500 square feet.**~~
~~The storage of aerosol products in *flammable liquid* storage rooms greater than 500 square feet (46 m²) in area shall not exceed the following quantities:~~

1. ~~A net weight of 2,500 pounds (1135 kg) of Level 2 aerosol products.~~
2. ~~A net weight of 1,000 pounds (454 kg) of Level 3 aerosol products.~~
3. ~~A combined net weight of 2,500 pounds (1135 kg) of Level 2 and 3 aerosol and plastic aerosol 3 products.~~

~~The maximum aggregate storage quantity of Level 2 and 3 aerosol products permitted in separate inside storage rooms protected by an *approved automatic sprinkler system* in accordance with NFPA 30B shall be 5,000 pounds (2270 kg).~~

~~5104.6 Storage in liquid warehouses~~.

~~The storage of Level 2 and 3 aerosol products in liquid warehouses shall comply with NFPA 30B. The storage shall be located within segregated storage areas in accordance with Section 5104.3.2 and Sections 5104.6.1 through 5104.6.3.~~

~~5104.6.1 Containment.~~ ~~Spill control or drainage shall be provided to prevent the flow of liquid to within 8 feet (2438 mm) of the segregated storage area.~~

~~5104.6.2 Sprinkler design.~~ ~~Sprinkler protection shall be designed based on the highest level of aerosol product present.~~

~~5104.6.3 Opening protection into segregated storage areas.~~ ~~Fire doors or gates opening into the segregated storage area shall either be self-closing or provided with automatic-closing devices activated by sprinkler water flow or an *approved* fire detection system.~~

~~5104.7 Storage in Group M occupancies~~.

~~Storage of Level 2 and 3 aerosol products, aerosol cooking spray products and plastic aerosol 3 products in occupancies in Group M shall comply with Table 5104.7. Retail display shall comply with Section 5106.~~

~~TABLE 5104.7 MAXIMUM QUANTITIES OF LEVEL 2 AND 3 AEROSOL PRODUCTS, AEROSOL COOKING SPRAY PRODUCTS AND PLASTIC AEROSOL 3 PRODUCTS IN RETAIL STORAGE AREAS~~

MAXIMUM NET WEIGHT PER FLOOR (pounds)			
Floor	Nonsegregated storage[a, b]	Segregated storage	
		Storage cabinets[b]	Separated from retail area[c]
Basement	Not Permitted	Not Permitted	Not Permitted
Ground	2,500	5,000	Note d
Upper	500	1,000	Note d

~~For SI: 1 pound = 0.454 kg, 1 square foot = 0.0929 m^2.~~

a. ~~The total aggregate quantity on display and in storage shall not exceed the maximum retail display quantity indicated in Section 5106.3.~~

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

c. ~~The storage area shall be separated from the retail area with a 1-hour fire-resistance-rated assembly.~~

d. ~~See Table 5104.3.2.~~

~~5104.8 Storage of aerosol cooking spray products.~~ ~~*Aerosol cooking spray products* shall be permitted to be stored in a general purpose warehouse.~~

~~5104.8.1 Mixed storage.~~ ~~Where *aerosol cooking spray products* are mixed with other higher-hazard aerosol products, the provided isolation, storage height restrictions and protection shall be based on the highest-hazard aerosol product present.~~

~~5104.8.2 Storage conditions~~.

~~The storage and handling of *aerosol cooking spray products* shall comply with this chapter and NFPA 30B.~~

SECTION 5105
OUTSIDE STORAGE

Revise as follows:

5105.1 General.
The outside storage of Level 2 and 3 aerosol products, plastic aerosol 2 products, and plastic aerosol 3 products, including storage in temporary storage trailers, shall be separated from exposures in accordance with Table 5105.1.

TABLE 5105.1 DISTANCE TO EXPOSURES FOR OUTSIDE STORAGE OF LEVEL 2 AND 3 AEROSOL PRODUCTS, PLASTIC AEROSOL 2 PRODUCTS, AND PLASTIC AEROSOL 3 PRODUCTS

EXPOSURE	MINIMUM DISTANCE FROM AEROSOL STORAGE (feet)[a]
Buildings	50
Exit discharge to a public way	50
Lot lines	20
Other outside storage	50
Public alleys, public ways, public streets	20

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. The minimum separation distance indicated is not required where exterior walls having a 2-hour fire-resistance rating without penetrations separate the storage from the exposure. The walls shall extend not less than 30 inches above and to the sides of Level 2 and 3 aerosol products, plastic aerosol 2 products, and plastic aerosol 3 products.

SECTION 5106 RETAIL DISPLAY

Revise as follows:

5106.1 General. ~~This section shall apply to t~~The retail display of 500 pounds (227 kg) or more of Level 2 and 3 aerosol products, aerosol cooking spray products, plastic aerosol 2 products and plastic aerosol 3 products shall comply with NFPA 30B.

Delete without substitution:

~~**5106.2 Aerosol display and normal merchandising not exceeding 8 feet in height.**~~
~~Aerosol display and normal merchandising not exceeding 8 feet (2438 mm) in height shall be in accordance with Sections 5106.2.1 through 5106.2.5.~~

~~**5106.2.1 Maximum quantities in retail display areas.**~~
~~Aerosol products, aerosol cooking spray products and plastic aerosol 3 products in retail display areas shall not exceed quantities needed for display and normal merchandising and shall not exceed the quantities in Table 5106.2.1.~~

~~**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 inaccordance with Section 5106.2[a, c]	Protected inaccordance with Section 5106.3[c]
Basement	Not Allowed	500	500
Ground	2,500	10,000	10,000
Upper	500	2,000	Not Allowed

~~For SI: 1 pound = 0.454 kg, 1 square foot = 0.0929 m^2.~~

~~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.~~

~~5106.2.2 Aerosol cooking spray product storage and fire protection~~.
~~The storage and handling of aerosol cooking spray products shall comply with this chapter and NFPA 30B.~~

~~5106.2.3 Display of aerosol products~~. ~~Level 2 and 3 aerosol and plastic aerosol 3 products shall not be stacked more than 6 feet (1829 mm) high from the base of the aerosol product array to the top of the aerosol product array unless the aerosol products are placed on fixed shelving or otherwise secured in an *approved* manner. Where storage or retail display is on shelves, the height of such storage or retail display to the top of aerosol products shall not exceed 8 feet (2438 mm).~~

~~5106.2.4 Combustible cartons~~.
~~Aerosol products located in retail display areas shall be removed from combustible cartons.~~

~~Exceptions:~~

1. ~~Display areas that use a portion of combustible cartons that consist of only the bottom panel and not more than 2 inches (51 mm) of the side panel are allowed.~~
2. ~~Where the display area is protected in accordance with Tables 7.4.2.7(a) through 7.4.2.7(l) of NFPA 30B, storage of aerosol products in combustible cartons is allowed.~~

~~5106.2.5 Retail display automatic sprinkler system~~.
~~Where an *automatic sprinkler system* is required for the protected retail display of aerosol products, the wet-pipe *automatic sprinkler system* shall be in accordance with Section 903.3.1.1. The minimum system design shall be for an Ordinary Hazard Group 2 occupancy. The system shall be provided throughout the retail display area.~~

~~5106.3 Aerosol product display and normal merchandising exceeding 8 feet in height~~.
~~Aerosol product display and merchandising exceeding 8 feet (2438 mm) in height shall be in accordance with Sections 5106.3.1 through 5106.3.3.~~

~~5106.3.1 Maximum quantities in retail display areas~~.
~~Aerosol products in retail display areas shall not exceed quantities needed for display and normal merchandising and shall not exceed the quantities in Table 5106.2.1, with fire protection in accordance with Section 5106.3.2.~~

~~5106.3.2 Automatic sprinkler protection~~.
~~Aerosol product and plastic aerosol 3 product display and merchandising areas shall be protected by an *automatic sprinkler system* based on the requirements set forth in Tables 7.4.2.7(a) through 7.4.2.7(l) of NFPA 30B and the following:~~

1. ~~Protection shall be based on the highest level of aerosol product in the array and the packaging method of the storage located more than 6 feet (1829 mm) above the finished floor.~~
2. ~~Where using the cartoned aerosol products tables of NFPA 30B, uncartoned or display-cut Level 2 and 3 aerosol products and plastic aerosol 3 products shall not be permitted more than 6 feet (1829 mm) above the finished floor.~~

3. ~~The design area for Level 2 and 3 aerosol products and plastic aerosol 3 products shall extend not less than 20 feet (6096 mm) beyond the Level 2 and 3 aerosol product and plastic aerosol 3 product display and merchandising areas.~~
4. ~~Where ordinary and high-temperature ceiling sprinkler systems are adjacent to each other, noncombustible draft curtains shall be installed at the interface.~~

~~5106.3.3 Separation of Level 2 and 3 aerosol product and plastic aerosol 3 product areas~~.

~~Separation of Level 2 and 3 aerosol product areas or plastic aerosol 3 product areas shall comply with the following:~~

1. ~~Level 2 and 3 aerosol product or plastic aerosol 3 product display and merchandising areas shall be separated from each other by not less than 25 feet (7620 mm). See Table 5106.2.1.~~
2. ~~Level 2 and 3 aerosol product or plastic aerosol 3 product display and merchandising areas shall be separated from *flammable* and *combustible liquids* storage and display areas by one or a combination of the following:~~
   2.1. ~~Segregating areas from each other by horizontal distance of not less than 25 feet (7620 mm).~~
   2.2. ~~Isolating areas from each other by a noncombustible partition extending not less than 18 inches (457 mm) above the merchandise.~~
   2.3. ~~In accordance with Section 5106.5.~~
3. ~~Where Item 2.2 is used to separate Level 2 or 3 aerosol products or plastic aerosol 3 products from *flammable* or *combustible liquids*, and the aerosol products are located within 25 feet (7620 mm) of *flammable* or *combustible liquids*, the area below the noncombustible partition shall be liquid tight at the floor to prevent spilled liquids from flowing beneath the aerosol products.~~

~~5106.4 Maximum quantities in storage areas~~.

~~Aerosol products in storage areas adjacent to retail display areas shall not exceed the quantities in Table 5106.4.~~

~~TABLE 5106.4 MAXIMUM STORAGE QUANTITIES FOR STORAGE AREAS ADJACENT TO RETAIL DISPLAY OF LEVEL 2 AND 3 AEROSOL PRODUCTS AND PLASTIC AEROSOL 3 PRODUCTS~~

MAXIMUM NET WEIGHT PER FLOOR (pounds)			
Floor	Unseparated[a, b]	Separated	
		Storage cabinets[b]	1-hour occupancy separation
Basement	Not Allowed	Not Allowed	Not Allowed
Ground	2,500	5,000	In accordance with Sections 6.4.4.3 and 6.4.4.4 of NFPA 30B
Upper	500	1,000	In accordance with Sections 6.4.4.3 and 6.4.4.4 of NFPA 30B

~~For SI: 1 pound = 0.454 kg, 1 square foot = 0.0929 m^2.~~

a. ~~The aggregate quantity in storage and retail display shall not exceed the quantity limits for retail display.~~

b. ~~In any 50,000-square-foot area.~~

~~5106.5 Special protection design for Level 2 and 3 aerosol products adjacent to flammable and combustible liquids in double-row racks~~.

~~The display and merchandising of Level 2 and 3 aerosol products adjacent to *flammable* and *combustible liquids* in double-row racks shall be in accordance with Section 5106.3.3 or Sections 5106.5.1 through 5106.5.8.~~

~~5106.5.1 Fire protection~~.

~~Fire protection for the display and merchandising of Level 2 and 3 aerosols in double-row racks shall be in accordance with Table 8.5.1~~

~~and Figure 8.5.1 of NFPA 30B.~~

~~**5106.5.2 Cartoned aerosol products.** Level 2 and 3 aerosol products displayed or merchandised more than 8 feet (2438 mm) above the finished floor shall be in cartons.~~

~~**5106.5.3 Shelving.** Shelving in racks shall be limited to wire mesh shelving having uniform openings not more than 6 inches (152 mm) apart, with the openings comprising not less than 50 percent of the overall shelf area.~~

~~**5106.5.4 Aisles.** Racks shall be arranged so that aisles not less than 7[1]/[2] feet (2286 mm) wide are maintained between rows of racks and adjacent solid-piled or palletized merchandise.~~

~~**5106.5.5 Flue spaces.** Flue spaces in racks shall comply with the following:~~

1. ~~Transverse flue spaces—Nominal 3-inch (76 mm) transverse flue spaces shall be maintained between merchandise and rack uprights.~~
2. ~~Longitudinal flue spaces—Nominal 6-inch (152 mm) longitudinal flue spaces shall be maintained.~~

~~**5106.5.6 Horizontal barriers.**~~

~~Horizontal barriers constructed of minimum [3]/[8]-inch-thick (10 mm) plywood or minimum 0.034-inch (0.086 mm) (No. 22 gage) sheet metal shall be provided and located in accordance with Table 8.5.1 and Figure 8.5.1 of NFPA 30B where in-rack sprinklers are installed.~~

~~**5106.5.7 Class I, II, III, IV and plastic commodities.**~~

~~Class I, II, III, IV and plastic commodities located adjacent to Level 2 and 3 aerosol products and plastic aerosol 3 products shall be protected in accordance with NFPA 13.~~

~~**5106.5.8 Flammable and combustible liquids.**~~

~~Class I, II, III A and III B liquids shall be allowed to be located adjacent to Level 2 and 3 aerosol products where both of the following conditions are met:~~

1. ~~Class I, II, IIIA and IIIB liquid containers: Containers for Class I, II, IIIA and IIIB liquids shall be limited to 1.06-gallon (4 L) metal-relieving and nonrelieving style containers and 5.3-gallon (20 L) metal-relieving style containers.~~
2. ~~Fire protection for Class I, II, IIIA and IIIB Liquids: Automatic sprinkler protection for Class I, II, IIIA and IIIB liquids shall be in accordance with Chapter 57.~~

SECTION 5107
MANUFACTURING FACILITIES

5107.1 General.

Manufacturing facilities shall be in accordance with NFPA 30B.

Reason: Portions of Chapter 51 rely solely on NFPA 30B while other portions refer the user of the Code to NFPA 30B with similar text included in the IFC. This causes confusion and results in differences between the reference standard and the IFC, especially if updates are not processed every revision cycle. In addition, NFPA 30B is more comprehensive and due to the references throughout the Chapter, must be used regardless of what is in the IFC. If a requirement exists in NFPA 30B but not in the IFC, does one have to meet that requirement given the fact that the Code takes precedence over the reference standard?

The section on outdoor storage has been retained since that is not addressed in NFPA 30B.

For example, last code change cycle a series of proposals were submitted to include plastic aerosol 2 products. They were appropriately disapproved because the test program was not yet completed. However, since that time the test program has been completed and the current edition of NFPA 30B addresses plastic aerosol 2 products, although the 2024 Edition of the IFC does not. If this proposal is not accepted, a significant package of changes will need to be submitted during the Public Comment period to properly align the IFC with NFPA 30B.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Industry is already typically required to comply with NFPA 30B for reasons in addition to the references in the IFC. If anything, the cost of construction may be reduced slightly due to the elimination of confusion regarding the applicable requirements.

F243-24

F244-24

IFC: 5303.16, 5303.16.14

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com); Julius Ballanco, P.E., JB Engineering and Code Consulting, P.C., Self (jbengineer@aol.com)

2024 International Fire Code

5303.16 Vaults.
Generation, compression, storage and dispensing equipment for *compressed gases* shall be allowed to be located in either above- or below-grade vaults complying with Sections 5303.16.1 through 5303.16.14.

Revise as follows:

5303.16.14 Classified area.
The interior of a vault containing a flammable gas shall be designated a Class I, Division 1, location, as defined in NFPA 70.

Exception: Category 1B flammable gas with a fundamental burning velocity of less than 3.9 inches/second (99 mm/s).

Reason: Category 1B flammable gas refrigerants are difficult to ignite and do not present an explosion hazard. These vaults are required to provide a gas detection system detecting at 25% LFL. Vaults are also required to provide ventilation which either operates continuously or activates when 25% LFL is detected. The exclusion of Class 1, Div 1 is always based on adequate ventilation being present for Category 1B flammable gases. Section 5303.16.9 requires continuous ventilation which greatly reduces any hazard regarding Category 1B flammable gases. It would be inappropriate to require classified wiring pursuant to NFPA 70 when a vault is used for 1B flammable gas refrigerant storage.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

There would be a decrease in costs by eliminating unnecessary classified wiring requirements This cost will depend upon the installation. In either case the code will be less restrictive.

F244-24

F245-24

IFC: 5307.1, 5307.2 (New), 5307.2, 5307.2.1

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

2024 International Fire Code

5307.1 General.
Compressed gases in storage or use not regulated by the material-specific provisions of Chapters 6, 54, 55, and 60 through 67, including asphyxiant, irritant and radioactive gases, shall comply with this section in addition to other requirements of this chapter.

Add new text as follows:

5307.2 **Asphyxiants, irritants and radioactive gases.** Asphyxiant, irritant or radioactive gases used or stored in quantities exceeding 1,000 cubic feet (28 m³) shall comply with Sections 5307.2.1 or 5307.2.2.

Exception: Carbon dioxide systems regulated by Sections 5307.3 or 5307.4.

Revise as follows:

~~**5307.2**~~ 5307.2.1 **Ventilation.**
Indoor storage and use areas and storage buildings shall be provided with ventilation in accordance with Section 5004.3. Where mechanical ventilation is provided, the systems shall be operational during such time as the building or space is occupied.

~~**Exceptions:**~~

1. ~~A *gas detection system* complying with Section 5307.2.1 shall be permitted in lieu of mechanical ventilation.~~
2. ~~Areas containing insulated liquid carbon dioxide systems used in beverage dispensing applications shall comply with Section 5307.3.~~

~~**5307.2.1**~~ **5307.2.2 Gas detection system.**
In rooms or areas not provided with ventilation in accordance with Section ~~5307.2~~ 5307.2.1, a *gas detection system* complying with Section 916 or, where *approved*, an oxygen depletion alarm system, either of which initiates audible and visible alarm signals in the room or area where sensors are installed, shall be provided.

Reason: This proposal intends to resolve an unintended loophole in the code.

Currently, Section 5307 regulates asphyxiant, irritant and radioactive gases in any quantity. These gases require require either ventilation or gas detection.

Section 5307.3 regulates liquid carbon dioxide systems for beverage dispensing, but does not make any requirements until the quantity exceeds 100 pounds.

Section 5307.4 regulates carbon dioxide enrichment systems, and again does not make any requirements until the quantity exceeds 100 pounds. This provision does not limit its application to liquid or gaseous CO2; it applies to both.

Carbon dioxide is an asphyxiant gas, and in fact that characteristic was the impetus for the regulations of beverage dispensing and CO2 enrichment. The inconsistency is that when CO2 is used for something other than beverage dispensing or CO2 enrichment the threshold of regulation drops to 0. There is no justification to regulate the other gases in any quantity, when the liquid asphyxiants (CO2) are not regulated until they exceed 100 pounds. This proposal provides a similar threshold for all other gases that fall under Section 5307, the asphyxiant, irritant and radioactive gases.

A new section 5307.2 is inserted to require that when asphyxiant, irritant and radioactive gases exceed 1,000 cubic feet, they must be provided with either ventilation or gas detection. This is the same approach used for beverage dispensing. The exceptions are relocated to Section 5307.2 in both the text and the new exception.

The 1,000 cubic feet is simply an approximation of an equivalent volume. 100 pounds of CO2 is equivalent to 875 cubic feet. Nitrogen is another common asphyxiant and 100 pounds of nitrogen is approximately 1380 cubic feet. Nitrogen is available in cylinders containing about 230 cubic feet, so 4 cylinders would be below the threshold of 1,000 cubic feet.

This proposal will provide some consistency between the requirements for CO2 in beverage dispensing or CO2 enrichment and other uses of CO2 or other asphyxiants.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

This proposal will decrease the cost of construction because mechanical ventilation or gas detection will not be required for rooms or areas not exceeding 1,000 cubic feet of gas. For a typical small storage room, an estimated $5,000 will be saved by not providing additional ventilation or a gas detection system.

Estimated Immediate Cost Impact Justification (methodology and variables):

The estimated cost is difficult to pinpoint because it would be based on the size of room and other variables. The estimate is based on a reasonable assumption of construction costs.

F245-24

F246-24

IFC: 5307.2, 5307.3, 5307.3.1, 5307.3.2, 5307.4.3, 916.8

Proponents: Scott Plumer, Arvada Fire Protection District, Arvada Fire Protection District

2024 International Fire Code

Revise as follows:

5307.2 Ventilation.
Indoor storage and use areas and storage buildings shall be provided with ventilation in accordance with Section 5004.3. Where mechanical ventilation is provided, the systems shall be operational during such time as the building or space is occupied.

Exceptions:

1. A *gas detection system* complying with Section 5307.2.1 shall be permitted in lieu of mechanical ventilation.
2. Areas containing ~~insulated liquid~~ carbon dioxide systems used in beverage dispensing applications shall comply with Section 5307.3.

5307.3 ~~Insulated liquid carbon~~ Carbon dioxide systems used in beverage dispensing applications.
~~Insulated liquid carbon~~ Carbon dioxide systems with more than 100 pounds (45.4 kg) of carbon dioxide used in beverage dispensing applications shall comply with Section 5307.3.1.

5307.3.1 Ventilation.
Where ~~insulated liquid~~ carbon dioxide storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing storage tanks, cylinders, piping and equipment, and other areas where a leak of carbon dioxide is expected to accumulate, shall be provided with mechanical ventilation in accordance with Section 5004.3 and designed to maintain the room containing carbon dioxide at a negative pressure in relation to the surrounding area.

Exception: A *gas detection system* complying with Section 5307.3.2 shall be permitted in lieu of mechanical ventilation.

5307.3.2 Gas detection system. Where ventilation is not provided in accordance with Section 5307.3.1, a *gas detection system* complying with Section 916 shall be provided in rooms or indoor areas and in below-grade outdoor locations with ~~insulated~~ carbon dioxide systems. Carbon dioxide sensors shall be provided within 12 inches (305 mm) of the floor in the area where the gas is expected to accumulate or other *approved* locations. The system shall be installed ~~as follows:~~in accordance with NFPA 55.

1. ~~Activates an audible and visible supervisory alarm at a normally attended location upon detection of a carbon dioxide concentration of 5,000 ppm (9000 mg/m^3).~~
2. ~~Activates an audible and visible alarm within the room or immediate area where the system is installed upon detection of a carbon dioxide concentration of 30,000 ppm (54 000 mg/m^3).~~

5307.4.3 Gas detection system. A *gas detection system* complying with Section 916 shall be provided in rooms or indoor areas in which the carbon dioxide enrichment process is located, in rooms or indoor areas in which container systems are located, and in other areas where carbon dioxide is expected to accumulate. Carbon dioxide sensors shall be provided within 12 inches (305 mm) of the floor in the area where the gas is expected to accumulate or leaks are most likely to occur. The system shall be installed ~~as follows:~~ in accordance with NFPA 55.

1. ~~Activates a low-level alarm upon detection of a carbon dioxide concentration of 5,000 ppm (9000 mg/m^3).~~
2. ~~Activates a high-level alarm upon detection of a carbon dioxide concentration of 30,000 ppm (54 000 mg/m^3).~~

916.8 System activation. A gas detection alarm shall be initiated where any sensor detects a concentration of gas exceeding the following thresholds:

1. For *flammable gases*, a gas concentration exceeding 25 percent of the lower flammability limit (LFL).

2. For nonflammable gases, a gas concentration exceeding one-half of the IDLH, unless a different threshold is specified by the section of this code requiring a *gas detection system*.

Upon activation of a gas detection alarm, alarm signals or other required responses shall be as specified by the section of this code requiring a *gas detection system*. Audible and visible alarm signals associated with a gas detection alarm shall be distinct from fire alarm and carbon monoxide alarm signals.

Exception: Systems installed in accordance with Section 5307.3 or 5307.4.

Reason: There is currently a discrepancy between the IFC requirements and the NFPA 55 requirements for CO2 detection. Namely, the IFC requires an instantaneous alarm actuation at 5,000ppm in section 5307.3.2. However, NFPA 55 requires a time weighted average trigger at 5,000ppm. In IFC section 916.8, the alarm value is "one-half of the IDLH unless a different threshold is specified by the section of this code requiring a gas detection system." For CO2, one-half of the IDLH is 20,000ppm per OSHA. Section 916.8 is not clear as to whether the lower level (20,000ppm) should be used or the higher level (30,000ppm) in chapter 53 should be used. Furthermore, NFPA 55 refers to OSHA and ACGIH determined levels rather than a specific value. Installers of these systems and AHJs are left trying to navigate the conflicting levels between different sections, standards, and agencies. This proposal provides clarity by moving the installation requirements out of the IFC and references NFPA 55, which is already a referenced standard. This will reduce conflicts between the code and standard and falls more in line with how other sections of the IFC deal with installation standards (NFPA 13, 13R, 17, 17A, 24, 72, etc). Furthermore, it removes the language about insulated systems. It should not matter whether the carbon dioxide is insulated or not, if there is a leak, it should be detected.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no increase in installation costs for this proposal, it just cleans up the requirements and makes it easier to understand the installation requirements. There is no ongoing maintenance cost for this proposal as there are no ongoing maintenance requirements for these systems.

F246-24

F247-24

IFC: 5505.2, 5504.2.3 (New), 5504.2.3.1 (New), 5504.2.3.2 (New), 5504.2.3.3 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Revise as follows:

5505.2 Indoor use.
Indoor use of *cryogenic fluids* shall comply with the material-specific provisions of Section 5501.1 and Sections 5504.2.3 through 5504.2.3.3.

Add new text as follows:

5504.2.3 Oxygen Gas Detection. An oxygen gas detection system, complying with Section 916, shall be provided in rooms or indoor areas in which cryogenic fluids are stored. The system shall be designed as follows:

1. Activates a low-level alarm upon detection of an oxygen deficient atmosphere of 19.5% oxygen.
2. Activated a high-level alarm upon detection of an oxygen deficient atmosphere of 18% oxygen.

5504.2.3.1 Low level alarm activation. Activation of the low-level gas detection system alarm shall automatically do all of the following:

1. Stop the flow of cryogenic fluid to the piping system.
2. Activate the mechanical exhaust ventilation system.
3. Activate an audible and visible supervisory alarm signal at an approved location within the building.
4. Transmit a supervisory signal to an approved location in accordance with NFPA 72.

5504.2.3.2 High level alarm activation. Activation of the high-level gas detection system alarm shall automatically do all of the following:

1. Stop the flow of cryogenic fluid to the piping system.
2. Activate the mechanical exhaust ventilation system.
3. Activate an audible and visible evacuation alarm both inside and outside of the oxygen deficient area, and the area in which the cryogenic containers are located.
4. Transmit an alarm signal to an approved location in accordance with NFPA 72.

5504.2.3.3 Fire alarm system connections. The oxygen gas detection system shall be connected to a fire alarm system in accordance with fire alarm equipment manufacturer's instructions and NFPA 72.

Reason: Due the high expansion ratio of cryogenic fluids, a small leak of a cryogenic fluid can easily fill up a room or space and create an oxygen deficient or enriched atmosphere. An oxygen deficient atmosphere means that there will not be a sufficient amount of oxygen for someone to survive. An oxygen enriched atmosphere creates an environment that can easily catch fire for explode due to the fact that there is too much oxygen. These new code sections provide a oxygen detection so that the occupants are made aware of the dangerous situation and can safely evacuate. This new code language is in line with existing language for liquified compressed CO2.
FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC**

Website

Cost Impact: Increase

Estimated Immediate Cost Impact:

Many sensors cost between $20 and $100. Typically, labor costs for a sensor installation and tying into the fire alarm system are around $150.

Estimated Immediate Cost Impact Justification (methodology and variables):

The overall cost increase in minimal but that cost is really outweighed by the fact that we are providing life safety to those that are in areas that are in and around cryogenic fluids. Individuals in these areas would not know that there is a dangerous situation without this detection and notification system. Through our research, many sensors cost between $20 and $100 and labor costs for a sensor installation and tying into the fire alarm system are around $150.

F247-24

F248-24

IFC: 5505.2, 5505.2 (New), 5505.2.2.1 (New), 5505.2.2.2 (New)

Proponents: Adam Henson, U.S. Chemical Safety and Hazard Investigation Board (adam.henson@csb.gov)

2024 International Fire Code

Revise as follows:

5505.2 Indoor use. Indoor use of cryogenic fluids shall comply with the material-specific provisions of Section 5501.1.

Add new text as follows:

5505.2 Oxygen deficiency hazards. Oxygen deficiency monitoring, alarms and controls shall be in accordance with Sections 5502.2.1 and 5502.2.2.

5505.2.2.1 Atmospheric monitoring. Areas where cryogenic liquids are used and vaporization takes place shall be monitored for oxygen deficiency. When the concentration of oxygen measures 19.5% or below an audible alarm shall sound and a visual indication shall be given inside the area and immediately outside of all entrances to the area. The alarm shall be distinct from other facility alarms. Area monitors shall be permitted to be supplemented with personal monitors where necessary.

5505.2.2.2 Emergency Stop Devices. Manually operated control devices shall be provided to shut off the cryogenic fluid supply in case of emergency. These devices shall be located at each operator control station, at entrances and exits, at all locations where a human and machine interaction is expected by design, and other locations as determined by risk assessment.

Reason: On January 28, 2021, liquid nitrogen overflowed from an immersion-spiral freezer located inside the Plant 4 building at the Foundation Food Group (FFG) facility in Gainesville, GA. The release asphyxiated two employees working on the freezer immediately and continued undetected and uncontrolled for 30 to 60 minutes. Eventually, another employee noticed the freezer room had filled with a four- to five-foot-high vapor cloud and initiated an emergency response by notifying a supervisor.

During the response to this release as many as 14 other FFG employees, including members of management, traveled to the freezer room either to investigate the release or rescue the workers. Four additional FFG employees were killed by asphyxiation, and four additional people including one firefighter were seriously injured presenting asphyxiation symptoms as the result of the response. Six additional FFG employees and three additional firefighters were also treated in the emergency room for symptoms of asphyxiation but were released that day. In addition to the staggering human toll of this incident damages of roughly $1.7 million were reported by the facility.

The freezer involved in the incident was a liquid nitrogen immersion-spiral freezer operated in conjunction with “Line 4”. Liquid nitrogen was supplied to this freezer from a 13,000-gallon bulk liquid tank installed outside of the building. The freezer was subdivided from the adjacent area by four new walls. The freezer had an exhaust system which directed vaporized nitrogen gas from inside the equipment outside of the building, but the room where the freezer was located was not served by mechanical exhaust or an HVAC system.

Despite warnings from FFG’s nitrogen/equipment supplier, no atmospheric monitoring was installed or used in the area or room where the freezer was located. Manul shutoffs for the nitrogen supply were located at the bulk tanks on the opposite end of the building from the freezer. In addition, there were ten E-stop buttons designed to shut down the freezer and isolate the nitrogen supply upon activation. All ten E-stop buttons were located within the freezer room.

During its investigation the CSB concluded that had FFG installed atmospheric monitoring and an alarm system in and around the freezer room, workers would have been warned against entering the oxygen deficient atmosphere. The CSB also concluded that the placement of the E-stop buttons solely within the room containing the hazard is not a sensible design and delayed the response to this incident. The successful implementation of these devices in conjunction with effective emergency planning and response could have prevented or mitigated the fatalities and injuries that occurred during the response to this incident.

As part of its investigation into this incident, the CSB reviewed the requirements of the International Fire Code (IFC) and determined that the IFC Chapter 55 *Cryogenic Fluids* requires inert cryogenic fluids, including nitrogen, shall comply with ANSI/CGA P-18 along with requirements for storage and use and handling. Nothing in the code would have required FFG to use atmospheric monitoring for oxygen deficiency and an associated alarm. Additionally, no guidance is given in the code regarding the appropriate location of E-stop buttons.

As the result of the investigation, the CSB issued the following recommendation to the International Code Council:

CSB Recommendation No. 2021-03-I-GA-R12:

Update the International Fire Code to:

a) require the use of atmospheric monitoring with cryogenic asphyxiants in accordance with industry guidance such as is contained in CGA P-76 Hazards of Oxygen-Deficient Atmospheres and CGA P-12 Safe Handling of Cryogenic Liquids in addition to CGA P-18 Standard for Bulk Inert Gas Systems; and,

b) include guidance on the adequate safe location of manual shutoff valves and devices such as emergency push buttons used to activate remotely operated emergency isolation valves (ROEIVs) in cryogenic fluid service. At a minimum this guidance should be harmonized with the requirements of ISO 13850 Safety of machinery – Emergency stop function – Principles for design.

The language proposed is intended to satisfactorily implement this recommendation.

Bibliography: U.S. Chemical Safety and Hazard Investigation Board. (2023, December 12). *Foundation Food Group Fatal Chemical Release.* Retrieved from www.csb.gov: https://www.csb.gov/foundation-food-group-fatal-chemical-release-/

Cost Impact: Increase

Estimated Immediate Cost Impact:

$20,000

Estimated Immediate Cost Impact Justification (methodology and variables):

The cost of equipment is estimated at $12,000 on average and labor is estimated at $8,000 on average. The cost of the freezer unit involved in the incident at FFG was nearly $900,000. Installing the equipment described in this code change proposal would represent a ~2% increase in the total cost of that project.

$12,000 (Materials) + $8,000 (Labor) = $20,000

Cost Source:

This is an analogous estimate based on information from representatives from plant management and an engineering firm.

Estimated Life Cycle Cost Impact:

N/A

Estimated Life Cycle Cost Impact Justification (methodology and variables):

N/A

F248-24

F249-24

IFC: SECTION 202 (New), 5601.1.3, SECTION 5609, 5609.1, APPENDIX P (New), SECTION P101 (New), P101.1 (New), P101.2 (New), P101.2.1 (New), P101.2.2 (New), P101.2.3 (New), P101.2.4 (New), P101.2.5 (New), P101.2.6 (New), P101.2.7 (New), P101.2.7.1 (New), P101.2.7.2 (New), P101.2.7.3 (New), P101.2.7.4 (New), P101.2.7.5 (New), P101.2.8 (New), P101.2.9 (New), P101.2.10 (New), P101.2.11 (New), P101.2.11.1 (New), P101.2.11.2 (New), P101.2.12 (New), P101.2.12.1 (New), P101.2.13 (New), SECTION P102 (New), P102.1 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Add new definition as follows:

FIREWORKS RETAIL SALES (FRS) STRUCTURE. A tent, membrane structure, or temporary structure that is used only for the retail display and sale or storage of consumer fireworks to the public.

Revise as follows:

5601.1.3 Fireworks.
The possession, manufacture, storage, sale, handling and use of fireworks are prohibited.

Exceptions:

1. Storage and handling of fireworks as allowed in Section 5604.
2. Manufacture, assembly and testing of fireworks as allowed in Section 5605.
3. The use of fireworks for fireworks displays as allowed in Section 5608.
4. ~~The possession, storage, sale, handling and use of specific types of Division 1.4G fireworks where allowed by applicable laws, ordinances and regulations, provided that such fireworks and facilities comply with the 2006 edition of NFPA 1124, CPSC 16 CFR Parts 1500 and 1507, and DOTn 49 CFR Parts 100–185, as applicable for consumer fireworks.~~Retail sale of fireworks shall be permitted where approved and shall comply with the rules and limitations established by the jurisdiction.

Delete without substitution:

~~SECTION 5609~~
~~TEMPORARY STORAGE OF CONSUMER FIREWORKS~~

~~5609.1 General~~.
~~Where the display or temporary storage of fireworks 1.4G (consumer fireworks) is allowed by Section 5601.1.3, Exception 4, such display or storage shall comply with the applicable requirements of NFPA 1124.~~

Add new text as follows:

APPENDIX P RETAIL SALE OF CONSUMER FIREWORKS

SECTION P101
GENERAL

P101.1 Requirements. Retail display and sales of 1.4G fireworks, including related temporary storage of 1.4G fireworks, shall comply with the requirements of this section unless otherwise indicated.

P101.2 FRS sales of fireworks.. FRS sales of fireworks where allowed by applicable laws, ordinances and regulations shall comply with regulations of the U.S. Consumer Product Safety Commission as set forth in 16 CFR 1500 and 1507 and the regulations of the U.S. Department of Transportation as set forth in 49 CFR 100 to 178, including related storage and display for sale.

P101.2.1 FRS structures. . FRS Structures that are used for the retail display, and sales or temporary storage of 1.4G fireworks shall not exceed a floor area of 1000 ft2 (92.9 m2) individually, or in aggregate where the separation distance between individual FRS structures is less than the distances specified in Table P101.2.6, and shall be one of the following types of structures:

P101.2.2 Temporary use.. Temporary Tents, membrane structures and other temporary structures used as FRS structures shall be erected for a period not to exceed 30 days and shall comply with this section, Chapter 31 of this code, and the International Building Code.

P101.2.3 Construction Permit and approval.. A construction permit is required for the construction of an FRS structure as required by Section 105.6.24, or in accordance with the *International Building Code*, as applicable.

P101.2.4 Operational permits.. Operational permits are required in accordance with Sections 105.5.16 and 105.5.49.

P101.2.5 Construction documents. . Detailed plans for FRS structures and the site they are to be erected on shall be submitted to the code official for review and approval. The construction plans shall comply with this code and the International Building code as applicable and additionally include the following details:

1. Separation distances from the following site features:
   - 1.1 Public ways
   - 1.2 Buildings
   - 1.3 Other FRS structures
   - 1.4 Vehicle fuel dispensing
   - 1.5 Propane-cylinder exchange stations
   - 1.6 Flammable and combustible liquid or gas aboveground tank storage
   - 1.7 Flammable gas and flammable liquefied gas bulk aboveground storage and dispensing areas within 300 ft (91.5 m) of the FRS structure
   - 1.8 Combustible storage
   - 1.9 Permanent or temporary generators
   - 1.10 Additional fireworks storage location
2. Vehicle access and parking areas
3. Location and type of portable fire extinguishers
4. Means of egress exit discharge paths of buildings on the same site.

P101.2.6 Separation Distances. FRS structures shall be located with the minimum separation distances required by Table P101.2.6.

P101.2.6 MINIMUM SEPARATION DISTANCES

EXPOSURE	SEPARATION DISTANCE
Public Ways	20ft (6.1m)
Buildings	20ft (6.1m)
Other FRS structures	100ft (30.4 m)
Vehicle Fuel Dispensing	100ft (30.4 m)
Propane cylinder exchange stations	100ft (30.4 m)
Flammable gas and flammable liquefied gas bulk aboveground storage or dispensing areas	300ft (91.4 m)

Flammable and combustible liquid or gas aboveground tank storage	300ft (91.4 m)
Vehicle access and parking areas	20ft (6.1m)
Combustible storage	20ft (6.1m)
Generators	20ft (6.1m)
Fireworks Storage location	20ft (6.1m)

P101.2.7 Source of Ignition. Sources of ignition shall be controlled and comply with Sections P101.2.7.1 through P101.2.7.5.

P101.2.7.1 Electrical equipment and wiring. FRS structure electrical equipment and wiring shall be in accordance with NFPA 70.

P101.2.7.2 Portable Generators. Portable generators and generator fuel supplies shall be located not less than 20 ft (6.1 m) from a FRS structure or the location of additional fireworks storage.

P101.2.7.3 Cooking Equipment . Cooking equipment of any type shall not be permitted within 25 ft (7.6 m) of FRS structures or the location of additional fireworks storage.

P101.2.7.4 Covered Fuses. Consumer fireworks within reach access of the public shall be required to have covered fuses. The device shall be considered as having a covered fuse if the fireworks device is contained within a packaged arrangement, container, or wrapper that is arranged and configured such that the fuse of the fireworks device cannot be touched directly by a person handling the fireworks without the person having to puncture or tear the packaging or wrapper, unseal or break open a package or container, or otherwise damage or destroy the packaging material, wrapping, or container within which the fireworks are contained.

P101.2.7.5 No Smoking Signs. “FIREWORKS — NO SMOKING” signs complying with Section 310 shall be conspicuously posted on all four sides where required by the fire code official. Smoking shall not be permitted inside or within 25 ft (15.5 m) of the FRS structure or the location of additional fireworks storage.

P101.2.8 Sales Display . The following shall apply to the sale and display of consumer fireworks in FRS structures.:

1. FRS structure retail sales shall not allow access to the interior of the structure by the public:
2. Consumer fireworks shall be displayed in a manner that prevents the fireworks from being handled by persons other than those operating, supervising, or working in the FRS structure.
3. In FRS structures the maximum height of sales displays shall be limited to 8 ft (2.44 m).

P101.2.9 Fireworks Discharge. Fireworks shall not be discharged within three hundred feet of a FRS structure or any fireworks storage structure. Signs reading "NO FIREWORKS DISCHARGE WITHIN 300 FEET" will be in letters at least two inches high, with a principal stroke of not less than one-half inch, on a contrasting background, will be conspicuously posted on all four sides of the FRS structure and any fireworks storage structures.

P101.2.10 Portable Fire Extinguisher. Portable fire extinguishers complying with Section 906 shall be provided and placed in locations approved by the fire code official. FRS structures of less than 200 ft2 (18.6 m2) shall be required to have only one portable fire extinguisher.

P101.2.11 Means of Egress. Retail sales areas within FRS structures shall have a minimum of two egress exit paths for staff with a minimum clear with of 32in. (0.8 m) and otherwise comply with Chapter 10 of this code.

P101.2.11.1 Exit markings. Exit paths and exit doors shall be clearly indicated as approved by the *fire code official.*

P101.2.11.2 Means of egress illumination. . Means of egress shall be illuminated in accordance with Chapter 10.

P101.2.12 Security. FRS structures and storage shall be secured against unauthorized entry and safeguarded in a manner approved by the *fire code official.*

P101.2.12.1 Security management plan. The owner or owner's authorized representative shall prepare a security management plan when the FRS is not open to the public and shall be *approved* by the *fire code official.*

P101.2.13 Storage . Temporary storage associated with FRS structures shall meet the requirements of this section or shall comply with the applicable requirements of Section 5604.

SECTION P102
REFERENCED STANDARDS

P102.1 General. See Table P102.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.

P102.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
49 CFR 100-178 - 2015	Department of Transportation Hazardous Materials Regulation	P101.2
16 CFR 1500-2009	CPSC Hazardous Substances and Articles; Administration and Enforcement Regulations	P101.2
16 CFR 1507 - 2002	CPSC - Firework Devices	P101.2

Staff Analysis: The proposed referenced standards are currently referenced in the ***IFC.***

- ***CPSC Hazardous Substances and Articles; Administration and Enforcement Regulations (CPSC 16 CFR 1500-2009)***
- ***CPSC - Firework Devices (CPSC 16 CFR 1507-2002)***
- ***Department of Transportation Hazardous Materials Regulations (DOT 49 CFR 100-185 - 2015)***

Reason: Forty-nine out of the fifty states permit the sale of some type of consumer fireworks. Currently the 2021 and 2024 codes reference the 2006 NFPA 1124 which contains requirements for indoor sales of consumer fireworks. Later versions of NFPA 1124 no longer include any requirements due to concern that the provisions were not adequate and proper data needs to be developed to support the requirement. Regardless of whether provisions are available within codes or standards jurisdictions are looking for guidance as to how to enforce.

This proposal removes reference to the 2006 edition of NFPA 1124.

The proposal does not address indoor sales and instead is limited to outdoor sales with the use of stands. The focus is on separation, types of outdoor structures, ignition sources, security, signage, how the consumer fireworks are displayed, fire extinguisher availability and basic exit width, markings and illumination.

Due to the sensitivity of this issue it was suggested that this would be better suited for an appendix. This eliminates the need for a jurisdiction to justify removing from the body of the code during adoption.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal provides a new appendix to provide needed guidance to jurisdictions that must address consumer fireworks that are permitted within their state. It has no affect on construction costs.

F249-24

F250-24

IFC: CHAPTER 57

Proponents: Darcy Davidson, Carlsbad Fire Department, California Fire Prevention Officers (darcy.davidson@carlsbadca.gov)

2024 International Fire Code

CHAPTER 57 FLAMMABLE AND COMBUSTIBLE LIQUIDS

SECTION 5701 GENERAL

5701.1 Scope and application.
Prevention, control and mitigation of dangerous conditions related to storage, use, dispensing, mixing and handling of *flammable* and *combustible liquids* shall be in accordance with Chapter 50 and this chapter.

5701.2 Nonapplicability.
This chapter shall not apply to liquids as otherwise provided in other laws or regulations or chapters of this code, including:

1. Specific provisions for *flammable liquids* in motor fuel-dispensing facilities, repair garages, airports and marinas in Chapter 23.
2. Medicines, foodstuffs, cosmetics and commercial or institutional products containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solution not being flammable, provided that such materials are packaged in individual containers not exceeding 1.3 gallons (5 L).
3. Quantities of alcoholic beverages in retail or wholesale sales or storage occupancies, provided that the liquids are packaged in individual containers not exceeding 1.3 gallons (5 L).
4. Storage and use of fuel oil in tanks and containers connected to oil-burning equipment. Such storage and use shall be in accordance with Section 605. For abandonment of fuel oil tanks, this chapter applies.
5. Refrigeration systems (see Section 608).
6. Storage and display of aerosol products complying with Chapter 51.
7. Storage and use of liquids that do not have a fire point when tested in accordance with ASTM D92.
8. Liquids with a *flash point* greater than 95°F (35°C) in a water-miscible solution or dispersion with a water and inert (noncombustible) solids content of more than 80 percent by weight, which do not sustain combustion.
9. Liquids without *flash points* that can be flammable under some conditions, such as certain halogenated hydrocarbons and mixtures containing halogenated hydrocarbons.
10. The storage of beer, distilled spirits and wines in barrels and casks.
11. Commercial cooking oil storage tank systems located within a building and designed and installed in accordance with Section 607 and NFPA 30.
12. Application and release of pesticide and agricultural products and materials intended for use in weed abatement, erosion control, soil amendment or similar applications where applied in accordance with the manufacturer's instructions and label directions.
13. The off-site transportation of *flammable* or *combustible liquids* where in accordance with Department of Transportation (DOTn) regulation.

Revise as follows:

5701.3 Referenced documents.
The applicable requirements of Chapter 50, other chapters of this code, the *International Building Code* and the *International Mechanical*

Code pertaining to *flammable* and combustible *liquids* shall apply.

5701.4 Permits.

Permits shall be required as set forth in Sections 105.5 and 105.6.

5701.5 Material classification.

Flammable and *combustible liquids* shall be classified in accordance with the definitions in Chapter 2.

When mixed with lower flash-point liquids, Class II or III liquids are capable of assuming the characteristics of the lower flash-point liquids. Under such conditions, the appropriate provisions of this chapter for the actual *flash point* of the mixed liquid shall apply.

When heated above their *flash points*, Class II and III liquids assume the characteristics of Class I liquids. Under such conditions, the appropriate provisions of this chapter for *flammable liquids* shall apply.

SECTION 5703 GENERAL REQUIREMENTS

5703.1 Electrical.

Electrical wiring and equipment shall be installed and maintained in accordance with Section 603 and NFPA 70.

5703.1.1 Classified locations for flammable liquids.

Areas where *flammable liquids* are stored, handled, dispensed or mixed shall be in accordance with Table 5703.1.1. A classified area shall not extend beyond an unpierced floor, roof or other solid partition.

The extent of the classified area is allowed to be reduced, or eliminated, where sufficient technical justification is provided to the *fire code official* that a concentration in the area in excess of 25 percent of the lower flammable limit (LFL) cannot be generated.

TABLE 5703.1.1 CLASS I ELECTRICAL EQUIPMENT LOCATIONS[a]

LOCATION	GROUP D DIVISION	EXTENT OF CLASSIFIED AREA
Underground tank fill opening	1	Pits, boxes or spaces below grade level, any part of which is within the Division 1 or 2 classified area.
	2	Up to 18 inches above grade level within a horizontal radius of 10 feet from a loose-fill connection and within a horizontal radius of 5 feet from a tight-fill connection.
Vent—Discharging upward	1	Within 3 feet of open end of vent, extending in all directions.
	2	Area between 3 feet and 5 feet of open end of vent, extending in all directions.
Drum and container filling		
Outdoor or indoor with adequate ventilation	1	Within 3 feet of vent and fill opening, extending in all directions.
	2	Area between 3 feet and 5 feet from vent of fill opening, extending in all directions. Also up to 18 inches above floor or grade level within a horizontal radius of 10 feet from vent or fill opening.
Pumps, bleeders, withdrawal fittings, meters and similar devices		
Indoor	2	Within 5 feet of any edge of such devices, extending in all directions, and up to 3 feet above floor or grade level within 25 feet horizontally from any edge of such devices.
Outdoor	2	Within 3 feet of any edge of such devices, extending in all directions, and up to 18 inches above floor or grade level within 10 feet horizontally from an edge of such devices.
Pits		
Without mechanical ventilation	1	Entire area within pit if any part is within a Division 1 or 2 classified area.
With mechanical ventilation	2	Entire area within pit if any part is within a Division 1 or 2 classified area.
Containing valves, fittings or piping, and not within a Division 1 or 2 classified area	2	Entire pit.
Drainage ditches, separators, impounding basins		
Indoor	1 or 2	Same as pits.
Outdoor	2	Area up to 18 inches above ditch, separator or basin, and up to 18 inches above grade within 15 feet horizontal from any edge.
Tank vehicle and tank car[b]		
Loading through open dome	1	Within 3 feet of edge of dome, extending in all directions.
	2	Area between 3 feet and 15 feet from edge of dome, extending in all directions.
Loading through bottom connections with atmospheric venting	1	Within 3 feet of point of venting to atmosphere, extending in all directions.
	2	Area between 3 feet and 15 feet from point of venting to atmosphere, extending in all directions. Also up to 18 inches above grade within a horizontal radius of 10 feet from point of loading connection.
Loading through closed dome with atmospheric venting	1	Within 3 feet of open end of vent, extending in all directions.
	2	Area between 3 feet and 15 feet from open end of vent, extending in all directions, and within 3 feet of edge of dome, extending in all directions.
Loading through closed dome with vapor control	2	Within 3 feet of point of connection of both fill and vapor lines, extending in all directions.
Bottom loading with vapor control or any bottom unloading	2	Within 3 feet of point of connection, extending in all directions, and up to 18 inches above grade within a horizontal radius of 10 feet from point of connection.

LOCATION	GROUP D DIVISION	EXTENT OF CLASSIFIED AREA
Storage and repair garage for tank vehicles	1	Pits or spaces below floor level.
	2	Area up to 18 inches above floor or grade level for entire storage or repair garage.
Garages for other than tank vehicles	Ordinary	Where there is an opening to these rooms within the extent of an outdoor classified area, the entire room shall be classified the same as the area classification at the point of the opening.
Outdoor drum storage	Ordinary	—
Indoor warehousing where there is no flammable liquid transfer	Ordinary	Where there is an opening to these rooms within the extent of an indoor classified area, the room shall be classified the same as if the wall, curb or partition did not exist.
Indoor equipment where flammable vapor/air mixtures could exist under normal operations	1	Area within 5 feet of any edge of such equipment, extending in all directions.
	2	Area within 5 feet of any edge of such equipment, extending in all directions. Area between 5 feet and 8 feet of any edge of such equipment, extending in all directions, and the area up to 3 feet above floor or grade level within 5 feet to 25 feet horizontally from any edge of such equipment.[c]
Outdoor equipment where flammable vapor/air mixtures could exist under normal operations	1	Area within 3 feet of any edge of such equipment, extending in all directions.
	2	Area between 3 feet and 8 feet of any edge of such equipment extending in all directions, and the area up to 3 feet above floor or grade level within 3 feet to 10 feet horizontally from any edge of such equipment.
Tank—Above ground		
Shell, ends or roof and dike area	1	Area inside dike where dike height is greater than the distance from the tank to the dike for more than 50 percent of the tank circumference.
	2	Area within 10 feet from shell, ends or roof of tank. Area inside dikes to level of top of dike.
Vent	1	Area within 5 feet of open end of vent, extending in all directions.
	2	Area between 5 feet and 10 feet from open end of vent, extending in all directions.
Floating roof	1	Area above the roof and within the shell.
Office and restrooms	Ordinary	Where there is an opening to these rooms within the extent of an indoor classified location, the room shall be classified the same as if the wall, curb or partition did not exist.

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm.

a. Locations as classified in NFPA 70.

b. When classifying extent of area, consideration shall be given to the fact that tank cars or tank vehicles can be spotted at varying points. Therefore, the extremities of the loading or unloading positions shall be used.

c. The release of Class I liquids can generate vapors to the extent that the entire building, and possibly a zone surrounding it, are considered a Class I, Division 2, location.

Revise as follows:

5703.1.2 Classified locations for combustible liquids.
Areas where Class II or III liquids are heated above their *flash points* shall have electrical installations in accordance with Section 5703.1.1.

Exception: Solvent distillation units in accordance with Section ~~5705.4~~ 5706.2.13.

5703.1.3 Other applications.
The *fire code official* is authorized to determine the extent of the Class I electrical equipment and wiring location where a condition is not specifically covered by these requirements or NFPA 70.

5703.2 Fire protection.
Fire protection for the storage, use, dispensing, mixing, handling and on-site transportation of *flammable* and *combustible liquids* shall be in accordance with this chapter and applicable sections of Chapter 9.

5703.2.1 Portable fire extinguishers and hose lines.
Portable fire extinguishers shall be provided in accordance with Section 906. Hose lines shall be provided in accordance with Section 905.

5703.3 Site assessment. In the event of a spill, leak or discharge from a tank system, a site assessment shall be completed by the *owner* or operator of such tank system if the *fire code official* determines that a potential fire or explosion hazard exists. Such site assessments shall be conducted to ascertain potential fire hazards and shall be completed and submitted to the fire department within a time period established by the *fire code official*, not to exceed 60 days.

Revise as follows:

~~5703.4 Spill control and secondary containment~~.

~~Where the *maximum allowable quantity per control area* is exceeded, and where required by Section 5004.2, rooms, buildings or areas used for storage, dispensing, use, mixing or handling of Class I, II and IIIA liquids shall be provided with spill control and secondary containment in accordance with Section 5004.2.~~

~~5703.5~~5703.4 Labeling and signage.

The *fire code official* is authorized to require warning signs for the purpose of identifying the hazards of storing or using *flammable liquids*. Signage for identification and warning such as for the inherent hazard of flammable liquids or smoking shall be provided in accordance with this chapter and Sections 5003.5 and 5003.6.

~~5703.5.1~~5703.4.1 Style. Warning signs shall be of a durable material. Signs warning of the hazard of *flammable liquids* shall have white lettering on a red background and shall read: "DANGER—FLAMMABLE LIQUIDS." Letters shall be not less than 3 inches (76 mm) in height and $^1/_2$ inch (12.7 mm) in stroke.

~~5703.5.2~~5703.4.2 Location.

Signs shall be posted in locations as required by the *fire code official*. Piping containing *flammable liquids* shall be identified in accordance with ASME A13.1.

~~5703.5.3~~5703.4.3 Warning labels. Individual containers, packages and cartons shall be identified, marked, labeled and placarded in accordance with federal regulations and applicable state laws.

~~5703.5.4~~5703.4.4 Identification. Color coding or other *approved* identification means shall be provided on each loading and unloading riser for *flammable* or *combustible liquids* to identify the contents of the tank served by the riser.

~~5703.6~~5703.5 Piping systems.

Piping systems, and their component parts, for *flammable* and *combustible liquids* shall be in accordance with Sections ~~5703.6.1~~ 5703.5.1 through ~~5703.6.11~~5703.5.11.

~~5703.6.1~~5703.5.1 Nonapplicability.

The provisions of Section ~~5703.6~~5703.5 shall not apply to gas or oil well installations; piping that is integral to stationary or portable engines, including aircraft, watercraft and motor vehicles; and piping in connection with boilers and pressure vessels regulated by the *International Mechanical Code*.

~~5703.6.2~~5703.5.2 Design and fabrication of piping systems and components.

Piping system components shall be designed and fabricated in accordance with the applicable standard listed in Table ~~5703.6.2~~ 5703.5.2 and Chapter 27 of NFPA 30, except as modified by Section ~~5703.6.2.1~~5703.5.2.1.

TABLE ~~5703.6.2~~5703.5.2 PIPING STANDARDS

PIPING USE	STANDARD
Power piping	ASME B31.1
Process piping	ASME B31.3
Pipeline transportation systems for liquid hydrocarbons and other liquids	ASME B31.4
Building services piping	ASME B31.9
Double containment piping	UL 971A, UL 1369

~~5703.6.2.1~~5703.5.2.1 Special materials.

Low-melting-point materials (such as aluminum, copper or brass), materials that soften on fire exposure (such as nonmetallic materials) and nonductile material (such as cast iron) shall be acceptable for use underground in accordance with the applicable standard listed in Table ~~5703.6.2~~5703.5.2. Where such materials are used outdoors in above-ground piping systems or within buildings, they shall be in accordance with the applicable standard listed in Table ~~5703.6.2~~5703.5.2 and one of the following:

1. Suitably protected against fire exposure.
2. Located where leakage from failure would not unduly expose people or structures.

3. Located where leakage can be readily controlled by operation of remotely located valves in a location provided with *ready access*.

In all cases, nonmetallic piping shall be used in accordance with Section 27.4.6 of NFPA 30.

~~5703.6.3~~5703.5.3 Testing.

Unless tested in accordance with the applicable section of ASME B31.9, piping, before being covered, enclosed or placed in use, shall be hydrostatically tested to 150 percent of the maximum anticipated pressure of the system, or pneumatically tested to 110 percent of the maximum anticipated pressure of the system, but not less than 5 pounds per square inch gauge (psig) (34.47 kPa) at the highest point of the system. This test shall be maintained for a sufficient time period to complete visual inspection of joints and connections. For not less than 10 minutes, there shall be no leakage or permanent distortion. Care shall be exercised to ensure that these pressures are not applied to vented storage tanks. Such storage tanks shall be tested independently from the piping.

~~5703.6.3.1~~5703.5.3.1 Existing piping. Existing piping shall be tested in accordance with this section where the *fire code official* has reasonable cause to believe that a leak exists. Piping that could contain flammable or *combustible liquids* shall not be tested pneumatically. Such tests shall be at the expense of the *owner* or operator.

Exception: Vapor-recovery piping is allowed to be tested using an inert gas.

~~5703.6.4~~5703.5.4 Protection from vehicles.

Guard posts or other *approved* means shall be provided to protect piping, valves or fittings subject to vehicular damage in accordance with Section 312.

~~5703.6.5~~5703.5.5 Protection from external corrosion and galvanic action. Where subject to external corrosion, piping, related fluid-handling components and supports for both underground and above-ground applications shall be fabricated from noncorrosive materials, and coated or provided with corrosion protection. Dissimilar metallic parts that promote galvanic action shall not be joined.

~~5703.6.6~~5703.5.6 Valves. Piping systems shall contain a sufficient number of manual control valves and check valves to operate the system properly and to protect the plant under both normal and emergency conditions. Piping systems in connection with pumps shall contain a sufficient number of such valves to control properly the flow of liquids in normal operation and in the event of physical damage or fire exposure.

~~5703.6.6.1~~5703.5.6.1 Backflow protections. Connections to pipelines or piping by which equipment (such as tank cars, tank vehicles or marine vessels) discharges liquids into storage tanks shall be provided with check valves or block valves for automatic protection against backflow where the piping arrangement is such that backflow from the system is possible. Where loading and unloading is done through a common pipe system, a check valve is not required. However, a block valve, located in an area where it is provided with *ready access* or remotely operable, shall be provided.

~~5703.6.6.2~~5703.5.6.2 Manual drainage. Manual drainage-control valves shall be located at *approved* locations remote from the tanks, diked area, drainage system and impounding basin to ensure their operation in a fire condition.

~~5703.6.7~~5703.5.7 Connections. Above-ground tanks with connections located below normal liquid level shall be provided with internal or external isolation valves located as close as practical to the shell of the tank. Except for liquids whose chemical characteristics are incompatible with steel, such valves, where external, and their connections to the tank shall be of steel.

~~5703.6.8~~5703.5.8 Piping supports. Piping systems shall be substantially supported and protected against physical damage and excessive stresses arising from settlement, vibration, expansion, contraction or exposure to fire. The supports shall be protected against exposure to fire by one of the following:

1. Draining liquid away from the piping system at a minimum slope of not less than 1 percent.
2. Providing protection with a *fire-resistance rating* of not less than 2 hours.
3. Other *approved* methods.

~~5703.6.9~~5703.5.9 **Flexible joints.** Flexible joints shall be *listed* and *approved* and shall be installed on underground liquid, vapor and vent piping at all of the following locations:

1. Where piping connects to underground tanks.
2. Where piping ends at pump islands and vent risers.
3. At points where differential movement in the piping can occur.

~~5703.6.9.1~~5703.5.9.1 **Fiberglass-reinforced plastic piping.** Fiberglass-reinforced plastic (FRP) piping is not required to be provided with flexible joints in locations where both of the following conditions are present:

1. Piping does not exceed 4 inches (102 mm) in diameter.
2. Piping has a straight run of not less than 4 feet (1219 mm) on one side of the connection where such connections result in a change of direction.

In lieu of the minimum 4-foot (1219 mm) straight run length, *approved* and *listed* flexible joints are allowed to be used under dispensers and suction pumps, at submerged pumps and tanks, and where vents extend above ground.

~~5703.6.10~~5703.5.10 **Pipe joints.**
Joints shall be liquid tight and shall be welded, flanged or threaded except that *listed* flexible connectors are allowed in accordance with Section ~~5703.6.9~~5703.5.9. Threaded or flanged joints shall fit tightly by using *approved* methods and materials for the type of joint. Joints in piping systems used for Class I liquids shall be welded where located in concealed spaces within buildings.
Nonmetallic joints shall be *approved* and shall be installed in accordance with the manufacturer's instructions.

Pipe joints that are dependent on the friction characteristics or resiliency of combustible materials for liquid tightness of piping shall not be used in buildings. Piping shall be secured to prevent disengagement at the fitting.

~~5703.6.11~~5703.5.11 **Bends.**
Pipe and tubing shall be bent in accordance with ASME B31.9.

SECTION 5704
STORAGE IN CONTAINERS AND PORTABLE TANKS

5704.1 General.
The storage of *flammable* and *combustible liquids* in containers and tanks shall be in accordance with this section and the applicable sections of Chapter 50. Storage of *flammable* and *combustible liquids* in closed containers not exceeding 60 gallons (227 L) in individual capacity and portable tanks not exceeding 660 gallons (2498 L) in individual capacity, and limited transfers incidental thereto, shall comply with applicable Sections of 5703 and Sections 5704.1.1 through 5704.4.8 as follows:

1. Storage in containers and portable tank storage shall comply with Sections 5704.1 through 5704.1.3.11.
2. Storage of quantities not exceeding the maximum allowable quantities for indoor storage per control area shall comply with the additional requirements in Sections 5704.2 through 5704.2.3.5.5.
3. Storage of quantities exceeding the maximum allowable quantities for indoor storage per control area shall comply with the additional requirements in Sections 5704.3 through 5704.3.2.5.
4. Outdoor storage of containers and portable tanks shall comply with Sections 5704.4 through 5704.4.8.

~~**5704.3 Container and portable tank storage.**~~

~~Storage of *flammable* and *combustible liquids* in closed containers that do not exceed 60 gallons (227 L) in individual capacity and portable tanks that do not exceed 660 gallons (2498 L) in individual capacity, and limited transfers incidental thereto, shall comply with Sections 5704.3.1 through 5704.3.8.5.~~

~~5704.3.1~~ 5704.1.1 **Design, construction and capacity of containers and portable tanks.**
The design, construction and capacity of containers for the storage of Class I, II and IIIA liquids shall be in accordance with this section

and Section 9.4 of NFPA 30.

~~5704.3.1.1~~ 5704.1.1.1 Approved containers. Only *approved* containers and portable tanks shall be used.

~~5704.3.2~~ 5704.1.2 Liquid storage cabinets.
Where other sections of this code require that liquid containers be stored in storage cabinets, such cabinets and storage shall be in accordance with Sections ~~5704.3.2.1~~ 5704.1.2.1 through ~~5704.3.2.2~~ 5704.1.2.2.

~~5704.3.2.1~~ 5704.1.2.1 Design and construction of storage cabinets.
Design and construction of liquid storage cabinets shall be in accordance with Sections ~~5704.3.2.1.1~~ 5704.1.2.1.1 through ~~5704.3.2.1.4~~ 5704.1.2.1.4.

~~5704.3.2.1.1~~ 5704.1.2.1.1 Materials.
Cabinets shall be *listed* in accordance with UL 1275, or constructed of *approved* wood or metal in accordance with the following:

1. Unlisted metal cabinets shall be constructed of steel having a thickness of not less than 0.044 inch (1.12 mm) (18 gage). The cabinet, including the door, shall be double walled with $1^1/_2$-inch (38 mm) airspace between the walls. Joints shall be riveted or welded and shall be tight fitting.
2. Unlisted wooden cabinets, including doors, shall be constructed of not less than 1-inch (25 mm) exterior grade plywood. Joints shall be rabbeted and shall be fastened in two directions with wood screws. Door hinges shall be of steel or brass. Cabinets shall be painted with an intumescent-type paint.

~~5704.3.2.1.2~~ 5704.1.2.1.2 Labeling. Cabinets shall be provided with a conspicuous label in red letters on contrasting background that reads: "FLAMMABLE—KEEP FIRE AWAY."

~~5704.3.2.1.3~~ 5704.1.2.1.3 Doors. Doors shall be well fitted, self-closing and equipped with a three-point latch.

~~5704.3.2.1.4~~ 5704.1.2.1.4 Bottom. The bottom of the cabinet shall be liquid tight to a height of not less than 2 inches (51 mm).

~~5704.3.2.2~~ 5704.1.2.2 Capacity. The combined total quantity of liquids in a cabinet shall not exceed 120 gallons (454 L).

~~5704.3.3~~ 5704.1.3 Indoor storage. Storage of *flammable* and *combustible liquids* inside buildings in containers and portable tanks shall be in accordance with Sections ~~5704.3.3.1~~ 5704.1.3.1 through ~~5704.3.3.10~~5704.1.3.11.

Exceptions:

1. Liquids in the fuel tanks of motor vehicles, aircraft, boats or portable or stationary engines.
2. The storage of distilled spirits and wines in wooden barrels or casks.

~~5704.3.3.1~~ 5704.1.3.1 Portable fire extinguishers.
Approved portable fire extinguishers shall be provided in accordance with specific sections of this chapter and Section 906.

~~5704.3.3.2~~ 5704.1.3.2 Incompatible materials.
Materials that will react with water or other liquids to produce a hazard shall not be stored in the same room with *flammable* and *combustible liquids* except where stored in accordance with Section 5003.9.8.

~~5704.3.3.3~~ 5704.1.3.3 Clear means of egress. Storage of any liquids, including stock for sale, shall not be stored near or be allowed to obstruct physically the route of egress.

~~5704.3.3.4~~5704.1.3.4 Empty containers or portable tank storage. The storage of empty tanks and containers previously used for the storage of *flammable* or *combustible liquids*, unless free from explosive vapors, shall be stored as required for filled containers and portable tanks. Portable tanks and containers, when emptied, shall have the covers or plugs immediately replaced in openings.

~~5704.3.3.5~~5704.1.3.5 Shelf storage.
Shelving shall be of *approved* construction, adequately braced and anchored. Seismic requirements shall be in accordance with the *International Building Code*.

~~5704.3.3.5.1~~5704.1.3.5.1 Use of wood. Wood of not less than 1 inch (25 mm) nominal thickness is allowed to be used as shelving, racks, dunnage, scuffboards, floor overlay and similar installations.

~~5704.3.3.5.2~~5704.1.3.5.2 Displacement protection. Shelves shall be of sufficient depth and provided with a lip or guard to prevent individual containers from being displaced.

Exception: Shelves in storage cabinets or on laboratory furniture specifically designed for such use.

~~5704.3.3.5.3~~5704.1.3.5.3 Orderly storage. Shelf storage of *flammable* and *combustible liquids* shall be maintained in an orderly manner.

~~5704.3.3.6~~5704.1.3.6 Rack storage. Where storage on racks is allowed elsewhere in this code, a minimum 4-foot-wide (1219 mm) aisle shall be provided between adjacent rack sections and any adjacent storage of liquids. Main aisles shall be not less than 8 feet (2438 mm) wide.

~~5704.3.3.7~~5704.1.3.7 Pile or palletized storage. Solid pile and palletized storage in liquid warehouses shall be arranged so that piles are separated from each other by not less than 4 feet (1219 mm). Aisles shall be provided and arranged so that containers or portable tanks are not more than 20 feet (6096 mm) from an aisle. Main aisles shall be not less than 8 feet (2438 mm) wide.

~~5704.3.3.8~~ 5704.1.3.8 Limited combustible storage.
Limited quantities of combustible commodities are allowed to be stored in liquid storage areas where the ordinary combustibles, other than those used for packaging the liquids, are separated from the liquids in storage by not less than 8 feet (2438 mm) horizontally, either by open aisles or by open racks, and where protection is provided in accordance with Chapter 9.

~~5704.3.3.9~~5704.1.3.9 Idle combustible pallets.
Storage of empty or idle combustible pallets inside an unprotected liquid storage area shall be limited to a maximum pile size of 2,500 square feet (232 m^2) and to a maximum storage height of 6 feet (1829 mm). Storage of empty or idle combustible pallets inside a protected liquid storage area shall comply with NFPA 13. Pallet storage shall be separated from liquid storage by aisles that are not less than 8 feet (2438 mm) wide.

~~5704.3.3.10~~5704.1.3.10 Containers in piles. Containers in piles shall be stacked in such a manner as to provide stability and to prevent excessive stress on container walls. Portable tanks stored more than one tier high shall be designed to nest securely, without dunnage. Material-handling equipment shall be suitable to handle containers and tanks safely at the upper tier level.

~~5704.3.4.4~~5704.1.3.11 Liquids for maintenance and operation of equipment.
In all occupancies, quantities of *flammable* and *combustible liquids* in excess of 10 gallons (38 L) used for maintenance purposes and the operation of equipment shall be stored in liquid storage cabinets in accordance with Section ~~5704.3.2~~ 5704.1.2. Quantities not exceeding 10 gallons (38 L) are allowed to be stored outside of a cabinet where in *approved* containers located in private garages or other *approved* locations.

~~5704.3.4~~5704.2 ~~Quantity limits for storage~~ Indoor storage of quantities not exceeding the maximum allowable quantity per control area.
~~Liquids storage quantity limitations~~
Indoor storage of quantities not exceeding the maximum allowable quantity per control area shall comply with Sections ~~5704.3.4.1~~ 5704.2.1 through ~~5704.3.4.4~~ 5704.3.4.2.4.

~~5704.3.4.1~~5704.2.1 Maximum allowable quantity per control area. For occupancies other than Group M wholesale and retail sales uses, indoor storage of *flammable* and *combustible liquids* shall not exceed the *maximum allowable quantities per control area* indicated in Table 5003.1.1(1) and shall not exceed the additional limitations set forth in this section.For Group M occupancy wholesale and retail sales uses, indoor storage of *flammable* and *combustible liquids* shall not exceed the *maximum allowable quantities per control area* indicated in Table ~~5704.3.4.1~~5704.2.1.

Storage of hazardous production material *flammable* and *combustible liquids* in Group H-5 occupancies shall be in accordance with Chapter 27.

TABLE ~~5704.3.4.1~~5704.2.1 MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN WHOLESALE AND RETAIL SALES OCCUPANCIES[a]

TYPE OF LIQUID	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA (gallons)		
	Sprinklered[b] in accordance with footnote densities and arrangements	Sprinklered in accordance with Tables 5704.3.6.3(4) through 5704.3.6.3(8) and Table 5704.3.7.5.1	Nonsprinklered
Class IA	60	60	30
Class IB, IC, II and IIIA	7,500[c]	15,000[c]	1,600
Class IIIB	Unlimited	Unlimited	13,200

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 gallon = 3.785 L, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. Control areas shall be separated from each other by not less than a 1-hour fire barrier.

b. To be considered as sprinklered, a building shall be equipped throughout with an *approved* automatic sprinkler system with a design providing minimum densities as follows:

   1. For uncartoned commodities on shelves 6 feet or less in height where the ceiling height does not exceed 18 feet, quantities are those allowed with a minimum sprinkler design density of Ordinary Hazard Group 2.

   2. For cartoned, palletized or racked commodities where storage is 4 feet 6 inches or less in height and where the ceiling height does not exceed 18 feet, quantities are those allowed with a minimum sprinkler design density of 0.21 gallon per minute per square foot over the most remote 1,500-square-foot area.

c. Where wholesale and retail sales or 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. A control area separation is not required. The cumulative amounts, including amounts attained by having an additional control area, shall not exceed 30,000 gallons.

~~5704.3.4.2~~5704.2.2 Occupancy quantity limits.

The following limits for quantities of stored *flammable* or *combustible liquids* shall not be exceeded:

1. Group A occupancies: Quantities in Group A occupancies shall not exceed that necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
2. Group B occupancies: Quantities in drinking, dining, office and school uses within Group B occupancies shall not exceed that necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
3. Group E occupancies: Quantities in Group E occupancies shall not exceed that necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
4. Group F occupancies: Quantities in dining, office, and school uses within Group F occupancies shall not exceed that necessary for demonstration, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
5. Group I occupancies: Quantities in Group I occupancies shall not exceed that necessary for demonstration, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
6. Group M occupancies: Quantities in dining, office, and school uses within Group M occupancies shall not exceed that necessary for demonstration, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1). The maximum allowable quantities for storage in wholesale and retail sales areas shall be in accordance with Section ~~5704.3.4.1~~5704.2.1.

7. Group R occupancies: Quantities in Group R occupancies shall not exceed that necessary for maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
8. Group S occupancies: Quantities in dining and office uses within Group S occupancies shall not exceed that necessary for demonstration, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).

~~5704.3.5~~5704.2.3 Storage in control areas.
Storage of *flammable* and *combustible liquids* in *control areas* shall be in accordance with Sections ~~5704.3.5.1~~5704.2.3.1 through ~~5704.3.5.4~~5704.2.3.4.

~~5704.3.5.1~~5704.2.3.1 Basement storage.
Class I liquids shall be allowed to be stored in *basements* in amounts not exceeding the *maximum allowable quantity per control area* for use-*open systems* in Table 5003.1.1(1), provided that *fire protection systems* are provided in accordance with Chapter 9. Class II and IIIA liquids shall be allowed to be stored in *basements*, provided that automatic suppression and other fire protection are provided in accordance with Chapter 9.

~~5704.3.5.2~~5704.2.3.2 Storage pile heights. Containers having less than a 30-gallon (114 L) capacity that contain Class I or II liquids shall not be stacked more than 3 feet (914.4 mm) or two containers high, whichever is greater, unless stacked on fixed shelving or otherwise satisfactorily secured. Containers of Class I or II liquids having a capacity of 30 gallons (114 L) or more shall not be stored more than one container high. Containers shall be stored in an upright position.

~~5704.3.5.3~~5704.2.3.3 Storage distance from ceilings and roofs. Piles of containers or portable tanks shall not be stored closer than 3 feet (914 mm) to the nearest beam, chord, girder or other obstruction, and shall be 3 feet (914 mm) below sprinkler deflectors or discharge orifices of water spray or other overhead *fire protection system*.

~~5704.3.5.4~~5704.2.3.4 Combustible materials. In areas that are not open to the public, Class I, II and IIIA liquids shall not be stored in the same pile or rack section as ordinary combustible commodities unless such materials are packaged together as kits.

~~5704.3.6~~5704.2.3.5 Wholesale and retail sales uses.
Flammable and *combustible liquids* in Group M occupancy wholesale and retail sales uses shall be in accordance with Sections ~~5704.3.6.1~~ 5704.2.3.5.1 through ~~5704.3.6.5~~ 5704.2.3.5.5, or Sections 10.10.2, 12.3.6, 16.4.1 through 16.4.3, 16.5.1 through 16.5.2.12, Figures 16.4.1(a) through 16.4.1(c) and Tables 16.5.2.1 through 16.5.2.12, of NFPA 30.

~~5704.3.6.1~~5704.2.3.5.1 Container type. Containers for Class I liquids shall be metal.

> **Exception:** In sprinklered buildings, an aggregate quantity of 120 gallons (454 L) of water-miscible Class IB and Class IC liquids is allowed in nonmetallic containers, each having a capacity of 16 ounces (0.473 L) or less.

~~5704.3.6.2~~5704.2.3.5.2 Container capacity.
Containers for Class I liquids shall not exceed a capacity of 5 gallons (19 L).

> **Exception:** Metal containers not exceeding 55 gallons (208 L) are allowed to store up to 240 gallons (908 L) of the *maximum allowable quantity per control area* of Class IB and IC liquids in a *control area*. The building shall be equipped throughout with an *approved automatic sprinkler system* in accordance with Table ~~5704.3.4.1~~5704.2.1. The containers shall be provided with plastic caps without cap seals and shall be stored upright. Containers shall not be stacked or stored in racks and shall not be located in areas open to the public.

~~5704.3.6.3~~5704.2.3.5.3 Fire protection and storage arrangements. Fire protection and container storage arrangements shall be in accordance with Table ~~5704.3.6.3(1)~~5704.2.3.5.3(1) or the following:

1. Storage on shelves shall not exceed 6 feet (1829 mm) in height, and shelving shall be metal.

2. Storage on pallets or in piles greater than 4 feet 6 inches (1372 mm) in height, or where the ceiling exceeds 18 feet (5486 mm) in height, shall be protected in accordance with Table ~~5704.3.6.3(4)~~5704.2.3.5.3(4), and the storage heights and arrangements shall be limited to those specified in Table ~~5704.3.6.3(2)~~5704.2.3.5.3(2).
3. Storage on racks greater than 4 feet 6 inches (1372 mm) in height, or where the ceiling exceeds 18 feet (5486 mm) in height shall be protected in accordance with Tables 5704.3.6.3(5), ~~5704.3.6.3(6)~~5704.2.3.5.3(6), and ~~5704.3.6.3(7)~~5704.2.3.5.3(7) as appropriate, and the storage heights and arrangements shall be limited to those specified in Table ~~5704.3.6.3(3)~~5704.2.3.5.3(3).

Combustible commodities shall not be stored above *flammable* and *combustible liquids*.

TABLE ~~5704.3.6.3(1)~~ 5704.2.3.5.3(1) MAXIMUM STORAGE HEIGHT IN CONTROL AREA

TYPE OF LIQUID	NONSPRINKLERED AREA (feet)	SPRINKLERED AREA[a] (feet)	SPRINKLERED WITH IN-RACK PROTECTION[a, b] (feet)
Flammable liquids:			
Class IA	4	4	4
Class IB	4	8	12
Class IC	4	8	12
Combustible liquids:			
Class II	6	8	12
Class IIIA	8	12	16
Class IIIB	8	12	20

For SI: 1 foot = 304.8 mm.

a In buildings protected by an automatic sprinkler system, the storage height for containers and portable tanks shall not exceed the maximum storage height permitted for the fire protection scheme set forth in NFPA 30 or the maximum storage height demonstrated in a full-scale fire test, whichever is greater. NFPA 30 criteria and fire test results for metallic containers and portable tanks shall not be applied to nonmetallic containers and portable tanks.

b. In-rack protection shall be in accordance with Table ~~5704.3.6.3(5)~~5704.2.3.5.3(5), ~~5704.3.6.3(6)~~5704.2.3.5.3(6) or ~~5704.3.6.3(7)~~5704.2.3.5.3(7).

TABLE ~~5704.3.6.3(2)~~ 5704.2.3.5.3(2) STORAGE ARRANGEMENTS FOR PALLETIZED OR SOLID-PILE STORAGE IN LIQUID STORAGE ROOMS AND WAREHOUSES

CLASS	STORAGE LEVEL	MAXIMUM STORAGE HEIGHT			MAXIMUM QUANTITY PER PILE (gallons)		MAXIMUM QUANTITY PER ROOM[a] (gallons)	
		Drums	Containers[b] (feet)	Portable tanks[b] (feet)	Containers	Portable tanks	Containers	Portable tanks
IA	Ground floor	1	5	Not Allowed	3,000	Not Allowed	12,000	Not Allowed
	Upper floors	1	5	Not Allowed	2,000	Not Allowed	8,000	Not Allowed
	Basements	0	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
IB	Ground floor	1	6.5	7	5,000	20,000	15,000	40,000
	Upper floors	1	6.5	7	3,000	10,000	12,000	20,000
	Basements	0	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
IC	Ground floor[d]	1	6.5[c]	7	5,000	20,000	15,000	40,000
	Upper floors	1	6.5[c]	7	3,000	10,000	12,000	20,000
	Basements	0	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed	Not Allowed
II	Ground floor[d]	3	10	14	10,000	40,000	25,000	80,000
	Upper floors	3	10	14	10,000	40,000	25,000	80,000
	Basements	1	5	7	7,500	20,000	7,500	20,000
III	Ground floor	5	20	14	15,000	60,000	50,000	100,000
	Upper floors	5	20	14	15,000	60,000	50,000	100,000
	Basements	3	10	7	10,000	20,000	25,000	40,000

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

a. See Section ~~5704.3.8.1~~5704.3.2.1 for unlimited quantities in liquid storage warehouses.

b. In buildings protected by an automatic sprinkler system, the storage height for containers and portable tanks shall not exceed the maximum storage height permitted for the fire protection scheme set forth in NFPA 30 or the maximum storage height demonstrated in a full-scale fire test, whichever is greater. NFPA 30 criteria and fire test results for metallic containers and portable tanks shall not be applied to nonmetallic containers and portable tanks.

c. These height limitations are allowed to be increased to 10 feet for containers having a capacity of 5 gallons or less.

d. For palletized storage of unsaturated polyester resins (UPR) in relieving-style metal containers with 50 percent or less by weight Class IC or II liquid and no Class IA or IB liquid, height and pile quantity limits shall be permitted to be 10 feet and 15,000 gallons, respectively, provided that such storage is protected by sprinklers in accordance with NFPA 30 and that the UPR storage area is not located in the same containment area or drainage path for other Class I or II liquids.

TABLE ~~5704.3.6.3(3)~~ 5704.2.3.5.3(3) STORAGE ARRANGEMENTS FOR RACK STORAGE IN LIQUID STORAGE ROOMS AND WAREHOUSES

CLASS	TYPE RACK	STORAGE LEVEL	MAXIMUM STORAGE HEIGHT[b] (feet) Containers	MAXIMUM QUANTITY PER ROOM[a] (gallons) Containers
IA	Double row or Single row	Ground floor	25	7,500
		Upper floors	15	4,500
		Basements	Not Allowed	Not Allowed
IB IC	Double row or Single row	Ground floor	25	15,000
		Upper floors	15	9,000
		Basements	Not Allowed	Not Allowed
II	Double row or Single row	Ground floor	25	24,000
		Upper floors	25	24,000
		Basements	15	9,000
III	Multirow	Ground floor	40	48,000
	Double row	Upper floors	20	48,000
	Single row	Basements	20	24,000

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

a. See Section ~~5704.3.8.1~~5704.3.2.1 for unlimited quantities in liquid storage warehouses.

b. In buildings protected by an automatic sprinkler system, the storage height for containers and portable tanks shall not exceed the maximum storage height permitted for the fire protection scheme set forth in NFPA 30 or the maximum storage height demonstrated in a full-scale fire test, whichever is greater. NFPA 30 criteria and fire test results for metallic containers and portable tanks shall not be applied to nonmetallic containers and portable tanks.

TABLE ~~5704.3.6.3(4)~~ 5704.2.3.5.3(4) AUTOMATIC SPRINKLER PROTECTION FOR SOLID-PILE AND PALLETIZED STORAGE OF LIQUIDS IN METAL CONTAINERS AND PORTABLE TANKS[a]

STORAGE CONDITIONS		CEILING SPRINKLER DESIGN AND DEMAND				MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLERS AND HOSE STREAMS (hours)
			Area (square feet)		Maximum spacing (square feet)		
Class liquid	Container size and arrangement	Density (gpm/ft^2)	High-temperature sprinklers	Ordinary temperature sprinklers			
IA	5 gallons or less, with or without cartons, palletized or solid pile[b]	0.30	3,000	5,000	100	750	2
	Containers greater than 5 gallons, on end or side, palletized or solid pile	0.60	5,000	8,000	80	750	
IB, IC and II	5 gallons or less, with or without cartons, palletized or solid pile[b]	0.30	3,000	5,000	100	500	2
	Containers greater than 5 gallons on pallets or solid pile, one high	0.25	5,000	8,000	100		
II	Containers greater than 5 gallons on pallets or solid pile, more than one high, on end or side	0.60	5,000	8,000	80	750	2
IB, IC and II	Portable tanks, one high	0.30	3,000	5,000	100	500	2
II	Portable tanks, two high	0.60	5,000	8,000	80	750	2
III	5 gallons or less, with or without cartons, palletized or solid pile	0.25	3,000	5,000	120	500	1

	STORAGE CONDITIONS	CEILING SPRINKLER DESIGN AND DEMAND					
			Area (square feet)				
Class liquid	Container size and arrangement	Density (gpm/ft)	High-temperature sprinklers	Ordinary temperature sprinklers	Maximum spacing (square feet)	MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLERS AND HOSE STREAMS (hours)
	Containers greater than 5 gallons on pallets or solid pile, on end or sides, up to three high	0.25	3,000	5,000	120	500	1
	Containers greater than 5 gallons, on pallets or solid pile, on end or sides, up to 18 feet high	0.35	3,000	5,000	100	750	2
	Portable tanks, one high	0.25	3,000	5,000	120	500	1
	Portable tanks, two high	0.50	3,000	5,000	80	750	2

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L, 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. The design area contemplates the use of Class II standpipe systems. Where Class I standpipe systems are used, the area of application shall be increased by 30 percent without revising density.

b. For storage heights above 4 feet or ceiling heights greater than 18 feet, an *approved* engineering design shall be provided in accordance with Section 104.2.2.

TABLE ~~5704.3.6.3(5)~~ 5704.2.3.5.3(5) AUTOMATIC SPRINKLER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN METAL CONTAINERS OF 5-GALLON CAPACITY OR LESS WITH OR WITHOUT CARTONS ON CONVENTIONAL WOOD PALLETS[a]

	~~CEILING SPRINKLER DESIGN AND DEMAND~~			~~IN-RACK SPRINKLER ARRANGEMENT AND DEMAND~~						
	CEILING SPRINKLER DESIGN AND DEMAND				IN-RACK SPRINKLER ARRANGEMENT AND DEMAND					
		Area (square feet)								
CLASS LIQUID	Density (gpm/ft^2)	High-temperature sprinklers	Ordinary temperature sprinklers	Maximum spacing	Racks up to 9 feet deep	Racks more than 9 feet to 12 feet deep	30 psi (standard orifice) 14 psi (large orifice)	Number of sprinklers operating	MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLER AND HOSE STREAM (hours)
I (maximum 25-foot height) Option 1	0.40	3,000	5,000	80 ft^2/head	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. One line sprinklers above each level of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. One line sprinklers above each level of storage 3. Locate in transverse flue spaces, staggered vertical and within 20 inches of aisle 4. Shields required where multiple-level	30 psi (0.5-inch orifice)	1. Eight sprinklers if only one level 2. Six sprinklers each on two levels if only two levels 3. Six sprinklers each on top three levels, if three or more levels 4. Hydraulically most remote	750	2
I (maximum 25-foot height) Option 2	0.55	2,000[b]	Not Applicable	100 ft^2/head	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. See 2 above 3. See 3 above 4. See 4 above	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. See 2 above 3. See 3 above 4. See 4 above	14 psi (0.53-inch orifice)	See 1 through 4 above	500	2
I and II (maximum 14-foot storage height) (maximum three tiers)	0.55[c]	2,000[d]	Not Applicable	100 ft^2/head	Not Applicable None for maximum 6-foot-deep racks	Not Applicable	Not Applicable	Not Applicable	500	2

CLASS LIQUID	~~CEILING SPRINKLER DESIGN AND DEMAND~~ CEILING SPRINKLER DESIGN AND DEMAND				~~IN-RACK SPRINKLER ARRANGEMENT AND DEMAND~~ IN-RACK SPRINKLER ARRANGEMENT AND DEMAND				MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLER AND HOSE STREAM (hours)
	Density (gpm/ft)	Area (square feet) High-temperature sprinklers	Area (square feet) Ordinary temperature sprinklers	Maximum spacing	Racks up to 9 feet deep	Racks more than 9 feet to 12 feet deep	30 psi (standard orifice) 14 psi (large orifice)	Number of sprinklers operating		
II (maximum 25-foot height)	0.30	3,000	5,000	100 ft^2/head	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. One line sprinklers between levels at nearest 10-foot vertical intervals 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. Two lines between levels at nearest 10-foot vertical intervals 3. Locate in transverse flue spaces, staggered vertical and within 20 inches of aisle 4. Shields required where multiple-level	30 psi	Hydraulically most remote—six sprinklers at each level, up to a maximum of three levels	750	2
III (40-foot height)	0.25	3,000	5,000	120 ft^2/head	Same as for Class II liquids	Same as for Class II liquids	30 psi	Same as for Class II liquids	500	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. The design area contemplates the use of Class II standpipe systems. Where Class I standpipe systems are used, the area of application shall be increased by 30 percent without revising density.

b. Using listed or approved extra-large orifices, high-temperature quick-response or standard element sprinklers under a maximum 30-foot ceiling with minimum 7.5-foot aisles.

c. For friction lid cans and other metal containers equipped with plastic nozzles or caps, the density shall be increased to 0.65 gpm per square foot using listed or approved extra-large orifice, high-temperature quick-response sprinklers.

d. Using listed or approved extra-large orifice, high-temperature quick-response or standard element sprinklers under a maximum 18-foot ceiling with minimum 7.5-foot aisles and metal containers.

TABLE ~~5704.3.6.3(6)~~ 5704.2.3.5.3(6) AUTOMATIC SPRINKLER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN METAL CONTAINERS GREATER THAN 5-GALLON CAPACITY[a]

CLASS LIQUID	~~CEILING SPRINKLER DESIGN AND DEMAND~~ CEILING SPRINKLER DESIGN AND DEMAND				~~IN-RACK SPRINKLER ARRANGEMENT AND DEMAND~~ IN-RACK SPRINKLER ARRANGEMENT AND DEMAND				MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLER AND HOSE STREAM (hours)
	Density (gpm/ft^2)	Area (square feet) High-temperature sprinklers	Area (square feet) Ordinary temperature sprinklers	Maximum spacing	On-side storage racks up to 9-foot-deep racks	On-end storage (on pallets) up to 9-foot-deep racks	Minimum nozzle pressure	Number of sprinklers operating		
IA (maximum 25-foot height)	0.60	3,000	5,000	80 ft^2/head	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. One line sprinklers above each tier of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. One line sprinklers above each tier of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	30 psi	Hydraulically most remote—six sprinklers at each level	1,000	2

CLASS LIQUID	~~CEILING SPRINKLER DESIGN AND DEMAND~~			~~IN-RACK SPRINKLER ARRANGEMENT AND DEMAND~~					MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLER AND HOSE STREAM (hours)
	CEILING SPRINKLER DESIGN AND DEMAND				IN-RACK SPRINKLER ARRANGEMENT AND DEMAND					
	Density (gpm/ft)	Area (square feet) High-temperature sprinklers	Area (square feet) Ordinary temperature sprinklers	Maximum spacing	On-side storage racks up to 9-foot-deep racks	On-end storage (on pallets) up to 9-foot-deep racks	Minimum nozzle pressure	Number of sprinklers operating		
IB, IC and II (maximum 25-foot height)	0.60	3,000	5,000	100 ft^2/head	1. See 1 above 2. One line sprinklers every three tiers of storage 3. See 3 above 4. See 4 above	1. See 1 above 2. See 2 above 3. See 3 above 4. See 4 above	30 psi	Hydraulically most remote—six sprinklers at each level	750	2
III (maximum 40-foot height)	0.25	3,000	5,000	120 ft^2/head	1. See 1 above 2. One line sprinklers every sixth level (maximum) 3. See 3 above 4. See 4 above	1. See 1 above 2. One line sprinklers every third level (maximum) 3. See 3 above 4. See 4 above	15 psi	Hydraulically most remote—six sprinklers at each level	500	1

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. The design assumes the use of Class II standpipe systems. Where a Class I standpipe system is used, the area of application shall be increased by 30 percent without revising density.

TABLE ~~5704.3.6.3(7)~~ 5704.2.3.5.3(7) AUTOMATIC AFFF WATER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN METAL CONTAINERS GREATER THAN 5-GALLON CAPACITY[a, b]

CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND			IN-RACK SPRINKLER ARRANGEMENT AND DEMAND[c]				DURATION AFFF SUPPLY (minimum)	DURATION WATER SUPPLY (hours)
	Density (gpm/ft^2)	Area (square feet) High-temperature sprinklers	Area (square feet) Ordinary temperature sprinklers	On-end storage of drumson pallets, up to 25 feet	Minimum nozzle pressure (psi)	Number of sprinklers operating	Hose stream demand[d] (gpm)		
IA, IB, IC and II	0.30	1,500	2,500	1. Ordinary temperature sprinkler up to 10 feet apart horizontally 2. One line sprinklers above each level of storage 3. Locate in longitudinal flue space, staggered vertically 4. Shields required for multiple-level	30	Three sprinklers per level	500	15	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. System shall be a closed-head wet system with approved devices for proportioning aqueous film-forming foam.

b. Except as modified herein, in-rack sprinklers shall be installed in accordance with NFPA 13.

c. The height of storage shall not exceed 25 feet.

d. Hose stream demand includes $1^1/_2$-inch inside hose connections, where required.

TABLE ~~5704.3.6.3(8)~~ 5704.2.3.5.3(8) AUTOMATIC SPRINKLER PROTECTION REQUIREMENTS FOR CLASS I LIQUID STORAGE IN METAL CONTAINERS OF 1-GALLON CAPACITY OR LESS WITH UNCARTONED OR CASE-CUT SHELF DISPLAY UP TO 6.5 FEET, AND PALLETIZED STORAGE ABOVE IN A DOUBLE-ROW RACK ARRAY[a]

STORAGE HEIGHT	CEILING SPRINKLER DESIGN AND DEMAND: Density (gpm/ft^2)	Area (square feet): High temperature	Area (square feet): Ordinary temperature	Maximum spacing	IN-RACK SPRINKLER ARRANGEMENT AND DEMAND: Racks up to 9 feet deep	Racks 9 to 12 feet	Minimum nozzle pressure	Number of sprinklers operating	MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLERS AND HOSE STREAM (hours)
Maximum 20-foot storage height	0.60	2,000[b]	Not Applicable	100 ft^2/head	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. One line of sprinklers at the 6-foot level and the 11.5-foot level of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	Not Applicable	30 psi (standard orifice) or 14 psi (large orifice)	1. Six sprinklers each on two levels 2. Hydraulically most remote 12 sprinklers	500	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. This table shall not apply to racks with solid shelves.

b. Using extra-large orifice sprinklers under a ceiling 30 feet or less in height. Minimum aisle width is 7.5 feet.

~~5704.3.6.4~~5704.2.3.5.4 **Warning for containers.** Cans, containers and vessels containing *flammable liquids* or *flammable liquid* compounds or mixtures offered for sale shall be provided with a warning indicator, painted or printed on the container and stating that the liquid is flammable, and shall be kept away from heat and an open flame.

~~5704.3.6.5~~5704.2.3.5.5 Storage plan.

Where required by ~~fire~~ the fire code official, *aisle* and storage plans shall be submitted in accordance with Chapter 50.

~~5704.3.4.3~~5704.3 ~~Quantities exceeding limits for control areas~~Indoor storage of quantities exceeding the maximum allowable quantity per control area.

Quantities exceeding ~~those~~ the limits allowed in *control areas* set forth in Section ~~5704.3.4.1~~5704.2.1 shall be in liquid storage rooms or liquid storage warehouses in accordance with Sections ~~5704.3.7~~5704.3.1 and ~~5704.3.8~~5704.3.2.

~~5704.3.7~~ 5704.3.1 Liquid storage rooms.

Liquid storage rooms shall comply with Sections ~~5704.3.7.1~~5704.3.1.1 through ~~5704.3.7.5.2~~5704.3.1.6.

~~5704.3.7.1~~ 5704.3.1.1 General.

Quantities of liquids exceeding those set forth in Section ~~5704.3.4.1~~5704.2.1 for storage in *control areas* shall be stored in a liquid storage room complying with this section and constructed and separated as required by the *International Building Code*.

~~5704.3.7.2~~ 5704.3.1.2 Quantities and arrangement of storage.

The quantity limits and storage arrangements in liquid storage rooms shall be in accordance with Tables ~~5704.3.6.3(2)~~5704.2.3.5.3(2) and ~~5704.3.6.3(3)~~5704.2.3.5.3(3) and Sections ~~5704.3.7.2.1~~5704.3.1.2.1 through ~~5704.3.7.2.3~~5704.3.1.2.3.

~~5704.3.7.2.1~~ 5704.3.1.2.1 Mixed storage.

Where two or more classes of liquids are stored in a pile or rack section, both of the following shall apply:

1. The quantity in that pile or rack shall not exceed the smallest of the maximum quantities for the classes of liquids stored in accordance with Table ~~5704.3.6.3(2)~~5704.2.3.5.3(2) or ~~5704.3.6.3(3)~~5704.2.3.5.3(3).
2. The height of storage in that pile or rack shall not exceed the smallest of the maximum heights for the classes of liquids stored in accordance with Table ~~5704.3.6.3(2)~~5704.2.3.5.3(2) or ~~5704.3.6.3(3)~~5704.2.3.5.3(3).

~~5704.3.7.2.2~~ 5704.3.1.2.2 **Separation and aisles.** Piles shall be separated from each other by not less than 4-foot (1219 mm) aisles. Aisles shall be provided so that all containers are 20 feet (6096 mm) or less from an aisle. Where the storage of liquids is on racks, a

minimum 4-foot-wide (1219 mm) aisle shall be provided between adjacent rows of racks and adjacent storage of liquids. Main aisles shall be not less than 8 feet (2438 mm) wide.
Additional aisles shall be provided for access to doors, required windows and ventilation openings, standpipe connections, mechanical equipment and switches. Such aisles shall be not less than 3 feet (914 mm) in width, unless greater widths are required for separation of piles or racks, in which case the greater width shall be provided.

~~5704.3.7.2.3~~ 5704.3.1.2.3 Stabilizing and supports.
Containers and piles shall be separated by pallets or dunnage to provide stability and to prevent excessive stress to container walls. Portable tanks stored over one tier shall be designed to nest securely without dunnage.
Requirements for portable tank design shall be in accordance with Chapters 9 and 12 of NFPA 30. Shelving, racks, dunnage, scuffboards, floor overlay and similar installations shall be of noncombustible construction or of wood not less than a 1-inch (25 mm) nominal thickness. Adequate material-handling equipment shall be available to handle tanks safely at upper tier levels.

~~5704.3.7.3~~ 5704.3.1.3 Spill control and secondary containment.
Liquid storage rooms shall be provided with spill control and secondary containment in accordance with Section 5004.2.

~~5704.3.7.4~~ 5704.3.1.4 Ventilation.
Liquid storage rooms shall be ventilated in accordance with Section 5004.3.

~~5704.3.7.5~~ 5704.3.1.5 Fire protection.
Fire protection for liquid storage rooms shall comply with Sections ~~5704.3.7.5.1~~5704.3.1.5.1 and ~~5704.3.7.5.2~~5704.3.1.5.2.

~~5704.3.7.5.1~~ 5704.3.1.5.1 Fire-protection systems.
Liquid storage rooms shall be protected by *automatic sprinkler systems* installed in accordance with Chapter 9 and Tables ~~5704.3.6.3(4)~~ 5704.2.3.5.3(4) through ~~5704.3.6.3(7)~~5704.2.3.5.3(7) and Table ~~5704.3.7.5.1~~5704.3.1.5.1. In-rack sprinklers shall also comply with NFPA 13.
Automatic foam-water systems and automatic aqueous film-forming foam (AFFF) water sprinkler systems shall not be used except where *approved*.

Protection criteria developed from fire modeling or full-scale fire testing conducted at an *approved* testing laboratory are allowed in lieu of the protection as shown in Tables ~~5704.3.6.3(2)~~5704.2.3.5.3(2) through ~~5704.3.6.3(7)~~5704.2.3.5.3(7) and Table ~~5704.3.7.5.1~~ 5704.3.1.5.1 where *approved*.

TABLE ~~5704.3.7.5.1~~ 5704.3.1.5.1 AUTOMATIC AFFF-WATER PROTECTION REQUIREMENTS FOR SOLID-PILE AND PALLETIZED STORAGE OF LIQUIDS IN METAL CONTAINERS OF 5-GALLON CAPACITY OR LESS[a, b]

PACKAGE TYPE	CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND: Density (gpm/ft^2)	Area (square feet)	Temperature rating	Maximum spacing	Orifice size (inch)	STORAGE HEIGHT (feet)	HOSE DEMAND (gpm)[c]	DURATION AFFF SUPPLY (minimum)	DURATION WATER SUPPLY (hours)
Cartoned	IB, IC, II and III	0.40	2,000	286°F	100 ft^2/head	0.531	11	500	15	2
Uncartoned	IB, IC, II and III	0.30	2,000	286°F	100 ft^2/head	0.5 or 0.531	12	500	15	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2, °C = (°F – 32)/1.8.

a. System shall be a closed-head wet system with *approved* devices for proportioning aqueous film-forming foam.

b. Maximum ceiling height of 30 feet.

c. Hose stream demand includes $1^1/_2$-inch inside hose connections, where required.

~~5704.3.7.5.2~~ 5704.3.1.5.2 Portable fire extinguishers. Not less than one *approved* portable fire extinguisher complying with Section 906 and having a rating of not less than 20-B shall be located not less than 10 feet (3048 mm) or more than 50 feet (15 240 mm) from any Class I or II liquid storage area located outside of a liquid storage room.
Not less than one portable fire extinguisher having a rating of not less than 20-B shall be located outside of, but not more than 10 feet

(3048 mm) from, the door opening into a liquid storage room.

~~5704.3.8~~ 5704.3.2 Liquid storage warehouses.

Buildings used for storage of *flammable* or *combustible liquids* in quantities exceeding those set forth in Section ~~5704.3.4~~5704.2 for *control areas* and Section ~~5704.3.7~~5704.3.1 for liquid storage rooms shall comply with Sections ~~5704.3.8.1~~5704.3.2.1 through ~~5704.3.8.5~~ 5704.3.2.5 and shall be constructed and separated as required by the *International Building Code*.

~~5704.3.8.1~~ 5704.3.2.1 Quantities and storage arrangement.

The total quantities of liquids in a liquid storage warehouse shall not be limited. The arrangement of storage shall be in accordance with Table ~~5704.3.6.3(2)~~5704.2.3.5.3(2) or ~~5704.3.6.3(3)~~5704.2.3.5.3(3).

~~5704.3.8.1.1~~ 5704.3.2.1.1 Mixed storage.

Mixed storage shall be in accordance with Section ~~5704.3.7.2.1~~5704.3.1.2.1.

~~5704.3.8.1.2~~ 5704.3.2.1.2 Separation and aisles.

Separation and aisles shall be in accordance with Section ~~5704.3.7.2.2~~5704.3.1.2.2.

~~5704.3.8.2~~ 5704.3.2.2 Spill control and secondary containment.

Liquid storage warehouses shall be provided with spill control and secondary containment as set forth in Section 5004.2.

~~5704.3.8.3~~ 5704.3.2.3 Ventilation.

Liquid storage warehouses storing containers greater than 5 gallons (19 L) in capacity shall be ventilated at a rate of not less than 0.25 cfm per square foot (0.00127 $m^3/s \times m^2$) of floor area over the storage area.

~~5704.3.8.4~~ 5704.3.2.4 Automatic sprinkler systems.

Liquid storage warehouses shall be protected by *automatic sprinkler systems* installed in accordance with Chapter 9 and Tables ~~5704.3.6.3(4)~~5704.2.3.5.3(4) through ~~5704.3.6.3(7)~~5704.2.3.5.3(7) and Table ~~5704.3.7.5.1~~5704.3.1.5.1, or Sections 16.4.1 through 16.4.3, 16.5.1 through 16.5.3.12, and Figures 16.4.1(a) through 16.4.1(c) and Tables 16.5.3.1 through 16.5.3.12 of NFPA 30. In-rack sprinklers shall also comply with NFPA 13.
Automatic foam-water systems and automatic AFFF water sprinkler systems shall not be used except where *approved*.

Protection criteria developed from fire modeling or full-scale fire testing conducted at an *approved* testing laboratory are allowed in lieu of the protection as shown in Tables ~~5704.3.6.3(2)~~5704.2.3.5.3(2) through ~~5704.3.6.3(7)~~5704.2.3.5.3(7) and Table ~~5704.3.7.5.1~~ 5704.3.1.5.1 where *approved*.

~~5704.3.8.5~~ 5704.3.2.5 Warehouse hose lines.

In liquid storage warehouses, either $1^1/_2$-inch (38 mm) lined or 1-inch (25 mm) hard rubber hose lines shall be provided in sufficient number to reach all liquid storage areas and shall be in accordance with Section 903 or 905.

5704.4 Outdoor storage of containers and portable tanks.

Storage of *flammable* and *combustible liquids* in closed containers and portable tanks outside of buildings shall be in accordance with Section 5703 and Sections 5704.4.1 through 5704.4.8. Capacity limits for containers and portable tanks shall be in accordance with Section ~~5704.3~~5704.1.

5704.4.1 Plans. Storage shall be in accordance with *approved* plans.

5704.4.2 Location on property.

Outdoor storage of liquids in containers and portable tanks shall be in accordance with Table 5704.4.2. Storage of liquids near buildings located on the same lot shall be in accordance with this section.

Revise as follows:

TABLE 5704.4.2 OUTDOOR LIQUID STORAGE IN CONTAINERS AND PORTABLE TANKS

CLASS OF LIQUID	CONTAINER STORAGE—MAXIMUM PER PILE Quantity[a, b] (gallons)	Height (feet)	PORTABLE TANK STORAGE—MAXIMUM PER PILE Quantity[a, b] (gallons)	Height (feet)	MINIMUM DISTANCE BETWEEN PILES OR RACKS (feet)	MINIMUM DISTANCE TO LOT LINE OF PROPERTY THAT CAN BE BUILT ON[c, d] (feet)	MINIMUM DISTANCE TO PUBLIC STREET, PUBLIC ALLEY OR PUBLIC WAY[d] (feet)
IA	1,100	10	2,200	7	5	50	10
IB	2,200	12	4,400	14	5	50	10
IC	4,400	12	8,800	14	5	50	10
II	8,800	12	17,600	14	5	25	5
III	22,000	18	44,000	14	5	10	5

For SI: 1 foot = 304.8 mm, 1 gallon 3.785 L.

a. For mixed class storage, see Section ~~5704.4.2~~5704.4.2.1.

b. For storage in racks, the quantity limits per pile do not apply, but the rack arrangement shall be limited to not more than 50 feet in length and two rows or 9 feet in depth.

c. If protection by a public fire department or private fire brigade capable of providing cooling water streams is not available, the distance shall be doubled.

d. Where the total quantity stored does not exceed 50 percent of the maximum allowed per pile, the distances are allowed to be reduced 50 percent, but not less than 3 feet.

5704.4.2.1 Mixed liquid piles. Where two or more classes of liquids are stored in a single pile, the quantity in the pile shall not exceed the smallest of maximum quantities for the classes of material stored.

5704.4.2.2 Access.
Storage of containers or portable tanks shall be provided with fire apparatus access roads in accordance with Chapter 5.

5704.4.2.3 Security. The storage area shall be protected against tampering or trespassers where necessary and shall be kept free from weeds, debris and other combustible materials not necessary to the storage.

5704.4.2.4 Storage adjacent to buildings.
Not more than 1,100 gallons (4163 L) of liquids stored in closed containers and portable tanks is allowed adjacent to a building located on the same premises and under the same management, provided that one of the following requirements is met:

1. The building does not exceed one story in height. Such building shall be of *fire-resistance-rated* construction with noncombustible exterior surfaces or noncombustible construction and shall be used principally for the storage of liquids.
2. The exterior building wall adjacent to the storage area shall have a *fire-resistance rating* of not less than 2 hours, having no openings to above-grade areas within 10 feet (3048 mm) horizontally of such storage and no openings to below-grade areas within 50 feet (15 240 mm) horizontally of such storage.

The quantity of liquids stored adjacent to a building protected in accordance with Item 2 is allowed to exceed 1,100 gallons (4163 L), provided that the maximum quantity per pile does not exceed 1,100 gallons (4163 L) and each pile is separated by a 10-foot-minimum (3048 mm) clear space along the common wall.
Where the quantity stored exceeds 1,100 gallons (4163 L) adjacent to a building complying with Item 1, or the provisions of Item 1 cannot be met, a minimum distance in accordance with Table 5704.4.2, column 7 (“Minimum Distance to Lot Line of Property That Can Be Built On”) shall be maintained between buildings and the nearest container or portable tank.

Revise as follows:

5704.4.3 Spill control and secondary containment.
Storage areas shall be provided with spill control and secondary containment in accordance with Section ~~5703.4~~5004.2.

Exception: Containers stored on *approved* containment pallets in accordance with Section 5004.2.3 and containers stored in cabinets and lockers with integral spill containment.

5704.4.4 Security. Storage areas shall be protected against tampering or trespassers by fencing or other *approved* control measures.

5704.4.5 Protection from vehicles.
Guard posts or other means shall be provided to protect exterior storage tanks from vehicular damage. Where guard posts are installed, the posts shall be installed in accordance with Section 312.

5704.4.6 Clearance from combustibles. The storage area shall be kept free from weeds, debris and combustible materials not necessary to the storage. The area surrounding an exterior storage area shall be kept clear of such materials for a minimum distance of 15 feet (4572 mm).

5704.4.7 Weather protection.
Weather protection for outdoor storage shall be in accordance with Section 5004.13.

5704.4.8 Empty containers and tank storage. The storage of empty tanks and containers previously used for the storage of *flammable* or *combustible liquids*, unless free from explosive vapors, shall be stored as required for filled containers and tanks. Tanks and containers when emptied shall have the covers or plugs immediately replaced in openings.

Add new text as follows:

5705
STORAGE IN STATIONARY TANKS

Revise as follows:

~~**5704.2**~~ **5705.1 Tank storage.** The provisions of this section shall apply to:

1. The storage of *flammable* and *combustible liquids* in fixed above-ground and underground tanks.
2. The storage of *flammable* and *combustible liquids* in fixed above-ground tanks inside of buildings.
3. The storage of *flammable* and *combustible liquids* in portable tanks whose capacity exceeds 660 gallons (2498 L).
4. The installation of such tanks and portable tanks.

The provisions of this section apply as follows:

1. General requirements for tanks shall be in accordance with Sections 5705.1 through 5705.1.10
2. Tank design, fabrication, construction, installation and protection shall comply with Sections 5705.2 through 5705.2.4.4.

~~**5704.2.1**~~ **5705.1.1 Change of tank contents.** Tanks subject to change in contents shall be in accordance with Section ~~5704.2.7~~ 5705.2. Prior to a change in contents, the *fire code official* is authorized to require testing of a tank.Tanks that have previously contained Class I liquids shall not be loaded with Class II or Class III liquids until such tanks and all piping, pumps, hoses and meters connected thereto have been completely drained and flushed.

~~**5704.2.2**~~ **5705.1.2 Use of tank vehicles and tank cars as storage tanks.** Tank cars and tank vehicles shall not be used as storage tanks.

~~**5704.2.3**~~ **5705.1.3 Labeling and signs.**
Labeling and signs for storage tanks and storage tank areas shall comply with Sections ~~5704.2.3.1~~ 5705.1.3.1 and ~~5704.2.3.2~~ 5705.1.3.2.

~~**5704.2.3.1**~~ **5705.1.3.1 Smoking and open flame.**
Signs shall be posted in storage areas prohibiting open flames and smoking. Signs shall comply with Section ~~5703.5~~ 5703.4.

~~**5704.2.3.2**~~ **5705.1.3.2 Label or placard.**

Tanks more than 100 gallons (379 L) in capacity, which are permanently installed or mounted and used for the storage of Class I, II or III liquids, shall bear a label and placard identifying the material therein. Placards shall be in accordance with NFPA 704.

Exceptions:

1. Tanks of 300-gallon (1136 L) capacity or less located on private property and used for heating and cooking fuels in single-family *dwellings*.
2. Tanks located underground.

~~5704.2.4~~ 5705.1.4 Sources of ignition.

Smoking and open flames are prohibited in storage areas in accordance with Section 5003.7.

Exception: Areas designated as smoking and hot work areas, and areas where hot work permits have been issued in accordance with this code.

~~5704.2.5~~ 5705.1.5 Explosion control.

Explosion control shall be provided in accordance with Section 911 for indoor tanks.

~~5704.2.6~~ 5705.1.6 Separation from incompatible materials.

Storage of *flammable* and *combustible liquids* shall be separated from *incompatible materials* in accordance with Section 5003.9.8. Grass, weeds, combustible materials and waste Class I, II or IIIA liquids shall not be accumulated in an unsafe manner at a storage site.

~~5704.2.12~~ 5705.1.7 Testing.

Tank testing shall comply with Sections ~~5704.2.12.1~~5705.1.7.1 and ~~5704.2.12.2~~5705.1.7.2.

~~5704.2.12.1~~ 5705.1.7.1 Acceptance testing.

Prior to being placed into service, tanks shall be tested in accordance with Section 21.5 of NFPA 30.

~~5704.2.12.2~~ 5705.1.7.2 Testing of underground tanks.

Before being covered or placed in use, tanks and piping connected to underground tanks shall be tested for tightness in the presence of the *fire code official*. Piping shall be tested in accordance with Section ~~5703.6.3~~5703.5.3. The system shall not be covered until it has been *approved*.

~~5704.2.13~~ 5705.1.8 Abandonment and status of tanks.

Tanks taken out of service shall be removed in accordance with Section ~~5704.2.14~~5705.1.8.3, or safeguarded in accordance with Sections ~~5704.2.13.1~~5705.1.8.1 through ~~5704.2.13.2.3~~5705.1.8.2.3 and API 1604.

~~5704.2.13.1~~ 5705.1.8.1 Underground tanks.

Underground tanks taken out of service shall comply with Sections ~~5704.2.13.1.1~~5705.1.8.1.1 through ~~5704.2.13.1.5~~5705.1.8.1.5.

~~5704.2.13.1.1~~ 5705.1.8.1.1 Temporarily out of service.

Underground tanks temporarily out of service shall have the fill line, gauge opening, vapor return and pump connection secure against tampering. Vent lines shall remain open and be maintained in accordance with Sections ~~5704.2.7.3~~5705.2.1.3 and ~~5704.2.7.4~~5705.2.1.4.

~~5704.2.13.1.2~~ 5705.1.8.1.2 Out of service for 90 days.

Underground tanks not used for a period of 90 days shall be safeguarded in accordance with all the following or be removed in accordance with Section ~~5704.2.14~~5705.1.9:

1. *Flammable* or *combustible liquids* shall be removed from the tank.
2. All piping, including fill line, gauge opening, vapor return and pump connection, shall be capped or plugged and secured from tampering.
3. Vent lines shall remain open and be maintained in accordance with Sections ~~5704.2.7.3~~5705.2.1.3 and ~~5704.2.7.4~~5705.2.1.4.

~~5704.2.13.1.3~~ 5705.1.8.1.3 Out of service for one year.
Underground tanks that have been out of service for a period of one year shall be removed from the ground in accordance with Section ~~5704.2.14~~5705.1.9 or abandoned in place in accordance with Section ~~5704.2.13.1.4~~5705.1.8.1.4.

~~5704.2.13.1.4~~ 5705.1.8.1.4 Tanks abandoned in place. Tanks abandoned in place shall be as follows:

1. *Flammable* and *combustible liquids* shall be removed from the tank and connected piping.
2. The suction, inlet, gauge, vapor return and vapor lines shall be disconnected.
3. The tank shall be filled completely with an *approved* inert solid material.
4. Remaining underground piping shall be capped or plugged.
5. A record of tank size, location and date of abandonment shall be retained.
6. All exterior above-grade fill piping shall be permanently removed when tanks are abandoned or removed.

~~5704.2.13.1.5~~ 5705.1.8.1.5 Reinstallation of underground tanks.
Tanks that are to be reinstalled for *flammable* or *combustible liquid* service shall be in accordance with this chapter, *ASME Boiler and Pressure Vessel Code* (Section VIII), API 1615, UL 58 and UL 1316.

~~5704.2.13.2~~ 5705.1.8.2 Above-ground tanks.
Above-ground tanks taken out of service shall comply with Sections ~~5704.2.13.2.1~~5705.1.8.2.1 through ~~5704.2.13.2.3~~5705.1.8.2.3.

~~5704.2.13.2.1~~ 5705.1.8.2.1 Temporarily out of service. Above-ground tanks temporarily out of service shall have all connecting lines isolated from the tank and be secured against tampering.

Exception: In-place fire protection (foam) system lines.

~~5704.2.13.2.2~~ 5705.1.8.2.2 Out of service for 90 days.
Above-ground tanks not used for a period of 90 days shall be safeguarded in accordance with Section ~~5704.2.13.1.2~~5705.1.8.1.2 or removed in accordance with Section ~~5704.2.14~~5705.1.8.3.

Exceptions:

1. Tanks and containers connected to oil burners that are not in use during the warm season of the year or are used as a backup heating system to gas.
2. In-place, active fire protection (foam) system lines.

~~5704.2.13.2.3~~ 5705.1.8.2.3 Out of service for one year.
Above-ground tanks that have been out of service for a period of 1 year shall be removed in accordance with Section ~~5704.2.14~~5705.1.9.

Exception: Tanks within operating facilities.

~~5704.2.14~~ 5705.1.9 Removal and disposal of tanks.
Removal and disposal of tanks shall comply with Sections ~~5704.2.14.1~~5705.1.9.1 and ~~5704.2.14.2~~5705.1.9.2.

~~5704.2.14.1~~ 5705.1.9.1 Removal. Removal of above-ground and underground tanks shall be in accordance with all of the following:

1. *Flammable* and *combustible liquids* shall be removed from the tank and connected piping.
2. Piping at tank openings that is not to be used further shall be disconnected.
3. Piping shall be removed from the ground.

   Exception: Piping is allowed to be abandoned in place where the *fire code official* determines that removal is not practical. Abandoned piping shall be capped and safeguarded as required by the *fire code official*.
4. Tank openings shall be capped or plugged, leaving a $^{1}/_{8}$-inch to $^{1}/_{4}$-inch-diameter (3.2 mm to 6.4 mm) opening for pressure equalization.

5. Tanks shall be purged of vapor and inerted prior to removal.
6. All exterior above-grade fill and vent piping shall be permanently removed.

   Exception: Piping associated with bulk plants, terminal facilities and refineries.

~~5704.2.14.2~~ 5705.1.9.2 **Disposal.** Tanks shall be disposed of in accordance with federal, state and local regulations.

~~5704.2.15~~ 5705.1.10 **Maintenance.** Above-ground tanks, connected piping and ancillary equipment shall be maintained in a safe operating condition. Tanks shall be maintained in accordance with their listings. Damage to above-ground tanks, connected piping or ancillary equipment shall be repaired using materials having equal or greater strength and *fire resistance* or the equipment shall be replaced or taken out of service.

~~5704.2.7.6~~ 5705.1.11 **Repair, alteration or reconstruction of tanks and piping.**
The repair, alteration or reconstruction, including welding, cutting and hot tapping of storage tanks and piping that have been placed in service, shall be in accordance with NFPA 30. Hot work, as defined in Section 202, on such tanks shall be conducted in accordance with Section 3510.

Add new text as follows:

5705.2 **Tank design, fabrication, construction, installation and protection.** Design, construction, fabrication, installation and protection of tanks shall comply with Section 5705.2.1 and the following:
1. Tank Vaults shall also comply with Section 5705.2.2.
2. Aboveground tanks and protected aboveground tanks shall also comply with Section 5705.2.3.
3. Underground Tanks shall also comply with Section 5705.2.4.

Revise as follows:

~~5704.2.7~~ 5705.2.1 **Design, fabrication and construction requirements for tanks.**
The design, fabrication and construction of tanks shall comply with NFPA 30. Each tank shall bear a permanent nameplate or marking indicating the standard used as the basis of design.

~~5704.2.7.1~~ 5705.2.1.1 **Materials used in tank construction.**
The materials used in tank construction shall be in accordance with NFPA 30. The materials of construction for tanks and their appurtenances shall be compatible with the liquids to be stored.

~~5704.2.7.2~~ 5705.2.1.2 **Pressure limitations for tanks.**
Tanks shall be designed for the pressures to which they will be subjected in accordance with NFPA 30.

~~5704.2.7.3~~ 5705.2.1.3 **Tank vents for normal venting.**
Tank vents for normal venting shall be installed and maintained in accordance with Sections ~~5704.2.7.3.1~~ 5705.2.1.3.1 through ~~5704.2.7.3.5.3~~ 5705.2.1.3.5.3.

~~5704.2.7.3.1~~ 5705.2.1.3.1 **Vent lines.** Vent lines from tanks shall not be used for purposes other than venting unless *approved*.

~~5704.2.7.3.2~~ 5705.2.1.3.2 **Vent-line flame arresters and pressure-vacuum vents.**
Listed or *approved* flame arresters or pressure-vacuum (PV) vents that remain closed unless venting under pressure or vacuum conditions shall be installed in normal vents of tanks containing Class IB and IC liquids.
Vent-line flame arresters shall be installed in accordance with their listing or API 2000 and maintained in accordance with Section 21.8.6 of NFPA 30 or API 2000. In-line flame arresters in piping systems shall be installed and maintained in accordance with their listing or API 2028. Pressure-vacuum vents shall be installed in accordance with Section 21.4.3 of NFPA 30 or API 2000 and maintained in

accordance with Section 21.8.6 of NFPA 30 or API 2000.

Exception: Where determined by the *fire code official* that the use of these devices can result in damage to the tank.

~~**5704.2.7.3.3**~~ **5705.2.1.3.3** **Vent pipe outlets.** Vent pipe outlets for tanks storing Class I, II or IIIA liquids shall be located such that the vapors are released at a safe point outside of buildings and not less than 12 feet (3658 mm) above the finished ground level. Vapors shall be discharged upward or horizontally away from adjacent walls to assist in vapor dispersion. Vent outlets shall be located such that flammable vapors will not be trapped by eaves or other obstructions and shall be not less than 5 feet (1524 mm) from building openings or *lot lines* of properties that can be built on. Vent outlets on atmospheric tanks storing Class IIIB liquids are allowed to discharge inside a building where the vent is a normally closed vent.

Exception: Vent pipe outlets on tanks storing Class IIIB liquid inside buildings and connected to fuel-burning equipment shall be located such that the vapors are released to a safe location outside of buildings.

~~**5704.2.7.3.4**~~ **5705.2.1.3.4** **Installation of vent piping.**

Vent piping shall be designed, sized, constructed and installed in accordance with Section ~~5703.6~~ 5703.5. Vent pipes shall be installed such that they will drain toward the tank without sags or traps in which liquid can collect. Vent pipes shall be installed in such a manner so as not to be subject to physical damage or vibration.

~~**5704.2.7.3.5**~~ **5705.2.1.3.5** **Manifolding.** Tank vent piping shall not be manifolded unless required for special purposes such as vapor recovery, vapor conservation or air pollution control.

~~**5704.2.7.3.5.1**~~ **5705.2.1.3.5.1** **Above-ground tanks.** For above-ground tanks, manifolded vent pipes shall be adequately sized to prevent system pressure limits from being exceeded where manifolded tanks are subject to the same fire exposure.

~~**5704.2.7.3.5.2**~~ **5705.2.1.3.5.2** **Underground tanks.** For underground tanks, manifolded vent pipes shall be sized to prevent system pressure limits from being exceeded when manifolded tanks are filled simultaneously.

~~**5704.2.7.3.5.3**~~ **5705.2.1.3.5.3** **Tanks storing Class I liquids.** Vent piping for tanks storing Class I liquids shall not be manifolded with vent piping for tanks storing Class II and III liquids unless positive means are provided to prevent the vapors from Class I liquids from entering tanks storing Class II and III liquids, to prevent contamination and possible change in classification of less volatile liquid.

~~**5704.2.7.4**~~ **5705.2.1.4** **Emergency venting.**

Stationary, above-ground tanks shall be equipped with additional venting that will relieve excessive internal pressure caused by exposure to fires. Emergency vents for Class I, II and IIIA liquids shall not discharge inside buildings. The venting shall be installed and maintained in accordance with Section 22.7 of NFPA 30.

Exceptions:

1. Tanks larger than 12,000 gallons (45 420 L) in capacity storing Class IIIB liquids that are not within the diked area or the drainage path of Class I or II liquids do not require emergency relief venting.
2. Emergency vents on protected above-ground tanks complying with UL 2085 containing Class II or IIIA liquids are allowed to discharge inside the building.

~~**5704.2.7.5**~~ **5705.2.1.5** **Tank openings other than vents.**

Tank openings for other than vents shall comply with Sections ~~5704.2.7.5.1~~ 5705.2.1.5.1 through ~~5704.2.7.5.8~~ 5705.2.1.5.8.

~~**5704.2.7.5.1**~~ **5705.2.1.5.1** **Connections below liquid level.** Connections for tank openings below the liquid level shall be liquid tight.

~~**5704.2.7.5.2**~~ **5705.2.1.5.2** **Filling, emptying and vapor recovery connections.** Filling, emptying and vapor recovery connections to tanks containing Class I, II or IIIA liquids shall be located outside of buildings in accordance with Section ~~5704.2.7.5.6~~ 5705.2.1.5.6 at a location free from sources of ignition and not less than 5 feet (1524 mm) away from building openings or *lot lines* of property that can be built on. Such openings shall be properly identified and provided with a liquid-tight cap that shall be closed when not in use.Filling and emptying connections to indoor tanks containing Class IIIB liquids and connected to fuel-burning equipment shall be located at a finished ground level location outside of buildings. Such openings shall be provided with a liquid-tight cap that shall be closed when not in use. A sign in accordance with Section 5003.6 that displays the following warning shall be permanently attached at the filling location:

TRANSFERRING FUEL OTHER THAN
CLASS IIIB COMBUSTIBLE LIQUID TO
THIS TANK CONNECTION IS A VIOLATION
OF THE FIRE CODE AND IS STRICTLY
PROHIBITED

~~5704.2.7.5.3~~ <u>5705.2.1.5.3</u> Piping, connections and fittings.
Piping, connections, fittings and other appurtenances shall be installed in accordance with Section ~~5703.6~~ <u>5703.5</u>.

~~5704.2.7.5.4~~ <u>5705.2.1.5.4</u> Manual gauging. Openings for manual gauging, if independent of the fill pipe, shall be provided with a liquid-tight cap or cover. Covers shall be kept closed when not gauging. If inside a building, such openings shall be protected against liquid overflow and possible vapor release by means of a spring-loaded check valve or other *approved* device.

~~5704.2.7.5.5~~ <u>5705.2.1.5.5</u> Fill pipes and discharge lines. For top-loaded tanks, a metallic fill pipe shall be designed and installed to minimize the generation of static electricity by terminating the pipe within 6 inches (152 mm) of the bottom of the tank, and it shall be installed in a manner that avoids excessive vibration.

~~5704.2.7.5.5.1~~ <u>5705.2.1.5.5.1</u> Class I liquids. For Class I liquids other than crude oil, gasoline and asphalt, the fill pipe shall be designed and installed in a manner that will minimize the possibility of generating static electricity by terminating within 6 inches (152 mm) of the bottom of the tank.

~~5704.2.7.5.5.2~~ <u>5705.2.1.5.5.2</u> Underground tanks. For underground tanks, fill pipe and discharge lines shall enter only through the top. Fill lines shall be sloped toward the tank. Underground tanks for Class I liquids having a capacity greater than 1,000 gallons (3785 L) shall be equipped with a tight fill device for connecting the fill hose to the tank.

~~5704.2.7.5.6~~ <u>5705.2.1.5.6</u> Location of connections that are made or broken. Filling, withdrawal and vapor-recovery connections for Class I, II and IIIA liquids that are made and broken shall be located outside of buildings, not more than 5 feet (1524 mm) above the finished ground level, in an *approved* location in close proximity to the parked delivery vehicle. Such location shall be away from sources of ignition and not less than 5 feet (1524 mm) away from building openings. Such connections shall be closed and liquid tight when not in use and shall be properly identified.

~~5704.2.7.5.7~~ <u>5705.2.1.5.7</u> Protection against vapor release. Tank openings provided for purposes of vapor recovery shall be protected against possible vapor release by means of a spring-loaded check valve or dry-break connections, or other *approved* device, unless the opening is a pipe connected to a vapor processing system. Openings designed for combined fill and vapor recovery shall be protected against vapor release unless connection of the liquid delivery line to the fill pipe simultaneously connects the vapor recovery line. Connections shall be vapor tight.

~~5704.2.7.5.8~~ <u>5705.2.1.5.8</u> Overfill prevention. An *approved* means or method in accordance with Section ~~5704.2.9.7.5~~ <u>5705.2.3.7.5</u> shall be provided to prevent the overfill of all Class I, II and IIIA liquid storage tanks. Storage tanks in refineries, bulk plants or terminals regulated by Section ~~5706.4~~

<u>5707.4</u> or ~~5706.7~~ <u>5707.7</u> shall have overfill protection in accordance with API 2350.An *approved* means or method in accordance with Section ~~5704.2.9.7.5~~ <u>5705.2.3.7.5</u> shall be provided to prevent the overfilling of Class IIIB liquid storage tanks connected to fuel-burning equipment inside buildings.

Exception: Outside above-ground tanks with a capacity of 1,320 gallons (5000 L) or less.

~~5704.2.7.7~~ <u>5705.2.1.6</u> Design of supports.
The design of the supporting structure for tanks shall be in accordance with the *International Building Code* and NFPA 30.

~~5704.2.7.8~~ <u>5705.2.1.7</u> Locations subject to flooding.
Where a tank is located in an area where it is subject to buoyancy because of a rise in the water table, flooding or accumulation of water

from fire suppression operations, uplift protection shall be provided in accordance with Sections 22.14 and 23.14 of NFPA 30.

~~5704.2.7.9~~ <u>5705.2.1.8</u> Corrosion protection.
Where subject to external corrosion, tanks shall be fabricated from corrosion-resistant materials, coated or provided with corrosion protection in accordance with Section 23.3.5 of NFPA 30.

~~5704.2.7.10~~ <u>5705.2.1.9</u> Leak reporting <u>and leaking tank disposition</u>. A consistent or accidental loss of liquid, or other indication of a leak from a tank system, shall be reported immediately to the fire department, the *fire code official* and other authorities having jurisdiction. <u>Leaking tanks shall be promptly emptied, repaired and returned to service, abandoned or removed in accordance with Section 5705.1.8 or 5705.1.9.</u>

~~5704.2.7.10.1 Leaking tank disposition.~~
~~Leaking tanks shall be promptly emptied, repaired and returned to service, abandoned or removed in accordance with Section 5704.2.13 or 5704.2.14.~~

~~5704.2.7.11~~ <u>5705.2.1.10</u> Tank lining. Steel tanks are allowed to be lined only for the purpose of protecting the interior from corrosion or providing compatibility with a material to be stored. Only those liquids tested for compatibility with the lining material are allowed to be stored in lined tanks.

~~5704.2.10~~ <u>5705.2.1.11</u> Drainage and diking. The area surrounding a tank or group of tanks shall be provided with drainage control or shall be diked to prevent accidental discharge of liquid from endangering adjacent tanks, adjoining property or reaching waterways.

Exceptions:

1. The *fire code official* is authorized to alter or waive these requirements based on a technical report that demonstrates that such tank or group of tanks does not constitute a hazard to other tanks, waterways or adjoining property, after consideration of special features such as topographical conditions, nature of occupancy and proximity to buildings on the same or adjacent property, capacity, and construction of proposed tanks and character of liquids to be stored, and nature and quantity of private and public fire protection provided.
2. Drainage control and diking is not required for *listed* secondary containment tanks.

~~5704.2.10.1~~ <u>5705.2.1.11.1</u> Volumetric capacity. The volumetric capacity of the diked area shall be not less than the greatest amount of liquid that can be released from the largest tank within the diked area. The capacity of the diked area enclosing more than one tank shall be calculated by deducting the volume of the tanks other than the largest tank below the height of the dike.

~~5704.2.10.2~~ <u>5705.2.1.11.2</u> Diked areas containing two or more tanks.
Diked areas containing two or more tanks shall be subdivided in accordance with NFPA 30.

~~5704.2.10.3~~ <u>5705.2.1.11.3</u> Protection of piping from exposure fires. Piping shall not pass through adjacent diked areas or impounding basins, unless provided with a sealed sleeve or otherwise protected from exposure to fire.

~~5704.2.10.4~~ <u>5705.2.1.11.4</u> Combustible materials in diked areas. Diked areas shall be kept free from combustible materials, drums and barrels.

~~5704.2.10.5~~ <u>5705.2.1.11.5</u> Equipment, controls and piping in diked areas. Pumps, manifolds and fire protection equipment or controls shall not be located within diked areas or drainage basins or in a location where such equipment and controls would be endangered by fire in the diked area or drainage basin. Piping above ground shall be minimized and located as close as practical to the shell of the tank in diked areas or drainage basins.

Exceptions:

1. Pumps, manifolds and piping integral to the tanks or equipment being served, which is protected by intermediate diking, berms, drainage or fire protection such as water spray, monitors or resistive coating.

2. Fire protection equipment or controls that are appurtenances to the tanks or equipment being protected, such as foam chambers or foam piping and water or foam monitors and hydrants, or hand and wheeled extinguishers.

~~5704.2.8~~ 5705.2.2 Vaults.
Vaults shall be allowed to be either above or below grade and shall comply with Sections ~~5704.2.8.1~~ 5705.2.2.1 through ~~5704.2.8.18~~ 5705.2.2.18.

~~5704.2.8.1~~ 5705.2.2.1 Listing required.
Vaults shall be *listed* in accordance with UL 2245.

Exception: Where *approved* by the *fire code official*, below-grade vaults are allowed to be constructed on site, provided that the design is in accordance with the *International Building Code* and that special inspections are conducted to verify structural strength and compliance of the installation with the *approved* design in accordance with Section 1707 of the International Building Code. Installation plans for below-grade vaults that are constructed on site shall be prepared by, and the design shall bear the stamp of, a professional engineer. Consideration shall be given to soil and hydrostatic loading on the floors, walls and lid; anticipated seismic forces; uplifting by groundwater or flooding; and to loads imposed from above such as traffic and equipment loading on the vault lid.

~~5704.2.8.2~~ 5705.2.2.2 Design and construction.
The vault shall completely enclose each tank. There shall not be openings in the vault enclosure except those necessary for access to, inspection of, and filling, emptying and venting of the tank. The walls and floor of the vault shall be constructed of reinforced concrete not less than 6 inches (152 mm) thick. The top of an above-grade vault shall be constructed of noncombustible material and shall be designed to be weaker than the walls of the vault, to ensure that the thrust of an explosion occurring inside the vault is directed upward before significantly high pressure can develop within the vault.
The top of an at-grade or below-grade vault shall be designed to relieve safely or contain the force of an explosion occurring inside the vault. The top and floor of the vault and the tank foundation shall be designed to withstand the anticipated loading, including loading from vehicular traffic, where applicable. The walls and floor of a vault installed below grade shall be designed to withstand anticipated soil and hydrostatic loading.

Vaults shall be designed to be wind and earthquake resistant, in accordance with the *International Building Code*.

~~5704.2.8.3~~ 5705.2.2.3 Secondary containment. Vaults shall be substantially liquid tight and there shall not be backfill around the tank or within the vault. The vault floor shall drain to a sump. For premanufactured vaults, liquid tightness shall be certified as part of the listing provided by a nationally recognized testing laboratory. For field-erected vaults, liquid tightness shall be certified in an *approved* manner.

~~5704.2.8.4~~ 5705.2.2.4 Internal clearance. There shall be sufficient clearance between the tank and the vault to allow for visual inspection and maintenance of the tank and its appurtenances. Dispensing devices are allowed to be installed on tops of vaults.

~~5704.2.8.5~~ 5705.2.2.5 Anchoring. Vaults and their tanks shall be suitably anchored to withstand uplifting by ground water or flooding, including when the tank is empty.

~~5704.2.8.6~~ 5705.2.2.6 Vehicle impact protection.
Vaults shall be resistant to damage from the impact of a motor vehicle, or vehicle impact protection shall be provided in accordance with Section 312.

~~5704.2.8.7~~ 5705.2.2.7 Arrangement. Tanks shall be *listed* for above-ground use, and each tank shall be in its own vault. Compartmentalized tanks shall be allowed and shall be considered as a single tank. Adjacent vaults shall be allowed to share a common wall. The common wall shall be liquid and vapor tight and shall be designed to withstand the load imposed when the vault on either side of the wall is filled with water.

~~5704.2.8.8~~ 5705.2.2.8 Connections. Connections shall be provided to permit venting of each vault to dilute, disperse and remove vapors prior to personnel entering the vault.

~~5704.2.8.9~~ 5705.2.2.9 Ventilation.

Vaults that contain tanks of Class I liquids shall be provided with an exhaust ventilation system installed in accordance with Section 5004.3. The ventilation system shall operate continuously or be designed to operate upon activation of the vapor or liquid detection system. The system shall provide ventilation at a rate of not less than 1 cubic foot per minute (cfm) per square foot of floor area [0.00508 $m^3/(s \times m^2)$], but not less than 150 cfm (4 m^3/min). The exhaust system shall be designed to provide air movement across all parts of the vault floor. Supply and exhaust ducts shall extend to within 3 inches (76 mm), but not more than 12 inches (305 mm), of the floor. The exhaust system shall be installed in accordance with the *International Mechanical Code*.

~~5704.2.8.10~~ 5705.2.2.10 Liquid detection. Vaults shall be equipped with a detection system capable of detecting liquids, including water, and activating an alarm.

~~5704.2.8.11~~ 5705.2.2.11 Monitoring and detection. Vaults shall be provided with *approved* vapor and liquid detection systems and equipped with on-site audible and visual warning devices with battery backup. Vapor detection systems shall sound an alarm when the system detects vapors that reach or exceed 25 percent of the lower explosive limit (LEL) of the liquid stored. Vapor detectors shall be located not higher than 12 inches (305 mm) above the lowest point in the vault. Liquid detection systems shall sound an alarm upon detection of any liquid, including water. Liquid detectors shall be located in accordance with the manufacturer's instructions. Activation of either vapor or liquid detection systems shall cause a signal to be sounded at an *approved*, constantly attended location within the facility serving the tanks or at an *approved* location. Activation of vapor detection systems shall shut off dispenser pumps.

~~5704.2.8.12~~ 5705.2.2.12 Liquid removal.
Means shall be provided to recover liquid from the vault. Where a pump is used to meet this requirement, the pump shall not be permanently installed in the vault. Electric-powered portable pumps shall be suitable for use in Class I, Division 1, or Zone 0 locations, as defined in NFPA 70.

~~5704.2.8.13~~ 5705.2.2.13 Normal vents. Vent pipes that are provided for normal tank venting shall terminate not less than 12 feet (3658 mm) above ground level.

~~5704.2.8.14~~ 5705.2.2.14 Emergency vents. Emergency vents shall be vapor tight and shall be allowed to discharge inside the vault. Long-bolt manhole covers shall not be allowed for this purpose.

~~5704.2.8.15~~ 5705.2.2.15 Accessway. Vaults shall be provided with an *approved* personnel accessway with a minimum dimension of 30 inches (762 mm) and with a permanently affixed, nonferrous ladder. Accessways shall be designed to be nonsparking. Travel distance from any point inside a vault to an accessway shall not exceed 20 feet (6096 mm). At each entry point, a warning sign indicating the need for procedures for safe entry into confined spaces shall be posted. Entry points shall be secured against unauthorized entry and vandalism.

~~5704.2.8.16~~ 5705.2.2.16 Fire protection. Vaults shall be provided with a suitable means to admit a fire suppression agent.

~~5704.2.8.17~~ 5705.2.2.17 Classified area.
The interior of a vault containing a tank that stores a Class I liquid shall be designated a Class I, Division 1, or Zone 0 location, as defined in NFPA 70.

~~5704.2.8.18~~ 5705.2.2.18 Overfill protection.
Overfill protection shall be provided in accordance with Section ~~5704.2.9.7.5~~ 5705.2.3.7.5. The use of a float vent valve shall be prohibited.

~~5704.2.9~~ 5705.2.3 Above-ground tanks.
Above-ground storage of *flammable* and *combustible liquids* in tanks shall comply with Section ~~5704.2~~ 5705.1 and Sections ~~5704.2.9.1~~ 5705.2.3.1 through ~~5704.2.9.7.9~~ 5705.2.3.7.9.

~~5704.2.9.1~~ 5705.2.3.1 Existing noncompliant installations.
Existing above-ground tanks shall be maintained in accordance with the code requirements that were applicable at the time of installation. Above-ground tanks that were installed in violation of code requirements applicable at the time of installation shall be made

code compliant or shall be removed in accordance with Section ~~5704.2.14~~ 5705.1.9, regardless of whether such tank has been previously inspected (see Section 109.4).

~~5704.2.9.2~~ 5705.2.3.2 Fire protection.
Fire protection for above-ground tanks shall comply with Sections ~~5704.2.9.2.1~~ 5705.2.3.2.1 through ~~5704.2.9.2.4~~ 5705.2.3.2.4.

~~5704.2.9.2.1~~ 5705.2.3.2.1 Required foam fire protection systems. Where required by the *fire code official*, foam fire protection shall be provided for above-ground tanks, other than pressure tanks operating at or above 1 pound per square inch gauge (psig) (6.89 kPa) where such tank, or group of tanks spaced less than 50 feet (15 240 mm) apart measured shell to shell, has a liquid surface area in excess of 1,500 square feet (139 m^2), and is in accordance with one of the following:

1. Used for the storage of Class I or II liquids.
2. Used for the storage of crude oil.
3. Used for in-process products and is located within 100 feet (30 480 mm) of a fired still, heater, related fractioning or processing apparatus or similar device at a processing plant or petroleum refinery as herein defined.
4. Considered by the *fire code official* as posing an unusual exposure hazard because of topographical conditions; nature of occupancy, proximity on the same or adjoining property, and height and character of liquids to be stored; degree of private fire protection to be provided; and facilities of the fire department to cope with *flammable liquid* fires.

~~5704.2.9.2.2~~ 5705.2.3.2.2 Foam fire protection system installation.
Where foam fire protection is required, it shall be installed in accordance with NFPA 11.

~~5704.2.9.2.2.1~~ 5705.2.3.2.2.1 Foam storage. Where foam fire protection is required, foam-producing materials shall be stored on the premises.

Exception: Storage of foam-producing materials off the premises is allowed as follows:

1. Such materials stored off the premises shall be of the proper type suitable for use with the equipment at the installation where required.
2. Such materials shall be readily available at the storage location at all times.
3. Adequate loading and transportation facilities shall be provided.
4. The time required to deliver such materials to the required location in the event of fire shall be consistent with the hazards and fire scenarios for which the foam supply is intended.
5. At the time of a fire, these off-premises supplies shall be accumulated in sufficient quantities before placing the equipment in operation to ensure foam production at an adequate rate without interruption until extinguishment is accomplished.

~~5704.2.9.2.3~~ 5705.2.3.2.3 Fire protection of supports.
Supports or pilings for above-ground tanks storing Class I, II or IIIA liquids elevated more than 12 inches (305 mm) above grade shall have a *fire-resistance rating* of not less than 2 hours in accordance with the fire exposure criteria specified in ASTM E1529.

Exceptions:

1. Structural supports tested as part of a protected above-ground tank in accordance with UL 2085.
2. Stationary tanks located outside of buildings where protected by an *approved* water-spray system designed in accordance with Chapter 9 and NFPA 15.
3. Stationary tanks located inside of buildings equipped throughout with an *approved automatic sprinkler system* designed in accordance with Section 903.3.1.1.

~~5704.2.9.2.4~~ 5705.2.3.2.4 Inerting of tanks storing boilover liquids. Liquids with boilover characteristics shall not be stored in fixed roof tanks larger than 150 feet (45 720 mm) in diameter unless an *approved* gas enrichment or inerting system is provided on the tank.

Exception: Crude oil storage tanks in production fields with no other exposures adjacent to the storage tank.

~~5704.2.9.3~~ 5705.2.3.3 Supports, foundations and anchorage.
Supports, foundations and anchorages for above-ground tanks shall be designed and constructed in accordance with NFPA 30 and the *International Building Code*.

~~5704.2.9.4~~ 5705.2.3.4 Stairways, platforms and walkways.
Stairways, platforms and walkways shall be of noncombustible construction and shall be designed and constructed in accordance with NFPA 30 and the *International Building Code*.

~~5704.2.9.5~~ 5705.2.3.5 Above-ground tanks inside of buildings.
Above-ground tanks inside of buildings shall comply with Sections ~~5704.2.9.5.1~~ 5705.2.3.5.1 and ~~5704.2.9.5.2~~ 5705.2.3.5.2.

~~5704.2.9.5.1~~ 5705.2.3.5.1 Overfill prevention.
Above-ground tanks storing Class I, II and IIIA liquids inside buildings shall be equipped with a device or other means to prevent overflow into the building including, but not limited to: a float valve; a preset meter on the fill line; a valve actuated by the weight of the tank's contents; a low-head pump that is incapable of producing overflow; or a liquid-tight overflow pipe not less than one pipe size larger than the fill pipe and discharging by gravity back to the outside source of liquid or to an *approved* location. Tanks containing Class IIIB liquids and connected to fuel-burning equipment shall be provided with a means to prevent overflow into buildings in accordance with Section ~~5704.2.7.5.8~~ 5705.2.1.5.8.

~~5704.2.9.5.2~~ 5705.2.3.5.2 Fill pipe connections.
Fill pipe connections for tanks storing Class I, II and IIIA liquids and Class IIIB liquids connected to fuel-burning equipment shall be in accordance with Section ~~5704.2.9.7.6~~ 5705.2.3.7.6.

~~5704.2.9.6~~ 5705.2.3.6 Above-ground tanks outside of buildings.
Above-ground tanks outside of buildings shall comply with Sections ~~5704.2.9.6.1~~ 5705.2.3.6.1 through ~~5704.2.9.6.3~~ 5705.2.3.6.3.

~~5704.2.9.6.1~~ 5705.2.3.6.1 Locations where above-ground tanks are prohibited. Storage of Class I and II liquids in above-ground tanks outside of buildings is prohibited within the limits established by law as set forth in the fire code adoption ordinance or other regulation adopted by the jurisdiction .

~~5704.2.9.6.1.1~~ 5705.2.3.6.1.1 Location of tanks with pressures 25 psig or less.
Above-ground tanks operating at pressures not exceeding 2.5 psig (17.2 kPa) for storage of Class I, II or IIIA liquids, which are designed with a floating roof, a weak roof-to-shell seam or equipped with emergency venting devices limiting pressure to 2.5 psig (17.2 kPa), shall be located in accordance with Table 22.4.1.1(a) of NFPA 30.

Exceptions:

1. Vertical tanks having a weak roof-to-shell seam and storing Class IIIA liquids are allowed to be located at one-half the distances specified in Table 22.4.1.1(a) of NFPA 30, provided that the tanks are not within a diked area or drainage path for a tank storing Class I or II liquids.
2. Liquids with boilover characteristics and unstable liquids in accordance with Sections ~~5704.2.9.6.1.3~~ 5705.2.3.6.1.3 and ~~5704.2.9.6.1.4~~ 5705.2.3.6.1.4.
3. For protected above-ground tanks in accordance with Section ~~5704.2.9.7~~5705.2.3.7 and tanks in at-grade or above-grade vaults in accordance with Section ~~5704.2.8~~ 5705.2.2, the distances in Table 22.4.1.1(b) of NFPA 30 shall apply and shall be reduced by one-half, but not to less than 5 feet (1524 mm).

~~5704.2.9.6.1.2~~ 5705.2.3.6.1.2 Location of tanks with pressures exceeding 25 psig.
Above-ground tanks for the storage of Class I, II or IIIA liquids operating at pressures exceeding 2.5 psig (17.2 kPa) or equipped with emergency venting allowing pressures to exceed 2.5 psig (17.2 kPa) shall be located in accordance with Table 22.4.1.3 of NFPA 30.

Exception: Liquids with boilover characteristics and unstable liquids in accordance with Sections ~~5704.2.9.6.1.3~~ 5705.2.3.6.1.3 and ~~5704.2.9.6.1.4~~ 5705.2.3.6.1.4.

~~5704.2.9.6.1.3~~ 5705.2.3.6.1.3 Location of tanks storing boilover liquids.
Above-ground tanks for storage of liquids with boilover characteristics shall be located in accordance with Table 2204.1.4.1 of NFPA 30.

~~5704.2.9.6.1.4~~ 5705.2.3.6.1.4 Location of tanks storing unstable liquids.
Above-ground tanks for the storage of unstable liquids shall be located in accordance with Table 22.4.1.5 of NFPA 30.

~~5704.2.9.6.1.5~~ 5705.2.3.6.1.5 Location of tanks storing Class IIIB liquids.
Above-ground tanks for the storage of Class IIIB liquids, excluding unstable liquids, shall be located in accordance with Table 22.1.5 of NFPA 30, except where located within a diked area or drainage path for a tank or tanks storing Class I or II liquids. Where a Class IIIB liquid storage tank is within the diked area or drainage path for a Class I or II liquid, distances required by Section ~~5704.2.9.6.1.1~~ 5705.2.3.6.1.1 shall apply.

~~5704.2.9.6.1.6~~ 5705.2.3.6.1.6 Reduction of separation distances to adjacent property.
Where two tank properties of diverse ownership have a common boundary, the *fire code official* is authorized to, with the written consent of the *owners* of the two properties, apply the distances in Sections ~~5704.2.9.6.1.2~~ 5705.2.3.6.1.2 through ~~5704.2.9.6.1.5~~ 5705.2.3.6.1.5 assuming a single property.

~~5704.2.9.6.2~~ 5705.2.3.6.2 Separation between adjacent stable or unstable liquid tanks.
The separation between tanks containing stable liquids shall be in accordance with Table 22.4.2.1 of NFPA 30. Where tanks are in a diked area containing Class I or II liquids, or in the drainage path of Class I or II liquids, and are compacted in three or more rows or in an irregular pattern, the *fire code official* is authorized to require greater separation than specified in Table 22.4.2.1 of NFPA 30 or other means to make tanks in the interior of the pattern open for firefighting purposes.
The separation between tanks containing unstable liquids shall be not less than one-half the sum of their diameters.

Exception: Tanks used for storing Class IIIB liquids are allowed to be spaced 3 feet (914 mm) apart unless within a diked area or drainage path for a tank storing Class I or II liquids.

~~5704.2.9.6.3~~ 5705.2.3.6.3 Separation between adjacent tanks containing flammable or combustible liquids and LP-gas. The minimum horizontal separation between an LP-gas container and a Class I, II or IIIA liquid storage tank shall be 20 feet (6096 mm) except in the case of Class I, II or IIIA liquid tanks operating at pressures exceeding 2.5 psig (17.2 kPa) or equipped with emergency venting allowing pressures to exceed 2.5 psig (17.2 kPa), in which case the provisions of Section ~~5704.2.9.6.2~~ 5705.2.3.6.2 shall apply. An *approved* means shall be provided to prevent the accumulation of Class I, II or IIIA liquids under adjacent LP-gas containers such as by dikes, diversion curbs or grading. Where *flammable* or *combustible liquid* storage tanks are within a diked area, the LP-gas containers shall be outside the diked area and not less than 10 feet (3048 mm) away from the centerline of the wall of the diked area.

Exceptions:

1. Liquefied petroleum gas containers of 125 gallons (473 L) or less in capacity installed adjacent to fuel-oil supply tanks of 660 gallons (2498 L) or less in capacity.
2. Horizontal separation is not required between above-ground LP-gas containers and underground *flammable* and *combustible liquid* tanks.

~~5704.2.9.7~~ 5705.2.3.7 Additional requirements for protected above-ground tanks.
In addition to the requirements of this chapter for above-ground tanks, the installation of protected above-ground tanks shall be in accordance with Sections ~~5704.2.9.7.1~~ 5705.2.3.7.1 through ~~5704.2.9.7.9~~ 5705.2.3.7.9.

~~5704.2.9.7.1~~ 5705.2.3.7.1 Tank construction.
The construction of a protected above-ground tank and its primary tank shall be in accordance with Section ~~5704.2.7~~ 5705.2.1.

~~5704.2.9.7.2~~ 5705.2.3.7.2 Normal and emergency venting.
Normal and emergency venting for protected above-ground tanks shall be provided in accordance with Sections ~~5704.2.7.3~~ 5705.2.1.3 and ~~5704.2.7.4~~ 5705.2.1.4. The vent capacity reduction factor shall not be allowed.

~~5704.2.9.7.3~~ 5705.2.3.7.3 Secondary containment.

Protected above-ground tanks shall be provided with secondary containment, drainage control or diking in accordance with Section 5004.2. A means shall be provided to establish the integrity of the secondary containment in accordance with NFPA 30.

~~5704.2.9.7.4~~ 5705.2.3.7.4 Vehicle impact protection.

Where protected above-ground tanks, piping, electrical conduit or dispensers are subject to vehicular impact, they shall be protected therefrom, either by having the impact protection incorporated into the system design in compliance with the impact test protocol of UL 2085, or by meeting the provisions of Section 312, or where necessary, a combination of both. Where guard posts or other *approved* barriers are provided, they shall be independent of each above-ground tank.

~~5704.2.9.7.5~~ 5705.2.3.7.5 Overfill prevention. Protected above-ground tanks shall not be filled in excess of 95 percent of their capacity. An overfill prevention system shall be provided for each tank. During tank-filling operations, the system shall comply with one of the following:

1. The overfill prevention system shall include the following:
   1.1. An independent means of notifying the person filling the tank that the fluid level has reached 90 percent of tank capacity by providing an audible or visual alarm signal, providing a tank level gauge marked at 90 percent of tank capacity, or other *approved* means.

   1.2. Automatic shut off of the flow of fuel to the tank when the quantity of liquid in the tank reaches 95 percent of tank capacity. For rigid hose fuel-delivery systems, an *approved* means shall be provided to empty the fill hose into the tank after the automatic shutoff device is activated.

2. The system shall reduce the flow rate to not more than 15 gallons per minute (0.95 L/s) so that at the reduced flow rate, the tank will not overfill for 30 minutes, and automatically shut off flow into the tank so that none of the fittings on the top of the tank are exposed to product because of overfilling.

~~5704.2.9.7.5.1~~ 5705.2.3.7.5.1 Information signs. A permanent sign shall be provided at the fill point for the tank, documenting the filling procedure and the tank calibration chart.

Exception: Where climatic conditions are such that the sign has the potential to be obscured by ice or snow, or weathered beyond readability or otherwise impaired, said procedures and chart shall be located in the office window, lock box or other area available to the person filling the tank.

~~5704.2.9.7.5.2~~ 5705.2.3.7.5.2 Determination of available tank capacity. The filling procedure shall require the person filling the tank to determine the gallonage (literage) required to fill it to 90 percent of capacity before commencing the fill operation.

~~5704.2.9.7.6~~ 5705.2.3.7.6 Fill pipe connections. The fill pipe shall be provided with a means for making a direct connection to the tank vehicle's fuel delivery hose so that the delivery of fuel is not exposed to the open air during the filling operation. Where any portion of the fill pipe exterior to the tank extends below the level of the top of the tank, a check valve shall be installed in the fill pipe not more than 12 inches (305 mm) from the fill hose connection.

~~5704.2.9.7.7~~ 5705.2.3.7.7 Spill containers. A spill container having a capacity of not less than 5 gallons (19 L) shall be provided for each fill connection. For tanks with a top fill connection, spill containers shall be noncombustible and shall be fixed to the tank and equipped with a manual drain valve that drains into the primary tank. For tanks with a remote fill connection, a portable spill container shall be allowed.

~~5704.2.9.7.8~~ 5705.2.3.7.8 Tank openings. Tank openings in protected above-ground tanks shall be through the top only.

~~5704.2.9.7.9~~ 5705.2.3.7.9 Antisiphon devices. *Approved* antisiphon devices shall be installed in each external pipe connected to the protected above-ground tank where the pipe extends below the level of the top of the tank.

~~5704.2.11~~ 5705.2.4 Underground tanks.

Underground storage of *flammable* and *combustible liquids* in tanks shall comply with Section ~~5704.2~~ 5705.2 and Sections ~~5704.2.11.1~~

5705.2.4.1 through ~~5704.2.11.4.2.1~~ 5705.2.4.4.

~~5704.2.11.1~~ 5705.2.4.1 Location. *Flammable* and *combustible liquid* storage tanks located underground, either outside or under buildings, shall be in accordance with all of the following:

1. Tanks shall be located with respect to existing foundations and supports such that the loads carried by the latter cannot be transmitted to the tank.
2. The distance from any part of a tank storing liquids to the nearest wall of a *basement*, pit, cellar or *lot line* shall be not less than 3 feet (914 mm).
3. A minimum distance of 1 foot (305 mm), shell to shell, shall be maintained between underground tanks.

~~5704.2.11.2~~ 5705.2.4.2 Depth and cover. Excavation for underground storage tanks shall be made with due care to avoid undermining of foundations of existing structures. Underground tanks shall be set on firm foundations and surrounded with not less than 6 inches (152 mm) of noncorrosive inert material, such as clean sand.

~~5704.2.11.3~~ 5705.2.4.3 Overfill protection and prevention systems.
Fill pipes shall be equipped with a spill container and an overfill prevention system in accordance with NFPA 30.

~~5704.2.11.4~~ 5705.2.4.4 Leak prevention.
~~Leak prevention~~An *approved* method of leak detection shall be provided for underground tanks and shall comply with ~~Sections 5704.2.11.4.1 and 5704.2.11.4.2.~~the following:

1. The leak detection system shall be capable of detecting a leak from any component of the underground storage tank system.
2. The leak detection shall be designed and installed in accordance with NFPA 30.
3. Daily inventory records for underground storage tank systems shall be maintained.
4. The leak detection panel status shall be annunciated at an *approved* on-site location.

~~**5704.2.11.4.1 Inventory control.** Daily inventory records for underground storage tank systems shall be maintained.~~

~~**5704.2.11.4.2 Leak detection.**~~
~~Underground storage tank systems shall be provided with an *approved* method of leak detection from any component of the system that is designed and installed in accordance with NFPA 30.~~

~~**5704.2.11.4.2.1 Location.** The leak detection panel status shall be annunciated at an *approved* on-site location.~~

SECTION ~~5705~~5706
DISPENSING, USE, MIXING AND HANDLING

~~5705.1~~5706.1 Scope and application.
Dispensing, use, mixing and handling of *flammable liquids* shall be in accordance with the applicable provisions in Section 5703~~, and this section~~ Section 5706.2 and the following.~~ Tank vehicle and tank car loading and unloading and other special operations shall be in accordance with Section 5706.~~

> ~~**Exception:** Containers of organic coatings having no fire point and which are opened for pigmentation are not required to comply with this section.~~

1. Indoor dispensing, use, mixing and handling in quantities not exceeding the maximum allowable quantity per control area shall also comply with Section 5706.3.
2. Indoor dispensing, use, mixing and handling in quantities exceeding the maximum allowable quantity per control area shall also comply with Section 5706.4.

3. Outdoor dispensing, use, mixing and handling in quantities exceeding the maximum allowable quantity per control area shall also comply with Section 5706.5.

Tank vehicle and tank car loading and unloading and other special operations shall be in accordance with Section 5707.

~~5705.2~~5706.2 ~~Liquid transfer~~General.
Liquid transfer equipment and methods for transfer of Class I, II and IIIA liquids shall be *approved* and be in accordance with Sections ~~5705.2.1~~5706.2.1 through ~~5705.2.6~~5706.2.6.

~~5705.2.1~~5706.2.1 Pumps. Where positive-displacement pumps are used, they shall be provided with pressure relief discharging back to the tank, pump suction or other *approved* location, or shall be provided with interlocks to prevent over-pressure.

~~5705.2.2~~5706.2.2 Pressured systems. Where gases are introduced to provide for transfer of Class I liquids, or Class II and III liquids transferred at temperatures at or above their *flash points* by pressure, only inert gases shall be used. Controls, including pressure relief devices, shall be provided to limit the pressure so that the maximum working pressure of tanks, containers and piping systems cannot be exceeded. Where devices operating through pressure within a tank or container are used, the tank or container shall be a pressure vessel *approved* for the intended use. Air or oxygen shall not be used for pressurization.

Exception: Air transfer of Class II and III liquids at temperatures below their *flash points*.

~~5705.2.3~~5706.2.3 Piping, hoses and valves. Piping, hoses and valves used in liquid transfer operations shall be *approved* or *listed* for the intended use.

~~5705.2.4~~5706.2.4 Class I, II and III liquids.
Class I liquids or, when heated to or above their flash points, Class II and Class III liquids, shall be transferred by one of the following methods:

1. From safety cans complying with UL 30.
2. Through an *approved* closed piping system.
3. From containers or tanks by an *approved* pump taking suction through an opening in the top of the container or tank.
4. For Class IB, IC, II and III liquids, from containers or tanks by gravity through an *approved* self-closing or automatic-closing valve where the container or tank and dispensing operations are provided with spill control and secondary containment in accordance with Section ~~5703.4~~5004.2. Class IA liquids shall not be dispensed by gravity from tanks.
5. *Approved* engineered liquid transfer systems.

Exception: Liquids in original shipping containers not exceeding a 5.3-gallon (20 L) capacity.

~~5705.2.5~~5706.2.5 Manual container filling operations. Class I liquids or Class II and Class III liquids that are heated up to or above their *flash points* shall not be transferred into containers unless the nozzle and containers are electrically interconnected. Acceptable methods of electrical interconnection include either of the following:

1. Metallic floor plates on which containers stand while filling, where such floor plates are electrically connected to the fill stem.
2. Where the fill stem is bonded to the container during filling by means of a bond wire.

~~5705.2.6~~5706.2.6 Automatic container-filling operations for Class I liquids. Container-filling operations for Class I liquids involving conveyor belts or other automatic-feeding operations shall be designed to prevent static accumulations.

~~5705.3~~5706.2.7 Use, dispensing and mixing inside of buildings.
Indoor use, dispensing and mixing of *flammable* and *combustible liquids* shall also be in accordance with ~~Section 5705.2 and~~ Sections ~~5705.3.1~~5706.2.7.1 through ~~5705.3.5.3~~5706.2.13.9.

~~5705.3.1~~5706.2.7.1 Closure of mixing or blending vessels. Vessels used for mixing or blending of Class I liquids and Class II or III liquids heated up to or above their *flash points* shall be provided with self-closing, tight-fitting, noncombustible lids that will control a fire within such vessel.

Exception: Where such devices are impractical, *approved* automatic or manually controlled fire-extinguishing devices shall be provided.

~~5705.3.2~~5706.2.8 Bonding of vessels. Where differences of potential could be created, vessels containing Class I liquids or liquids handled at or above their *flash points* shall be electrically connected by bond wires, ground cables, piping or similar means to a static grounding system to maintain equipment at the same electrical potential to prevent sparking.

~~5705.3.3~~5706.2.9 Heating, lighting and cooking appliances. Heating, lighting and cooking appliances that utilize Class I liquids shall not be operated within a building or structure.

Exception: Operation in single-family *dwellings*.

~~5705.3.4~~5706.2.10 Location of processing vessels.
Processing vessels shall be located with respect to distances to *lot lines* of adjoining property that can be built on, in accordance with Tables ~~5705.3.4(1)~~5706.2.10(1) and ~~5705.3.4(2)~~5706.2.10(2).

Exception: Where the *exterior wall* facing the adjoining *lot line* is a blank wall having a *fire-resistance rating* of not less than 4 hours, the *fire code official* is authorized to modify the distances. The distance shall be not less than that set forth in the *International Building Code*, and where Class IA or unstable liquids are involved, explosion control shall be provided in accordance with Section 911.

TABLE ~~5705.3.4(1)~~5706.2.10(1) SEPARATION OF PROCESSING VESSELS FROM LOT LINES

PROCESSING VESSELS WITH EMERGENCY RELIEF VENTING	LOCATION[a]	
	Stable liquids	Unstable liquids
Not in excess of 2.5 psig	Table ~~5705.3.4(2)~~5706.2.10(2)	2.5 times Table ~~5705.3.4(2)~~5706.2.10(2)
Over 2.5 psig	1.5 times Table ~~5705.3.4(2)~~5706.2.10(2)	4 times Table ~~5705.3.4(2)~~5706.2.10(2)

For SI: 1 pound per square inch gauge = 6.895 kPa.

a. Where protection of exposures by a public fire department or private fire brigade capable of providing cooling water streams on structures is not provided, distances shall be doubled.

TABLE ~~5705.3.4(2)~~5706.2.10(2) REFERENCE TABLE FOR USE WITH TABLE ~~5705.3.4(1)~~5706.2.10(1)

TANK CAPACITY (gallons)	MINIMUM DISTANCE FROM LOT LINE OF A LOT THAT IS OR CAN BE BUILT ON, INCLUDING THE OPPOSITE SIDE OF A PUBLIC WAY (feet)	MINIMUM DISTANCE FROM NEAREST SIDE OF ANY PUBLIC WAY OR FROM NEAREST IMPORTANT BUILDING ON THE SAME PROPERTY (feet)
275 or less	5	5
276 to 750	10	5
751 to 12,000	15	5
12,001 to 30,000	20	5
30,001 to 50,000	30	10
50,001 to 100,000	50	15
100,001 to 500,000	80	25
500,001 to 1,000,000	100	35
1,000,001 to 2,000,000	135	45
2,000,001 to 3,000,000	165	55
3,000,001 or more	175	60

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

~~5705.3.6~~5706.2.11 Cleaning with flammable and combustible liquids.
Cleaning with Class I, II and IIIA liquids shall be in accordance with Sections ~~5705.3.6.1~~5706.2.11.1 through ~~5705.3.6.2.7~~5706.2.11.2.7.

Exceptions:

1. Dry cleaning shall be in accordance with Chapter 21.

2. Spray-nozzle cleaning shall be in accordance with Section 2403.3.5.

~~5705.3.6.1~~5706.2.11.1 Cleaning operations.
Class IA liquids shall not be used for cleaning. Cleaning with Class IB, IC or II liquids shall be conducted in accordance with one of the following:

1. In a room or building, Section ~~5705.3.7~~5706.4.

2. In a parts cleaner *listed*, *labeled* and *approved* for the purpose, Section ~~5705.3.6.2~~5706.2.11.2.

Exception: Materials used in commercial and industrial process-related cleaning operations in accordance with other provisions of this code and not involving facilities maintenance cleaning operations.

~~5705.3.6.2~~5706.2.11.2 Listed and approved machines.
Parts cleaning and degreasing conducted in *listed* and *approved* machines in accordance with Section ~~5705.3.6.1~~5706.2.11.1 shall be in accordance with Sections ~~5705.3.6.2.1~~5706.2.11.2.1 through ~~5705.3.6.2.7~~5706.2.11.2.7.

~~5705.3.6.2.1~~5706.2.11.2.1 Solvents. Solvents shall be classified and shall be compatible with the machines within which they are used.

~~5705.3.6.2.2~~5706.2.11.2.2 Machine capacities. The quantity of solvent shall not exceed the *listed* design capacity of the machine for the solvent being used with the machine.

~~5705.3.6.2.3~~5706.2.11.2.3 Solvent quantity limits.
Solvent quantities shall be limited as follows:

1. Machines without remote solvent reservoirs shall be limited to quantities set forth in Section ~~5705.3.5~~5706.3.

2. Machines with remote solvent reservoirs using Class I liquids shall be limited to quantities set forth in Section ~~5705.3.5~~5706.3.

3. Machines with remote solvent reservoirs using Class II liquids shall be limited to 35 gallons (132 L) per machine. The total quantities shall not exceed an aggregate of 240 gallons (908 L) per *control area* in buildings not equipped throughout with an *approved automatic sprinkler system* and an aggregate of 480 gallons (1817 L) per *control area* in buildings equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1.

4. Machines with remote solvent reservoirs using Class IIIA liquids shall be limited to 80 gallons (303 L) per machine.

~~5705.3.6.2.4~~5706.2.11.2.4 Immersion soaking of parts. Work areas of machines with remote solvent reservoirs shall not be used for immersion soaking of parts.

~~5705.3.6.2.5~~5706.2.11.2.5 Separation. Multiple machines shall be separated from each other by a distance of not less than 30 feet (9144 mm) or by a *fire barrier* with a minimum 1-hour *fire-resistance rating*.

~~5705.3.6.2.6~~5706.2.11.2.6 Ventilation. Machines shall be located in areas adequately ventilated to prevent accumulation of vapors.

~~5705.3.6.2.7~~5706.2.11.2.7 Installation. Machines shall be installed in accordance with their listings.

~~5705.5~~5706.2.12 Alcohol-based hand rubs classified as Class I or II liquids.
The use of dispensers containing alcohol-based hand rubs classified as Class I or II liquids shall be in accordance with all of the following:

1. The maximum capacity of each dispenser shall be 68 ounces (2 L).

2. The minimum separation between dispensers shall be 48 inches (1219 mm).

3. Dispensers shall not be located above, below or closer than 1 inch (25 mm) to an electrical receptacle, switch, appliance, device or other ignition source. The wall space between the dispenser and the floor or intervening counter top shall be free of electrical receptacles, switches, appliances, devices or other ignition sources.
4. Dispensers shall be located so that the bottom of the dispenser is not less than 42 inches (1067 mm) and not more than 48 inches (1219 mm) above the finished floor.
5. Dispensers shall not obstruct required means of egress or be placed within 3 feet (914 mm) of an open flame, heating device or other ignition source.
6. Dispensers shall not release their contents except when the dispenser is manually activated. Facilities shall be permitted to install and use automatically activated “touch free” alcohol-based hand-rub dispensing devices with the following requirements:
    6.1. The facility or persons responsible for the dispensers shall test the dispensers each time a new refill is installed in accordance with the manufacturer’s care and use instructions.
    6.2. Dispensers shall be designed and must operate in a manner that ensures accidental or malicious activations of the dispensing device are minimized. At a minimum, all devices subject to or used in accordance with this section shall have the following safety features:
        6.2.1. Any activations of the dispenser shall only occur when an object is placed within 4 inches (98 mm) of the sensing device.
        6.2.2. The dispenser shall not dispense more than the amount required for hand hygiene consistent with label instructions as regulated by the United States Food and Drug Administration (USFDA).
        6.2.3. An object placed within the activation zone and left in place will cause only one activation.
7. Storage and use of alcohol-based hand rubs shall be in accordance with the applicable provisions of Sections 5704 and ~~5705~~ 5706.
8. Dispensers located in occupancies with carpeted floors shall only be allowed in *smoke compartments* or *fire areas* equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.

~~5705.5.1~~5706.2.12.1 Corridor installations.
In addition to the provisions of Section ~~5705.5~~5706.2.12, where dispensers containing alcohol-based hand rubs are located in *corridors* or rooms and areas open to the *corridor*, they shall be in accordance with all of the following:
1. Level 2 and 3 aerosol containers shall not be allowed in *corridors*.
2. The maximum capacity of each Class I or II liquid dispenser shall be 41 ounces (1.21 L) and the maximum capacity of each Level 1 aerosol dispenser shall be 18 ounces (0.51 kg).
3. The maximum quantity allowed in a *corridor* within a *control area* shall be 10 gallons (37.85 L) of Class I or II liquids or 1135 ounces (32.2 kg) of Level 1 aerosols, or a combination of Class I or II liquids and Level 1 aerosols not to exceed, in total, the equivalent of 10 gallons (37.85 L) or 1,135 ounces (32.2 kg) such that the sum of the ratios of the liquid and aerosol quantities divided by the allowable quantity of liquids and aerosols, respectively, shall not exceed one.
4. Projections into a *corridor* shall be in accordance with Section 1003.3.3.

~~5705.4~~5706.2.13 Solvent distillation units.
Solvent distillation units shall comply with Sections ~~5705.4.1~~5706.2.13.1 through ~~5705.4.9~~5706.2.13.9.

~~5705.4.1~~5706.2.13.1 Unit with a capacity of 60 gallons or less.
Solvent distillation units used to recycle Class I, II or IIIA liquids having a distillation chamber capacity of 60 gallons (227 L) or less shall be *listed*, *labeled* and installed in accordance with Section ~~5705.4~~5706.2.13 and UL 2208.

Exceptions:
1. Solvent distillation units used in continuous through-put industrial processes where the source of heat is remotely supplied using steam, hot water, oil or other heat transfer fluids, the temperature of which is below the auto-ignition point of the solvent.

2. *Approved* research, testing and experimental processes.

~~5705.4.2~~5706.2.13.2 Units with a capacity exceeding 60 gallons.
Solvent distillation units used to recycle Class I, II or IIIA liquids, having a distillation chamber capacity exceeding 60 gallons (227 L) shall be used in locations that comply with the use and mixing requirements of Section ~~5705~~5706.2 and other applicable provisions in this chapter.

~~5705.4.3~~5706.2.13.3 Prohibited processing. Class I, II and IIIA liquids that are classified as unstable (reactive) shall not be processed in solvent distillation units.

Exception: Appliances *listed* for the distillation of unstable (reactive) solvents.

~~5705.4.4~~5706.2.13.4 Labeling. A permanent label shall be affixed to the unit by the manufacturer. The label shall indicate the capacity of the distillation chamber, and the distance the unit shall be placed away from sources of ignition. The label shall indicate the products for which the unit has been *listed* for use or refer to the instruction manual for a list of the products.

~~5705.4.5~~5706.2.13.5 Manufacturer's instruction manual. An instruction manual shall be provided. The manual shall be readily available for the user and the *fire code official*. The manual shall include installation, use and servicing instructions. It shall identify the liquids for which the unit has been *listed* for distillation purposes along with each liquid's *flash point* and auto-ignition temperature. For units with adjustable controls, the manual shall include directions for setting the heater temperature for each liquid to be instilled.

~~5705.4.6~~5706.2.13.6 Location. Solvent distillation units shall be used in locations in accordance with the listing. Solvent distillation units shall not be used in *basements*.

~~5705.4.7~~5706.2.13.7 Storage of liquids.
Distilled liquids and liquids awaiting distillation shall be stored in accordance with the applicable Sections of 5704 and 5705.

~~5705.4.8~~5706.2.13.8 Storage of residues.
Hazardous residue from the distillation process shall be stored in accordance with the applicable Sections of 5704, 5705 and Chapter 50.

~~5705.4.9~~5706.2.13.9 Portable fire extinguishers.
Approved portable fire extinguishers shall be provided in accordance with Section 906. Not less than one portable fire extinguisher having a rating of not less than 40-B shall be located not less than 10 feet (3048 mm) or more than 30 feet (9144 mm) from any solvent distillation unit.

~~5705.3.5~~5706.3 ~~Quantity limits for use~~ Quantities not exceeding the maximum allowable quantity per control area.
Quantities not exceeding the maximum allowable quantity per control area for indoor dispensing, use, mixing and handling~~Liquid use quantity limitations~~ shall comply with Sections ~~5705.3.5.1~~5706.3.1 through ~~5705.3.5.3~~5706.3.2.

~~5705.3.5.1~~5706.3.1 Maximum allowable quantity per control area.
Indoor use, dispensing and mixing of *flammable* and *combustible liquids* shall not exceed the *maximum allowable quantity per control area* indicated in Table 5003.1.1(1) and shall not exceed the additional limitations set forth in Section ~~5705.3.5~~5706.3.2.
Use of hazardous production material *flammable* and *combustible liquids* in Group H-5 occupancies shall be in accordance with Chapter 27.

Exception: Cleaning with Class I, II and IIIA liquids shall be in accordance with Section ~~5705.3.6~~5706.2.11.

~~5705.3.5.2~~5706.3.2 Occupancy quantity limits.
The following limits for quantities of *flammable* and *combustible liquids* used, dispensed or mixed based on occupancy classification shall not be exceeded:

1. Group A occupancies: Quantities in Group A occupancies shall not exceed that necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
2. Group B occupancies: Quantities in drinking, dining, office and school uses within Group B occupancies shall not exceed that necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
3. Group E occupancies: Quantities in Group E occupancies shall not exceed that necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 5003.1.1(1).
4. Group F occupancies: Quantities in dining, office and school uses within Group F occupancies shall not exceed that necessary for demonstration, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
5. Group I occupancies: Quantities in Group I occupancies shall not exceed that necessary for demonstration, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
6. Group M occupancies: Quantities in dining, office and school uses within Group M occupancies shall not exceed that necessary for demonstration, laboratory work, maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
7. Group R occupancies: Quantities in Group R occupancies shall not exceed that necessary for maintenance purposes and operation of equipment, and shall not exceed quantities set forth in Table 5003.1.1(1).
8. Group S occupancies: Quantities in dining and office uses within Group S occupancies shall not exceed that necessary for demonstration, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 5003.1.1(1).

Exception: Cleaning with Class I, II, or IIIA liquids shall be in accordance with Section ~~5705.3.6~~5706.2.11.

~~5705.3.5.3~~5706.4 Quantities exceeding ~~limits for~~the maximum allowable quantity per control ~~areas~~area.
Quantities exceeding the *maximum allowable quantity per control area* indicated in Sections ~~5705.3.5.1~~5706.3.1 and ~~5705.3.5.2~~ 5706.3.2, or when required by Section 5706.2.11.1, shall be in accordance with the following:

1. For *open systems*, indoor use, dispensing and mixing of *flammable* and *combustible liquids* shall be within a room or building complying with the *International Building Code* and Sections ~~5705.3.7.1~~5706.4.1 through ~~5705.3.7.5.3~~5706.4.2.3.
2. For *closed systems*, indoor use, dispensing and mixing of *flammable* and *combustible liquids* shall be within a room or building complying with the *International Building Code* and Sections ~~5705.3.7~~5706.4.1 through ~~5705.3.7.4~~5706.4.1.4 and Section ~~5705.3.7.6~~5706.4.3.

~~5705.3.7~~5706.4.1 Rooms or buildings for quantities exceeding the maximum allowable quantity per control area.
Where required by Section ~~5705.3.5.3~~5706.4 or ~~5705.3.6.1~~5706.2.11.1, rooms or buildings used for the use, dispensing or mixing of *flammable* and *combustible liquids* in quantities exceeding the *maximum allowable quantity per control area* shall be in accordance with Sections ~~5705.3.7.1~~5706.4.1.1 through ~~5705.3.7.6.3~~5706.4.2.3.

~~5705.3.7.1~~5706.4.1.1 Construction, location and fire protection.
Rooms or buildings classified in accordance with the *International Building Code* as Group H-2 or H-3 occupancies based on use, dispensing or mixing of *flammable* or *combustible liquids* shall be constructed in accordance with the *International Building Code*.

~~5705.3.7.2~~5706.4.1.2 Basements.
In rooms or buildings classified in accordance with the *International Building Code* as Group H-2 or H-3, dispensing or mixing of *flammable* or *combustible liquids* shall not be conducted in *basements*.

~~5705.3.7.3~~5706.4.1.3 Fire protection.

Rooms or buildings classified in accordance with the *International Building Code* as Group H-2 or H-3 occupancies shall be equipped with an *approved automatic fire-extinguishing system* in accordance with Chapter 9.

~~5705.3.7.4~~5706.4.1.4 Doors.
Interior doors to rooms or portions of such buildings shall be self-closing fire doors in accordance with the *International Building Code*.

~~5705.3.7.5~~5706.4.2 Open systems.
Use, dispensing and mixing of *flammable* and *combustible liquids* in *open systems* shall be in accordance with Sections ~~5705.3.7.5.1~~ 5706.4.2.1 through ~~5705.3.7.5.3~~5706.4.2.3.

~~5705.3.7.5.1~~5706.4.2.1 Ventilation.
Continuous mechanical ventilation shall be provided at a rate of not less than 1 cfm per square foot [0.00508 $m^3/(s \times m^2)$] of floor area over the design area. Provisions shall be made for introduction of makeup air in such a manner to include all floor areas or pits where vapors can collect. Local or spot ventilation shall be provided where needed to prevent the accumulation of hazardous vapors. Ventilation system design shall comply with the *International Building Code* and *International Mechanical Code*.

Exception: Where natural ventilation can be shown to be effective for the materials used, dispensed or mixed.

~~5705.3.7.5.2~~5706.4.2.2 Explosion control.
Explosion control shall be provided in accordance with Section 911.

~~5705.3.7.5.3~~5706.4.2.3 Spill control and secondary containment.
Spill control shall be provided in accordance with Section ~~5703.4~~5004.2 where Class I, II or IIIA liquids are dispensed into containers exceeding a 1.3-gallon (5 L) capacity or mixed or used in open containers or systems exceeding a 5.3-gallon (20 L) capacity. Spill control and secondary containment shall be provided in accordance with Section ~~5703.4~~5004.2 where the capacity of an individual container exceeds 55 gallons (208 L) or the aggregate capacity of multiple containers or tanks exceeds 100 gallons (378.5 L).

~~5705.3.7.6~~5706.4.3 Closed systems.
Use or mixing of *flammable* or *combustible liquids* in *closed systems* shall be in accordance with Sections ~~5705.3.7.6.1~~5706.4.3.1 through ~~5705.3.7.6.3~~5706.4.3.3.

~~5705.3.7.6.1~~5706.4.3.1 Ventilation.
Closed systems designed to be opened as part of normal operations shall be provided with ventilation in accordance with Section ~~5705.3.7.5.1~~5706.4.2.1.

~~5705.3.7.6.2~~5706.4.3.2 Explosion control.
Explosion control shall be provided where an explosive environment can occur as a result of the mixing or use process. Explosion control shall be designed in accordance with Section 911.

Exception: Where process vessels are designed to contain fully the worst-case explosion anticipated within the vessel under process conditions considering the most likely failure.

~~5705.3.7.6.3~~5706.4.3.3 Spill control and secondary containment.
Spill control shall be provided in accordance with Section ~~5703.4~~5004.2.1 where *flammable* or *combustible liquids* are dispensed into containers exceeding a 1.3-gallon (5 L) capacity or mixed or used in open containers or systems exceeding a 5.3-gallon (20 L) capacity. ~~Spill control and secondary~~Secondary containment shall be provided in accordance with Section ~~5703.4~~5004.2 where the capacity of an individual container exceeds 55 gallons (208 L) or the aggregate capacity of multiple containers or tanks exceeds 1,000 gallons (3785 L).

~~5705.3.8~~5706.5 Use, dispensing and handling outside of buildings.
Outside use, dispensing and handling shall be in accordance with Sections ~~5705.3.8.1~~5706.5 through ~~5705.3.8.4~~5706.5.3. Dispensing of liquids into motor vehicle fuel tanks at motor fuel-dispensing facilities shall be in accordance with Chapter 23.

~~5705.3.8.1~~5706.5.1 Spill control.

Outside use, dispensing and handling areas shall be provided with spill control as set forth in Section ~~5703.4~~5004.2.

~~5705.3.8.2~~5706.5.2 Location on property.

Dispensing activities that exceed the quantities set forth in Table ~~5705.3.8.2~~5706.5.2 shall not be conducted within 15 feet (4572 mm) of buildings or combustible materials or within 25 feet (7620 mm) of building openings, *lot lines*, public streets, public alleys or *public ways*. Dispensing activities that exceed the quantities set forth in Table ~~5705.3.8.2~~5706.5.2 shall not be conducted within 15 feet (4572 mm) of storage of Class I, II or III liquids unless such liquids are stored in tanks that are *listed* and *labeled* as 2-hour protected tank assemblies in accordance with UL 2085.

Exceptions:

1. The requirements shall not apply to areas where only the following are dispensed: Class III liquids; liquids that are heavier than water; water-miscible liquids; and liquids with viscosities greater than 10,000 centipoise (cp) (10 Pa × s).
2. *Flammable* and *combustible liquid* dispensing in refineries, chemical plants, process facilities, gas and crude oil production facilities and oil-blending and packaging facilities, terminals and bulk plants.

TABLE ~~5705.3.8.2~~5706.5.2 MAXIMUM ALLOWABLE QUANTITIES FOR DISPENSING FLAMMABLE AND COMBUSTIBLE LIQUIDS IN OUTDOOR CONTROL AREAS[a, b]

CLASS OF LIQUID	QUANTITY (gallons)
Flammable	
Class IA	10
Class IB	15
Class IC	20
Combination Class IA, IB and IC	30[c]
Combustible	
Class II	30
Class IIIA	80
Class IIIB	3,300

For SI: 1 gallon = 3.785 L.

a. For definition of "Outdoor Control Area," see Section 202.

b. The fire code official is authorized to impose special conditions regarding locations, types of containers, dispensing units, fire control measures and other factors involving fire safety.

c. Containing not more than the maximum allowable quantity per control area of each individual class.

~~5705.3.8.3~~5706.5.2.1 Location of processing vessels.

Processing vessels shall be located with respect to distances to *lot lines* that can be built on in accordance with Table ~~5705.3.4(1)~~ 5706.2.10(1).

Exception: In refineries and distilleries.

~~5705.3.8.4~~5706.5.3 Weather protection.

Weather protection for outdoor use shall be in accordance with Section 5005.3.9.

SECTION ~~5706~~ 5707
SPECIAL OPERATIONS

~~5706.1~~ 5707.1 General.

This section shall cover the provisions for special operations that include, but are not limited to, storage, use, dispensing, mixing or handling of *flammable* and *combustible liquids*. The following special operations shall be in accordance with Sections 5701, 5703, 5704, ~~and~~ 5705 and 5706, except as ~~provided in Section 5706:~~modified by the following:

1. Storage and dispensing of *flammable* and *combustible liquids* on farms and construction sites shall comply with Section 5707.2.

2. Well drilling and operating shall comply with Section 5707.3.
3. Bulk plants or terminals shall comply with Section 5707.4.
4. Bulk transfer and process transfer operations utilizing tank vehicles and tank cars shall comply with Section 5707.5.
5. Tank vehicles and tank vehicle operation shall comply with Section 5707.6.
6. Refineries shall comply with Section 5707.7.
7. Vapor recovery and vapor-processing systems shall comply with Section 5707.8.

~~5706.2~~ 5707.2 Storage and dispensing of flammable and combustible liquids on farms and construction sites.
Permanent and temporary storage and dispensing of Class I and II liquids for private use on farms and rural areas and at construction sites, earth-moving projects, gravel pits or borrow pits shall be in accordance with Sections ~~5706.2.1~~5707.2.1 through ~~5706.2.8.1~~ 5707.2.8.1.

Exception: Storage and use of fuel oil and containers connected with oil-burning equipment regulated by Section 605 and the *International Mechanical Code*.

~~5706.2.1~~ 5707.2.1 Combustibles and open flames near tanks. Storage areas shall be kept free from weeds and extraneous combustible material. Open flames and smoking are prohibited in *flammable* or *combustible liquid* storage areas.

~~5706.2.2~~ 5707.2.2 Marking of tanks and containers. Tanks and containers for the storage of liquids above ground shall be conspicuously marked with the name of the product that they contain and the words: “FLAMMABLE—KEEP FIRE AND FLAME AWAY.” Tanks shall bear the additional marking: “KEEP 50 FEET FROM BUILDINGS.”

~~5706.2.3~~ 5707.2.3 Containers for storage and use.
Metal containers used for storage of Class I or II liquids shall be in accordance with DOTn requirements or shall be of an *approved* design.
Discharge devices shall be of a type that do not develop an internal pressure on the container. Pumping devices or *approved* self-closing faucets used for dispensing liquids shall not leak and shall be well-maintained. Individual containers shall not be interconnected and shall be kept closed when not in use.

Containers stored outside of buildings shall be in accordance with Section 5704 and the *International Building Code*.

~~5706.2.4~~ 5707.2.4 Permanent and temporary tanks.
The capacity of permanent above-ground tanks containing Class I or II liquids shall not exceed 1,100 gallons (4164 L). The capacity of temporary above-ground tanks containing Class I or II liquids shall not exceed 10,000 gallons (37 854 L). Tanks shall be of the single-compartment design.

Exception: Permanent above-ground tanks of greater capacity that meet the requirements of Section ~~5704.2~~5705.

~~5706.2.4.1~~ 5707.2.4.1 Fill-opening security. Fill openings shall be equipped with a locking closure device. Fill openings shall be separate from vent openings.

~~5706.2.4.2~~ 5707.2.4.2 Vents.
Tanks shall be provided with a method of normal and emergency venting. Normal vents shall be in accordance with Section ~~5704.2.7.3~~ 5705.2.1.3.
Emergency vents shall be in accordance with Section ~~5704.2.7.4~~5705.2.1.4. Emergency vents shall be arranged to discharge in a manner that prevents localized overheating or flame impingement on any part of the tank in the event that vapors from such vents are ignited.

~~5706.2.4.3~~ 5707.2.4.3 Location. Tanks containing Class I or II liquids shall be kept outside and not less than 50 feet (15 240 mm) from buildings and combustible storage. Additional distance shall be provided where necessary to ensure that vehicles, equipment and containers being filled directly from such tanks will not be less than 50 feet (15 240 mm) from structures, haystacks or other combustible storage.

~~5706.2.4.4~~ 5707.2.4.4 Locations where above-ground tanks are prohibited. The storage of Class I and II liquids in above-ground tanks is prohibited within the limits established by law as set forth in the fire code adoption ordinance or other regulation adopted by the jurisdiction .

~~5706.2.5~~ 5707.2.5 Type of tank. Tanks shall be provided with top openings only or shall be elevated for gravity discharge.

~~5706.2.5.1~~ 5707.2.5.1 Tanks with top openings only. Tanks with top openings shall be mounted in accordance with either of the following:

1. On well-constructed metal legs connected to shoes or runners designed so that the tank is stabilized and the entire tank and its supports can be moved as a unit.
2. For stationary tanks, on a stable base of timbers or blocks approximately 6 inches (152 mm) in height that prevents the tank from contacting the ground.

~~5706.2.5.1.1~~ 5707.2.5.1.1 Pumps and fittings. Tanks with top openings only shall be equipped with a tightly and permanently attached, *approved* pumping device having an *approved* hose of sufficient length for filling vehicles, equipment or containers to be served from the tank. Either the pump or the hose shall be equipped with a padlock to its hanger to prevent tampering. An effective antisiphoning device shall be included in the pump discharge unless a self-closing nozzle is provided. Siphons or internal pressure discharge devices shall not be used.

~~5706.2.5.2~~ 5707.2.5.2 Tanks for gravity discharge. Tanks with a connection in the bottom or the end for gravity-dispensing liquids shall be mounted and equipped as follows:

1. Supports to elevate the tank for gravity discharge shall be designed to carry all required loads and provide stability.
2. Bottom or end openings for gravity discharge shall be equipped with a valve located adjacent to the tank shell that will close automatically in the event of fire through the operation of an effective heat-activated releasing device. Where this valve cannot be operated manually, it shall be supplemented by a second, manually operated valve.

The gravity discharge outlet shall be provided with an *approved* hose equipped with a self-closing valve at the discharge end of a type that can be padlocked to its hanger.

~~5706.2.6~~ 5707.2.6 Spill control drainage control and diking.
Indoor storage and dispensing areas where the maximum allowable quantities per control area are exceeded and where required by Section 5004.2 shall be provided with spill control and drainage control as set forth in Section ~~5703.4~~5004.2. Outdoor storage areas shall be provided with drainage control or diking as set forth in Section ~~5704.2.10~~5705.2.1.11.

~~5706.2.7~~ 5707.2.7 Portable fire extinguishers.
Portable fire extinguishers with a minimum rating of 20-B:C and complying with Section 906 shall be provided where required by the *fire code official*.

~~5706.2.8~~ 5707.2.8 Dispensing from tank vehicles.
Where *approved*, liquids used as fuels are allowed to be transferred from tank vehicles into the tanks of motor vehicles or special equipment, provided that:

1. The tank vehicle's specific function is that of supplying fuel to motor vehicle fuel tanks.
2. The dispensing hose does not exceed 100 feet (30 480 mm) in length.
3. The dispensing nozzle is an *approved* type.
4. The dispensing hose is properly placed on an *approved* reel or in a compartment provided before the tank vehicle is moved.
5. Signs prohibiting smoking or open flames within 25 feet (7620 mm) of the vehicle or the point of refueling are prominently posted on the tank vehicle.
6. Electrical devices and wiring in areas where fuel dispensing is conducted are in accordance with NFPA 70.

7. Tank vehicle-dispensing equipment is operated only by designated personnel who are trained to handle and dispense motor fuels.
8. Provisions are made for controlling and mitigating unauthorized discharges.

~~**5706.2.8.1**~~ **5707.2.8.1** **Location.** Dispensing from tank vehicles shall be conducted not less than 50 feet (15 240 mm) from structures or combustible storage.

~~**5706.3**~~ **5707.3** **Well drilling and operating.**
Wells for oil and natural gas shall be drilled and operated in accordance with Sections ~~5706.3.1~~5707.3.1 through ~~5706.3.8~~5707.3.8.

~~**5706.3.1**~~ **5707.3.1** **Location.**
The location of wells shall comply with Sections ~~5706.3.1.1~~5707.3.1.1 through ~~5706.3.1.3.2~~5707.3.1.3.2.

~~**5706.3.1.1**~~ **5707.3.1.1** **Storage tanks and sources of ignition.** Storage tanks or boilers, fired heaters, open-flame devices or other sources of ignition shall not be located within 25 feet (7620 mm) of well heads. Smoking is prohibited at wells or tank locations except as designated and in *approved* posted areas.

Exception: Engines used in the drilling, production and serving of wells.

~~**5706.3.1.2**~~ **5707.3.1.2** **Streets and railways.** Wells shall not be drilled within 75 feet (22 860 mm) of any dedicated public street, highway or nearest rail of an operating railway.

~~**5706.3.1.3**~~ **5707.3.1.3** **Buildings.** Wells shall not be drilled within 100 feet (30 480 mm) of buildings not necessary to the operation of the well.

~~**5706.3.1.3.1**~~ **5707.3.1.3.1** **Group A, E or I buildings.** Wells shall not be drilled within 300 feet (91 440 mm) of buildings with an occupancy in Group A, E or I.

~~**5706.3.1.3.2**~~ **5707.3.1.3.2** **Existing wells.**
Where wells are existing, buildings shall not be constructed within the distances set forth in Section ~~5706.3.1~~5707.3.1 for separation of wells or buildings.

~~**5706.3.2**~~ **5707.3.2** **Waste control.** Control of waste materials associated with wells shall comply with Sections ~~5706.3.2.1~~5707.3.2.1 and ~~5706.3.2.2~~5707.3.2.2.

~~**5706.3.2.1**~~ **5707.3.2.1** **Discharge on a street or water channel.** Liquids containing crude petroleum or its products shall not be discharged into or on streets, highways, drainage canals or ditches, storm drains or flood control channels.

~~**5706.3.2.2**~~ **5707.3.2.2** **Discharge and combustible materials on ground.** The surface of the ground under, around or near wells, pumps, boilers, oil storage tanks or buildings shall be kept free from oil, waste oil, refuse or waste material.

~~**5706.3.3**~~ **5707.3.3** **Sumps.**
Sumps associated with wells shall comply with Sections ~~5706.3.3.1~~5707.3.3.1 through ~~5706.3.3.3~~5707.3.3.3.

~~**5706.3.3.1**~~ **5707.3.3.1** **Maximum width.** Sumps or other basins for the retention of oil or petroleum products shall not exceed 12 feet (3658 mm) in width.

~~**5706.3.3.2**~~ **5707.3.3.2** **Backfilling.** Sumps or other basins for the retention of oil or petroleum products larger than 6 feet by 6 feet by 6 feet (1829 mm by 1829 mm by 1829 mm) shall not be maintained longer than 60 days after the cessation of drilling operations.

~~**5706.3.3.3**~~ **5707.3.3.3** **Security.** Sumps, diversion ditches and depressions used as sumps shall be securely fenced or covered.

~~**5706.3.4**~~ **<u>5707.3.4</u> Prevention of blowouts.** Protection shall be provided to control and prevent the blowout of a well. Protection equipment shall meet federal, state and other applicable jurisdiction requirements.

~~**5706.3.5**~~ **<u>5707.3.5</u> Storage tanks.**
Storage of *flammable* or *combustible liquids* in tanks shall be in accordance with Section<u>s</u> 5704<u>and 5705</u>. Oil storage tanks or groups of tanks shall have posted in a conspicuous place, on or near such tank or tanks, an *approved* sign with the name of the *owner* or operator, or the lease number and the telephone number where a responsible person can be reached at any time.

~~**5706.3.6**~~ **<u>5707.3.6</u> Soundproofing.** Where soundproofing material is required during oil field operations, such material shall be noncombustible.

~~**5706.3.7**~~ **<u>5707.3.7</u> Signs.** Well locations shall have posted in a conspicuous place on or near such tank or tanks an *approved* sign with the name of the *owner* or operator, name of the leasee or the lease number, the well number and the telephone number where a responsible person can be reached at any time. Such signs shall be maintained on the premises from the time materials are delivered for drilling purposes until the well is abandoned.

~~**5706.3.8**~~ **<u>5707.3.8</u> Field-loading racks.**
Field-loading racks shall be in accordance with Section ~~5706.5~~<u>5707.5</u>.

~~**5706.4**~~ **<u>5707.4</u> Bulk plants or terminals.**
Portions of properties where *flammable* and *combustible liquids* are received by tank vessels, pipelines, tank cars or tank vehicles and stored or blended in bulk for the purpose of distribution by tank vessels, pipelines, tanks cars, tank vehicles or containers shall be in accordance with Sections ~~5706.4.1~~<u>5707.4.1</u> through ~~5706.4.10.4~~<u>5707.4.10.2</u>.

~~**5706.4.1**~~ **<u>5707.4.1</u> Building construction.**
Buildings shall be constructed in accordance with the *International Building Code*.

~~**5706.4.2**~~ **<u>5707.4.2</u> Means of egress.** Rooms in which liquids are stored, used or transferred by pumps shall have *means of egress* arranged to prevent occupants from being trapped in the event of fire.

~~**5706.4.3**~~ **<u>5707.4.3</u> Heating.** Rooms in which Class I liquids are stored or used shall be heated only by means not constituting a source of ignition, such as steam or hot water. Rooms containing heating appliances involving sources of ignition shall be located and arranged to prevent entry of flammable vapors.

~~**5706.4.4**~~ **<u>5707.4.4</u> Ventilation.**
Ventilation shall be provided for rooms, buildings and enclosures in which Class I liquids are pumped, used or transferred. Design of ventilation systems shall consider the relatively high specific gravity of the vapors. Where natural ventilation is used, adequate openings in outside walls at floor level, unobstructed except by louvers or coarse screens, shall be provided. Where natural ventilation is inadequate, mechanical ventilation shall be provided in accordance with the *International Mechanical Code*.

~~**5706.4.4.1**~~ **<u>5707.4.4.1</u> Basements and pits.** Class I liquids shall not be stored or used within a building having a *basement* or pit into which flammable vapors can travel, unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein.

~~**5706.4.4.2**~~ **<u>5707.4.4.2</u> Dispensing of Class I liquids.** Containers of Class I liquids shall not be drawn from or filled within buildings unless a provision is made to prevent the accumulation of flammable vapors in hazardous concentrations. Where mechanical ventilation is required, it shall be kept in operation while flammable vapors could be present.

~~**5706.4.5**~~ **<u>5707.4.5</u> Storage.**
Storage of Class I, II and IIIA liquids in bulk plants shall be in accordance with the applicable provisions of Section<u>s</u> 5704 <u>and 5705</u>.

~~**5706.4.6**~~ **<u>5707.4.6</u> Overfill protection of Class I and II liquids.**

Manual and automatic systems shall be provided to prevent overfill during the transfer of Class I and II liquids from mainline pipelines and marine vessels in accordance with API 2350.

~~5706.4.7~~ 5707.4.7 **Wharves.**
This section shall apply to all wharves, piers, bulkheads and other structures over or contiguous to navigable water having a primary function of transferring liquid cargo in bulk between shore installations and tank vessels, ships, barges, lighter boats or other mobile floating craft.

Exception: Marine motor fuel-dispensing facilities in accordance with Chapter 23.

~~5706.4.7.1~~ 5707.4.7.1 **Transferring approvals.** Handling packaged cargo of liquids, including full and empty drums, bulk fuel and stores, over a wharf during cargo transfer shall be subject to the approval of the wharf supervisor and the senior deck officer on duty.

~~5706.4.7.2~~ 5707.4.7.2 **Transferring location.** Wharves at which liquid cargoes are to be transferred in bulk quantities to or from tank vessels shall be not less than 100 feet (30 480 mm) from any bridge over a navigable waterway; or from an entrance to, or superstructure of, any vehicular or railroad tunnel under a waterway. The termination of the fixed piping used for loading or unloading at a wharf shall be not less than 200 feet (60 960 mm) from a bridge or from an entrance to, or superstructures of, a tunnel.

~~5706.4.7.3~~ 5707.4.7.3 **Superstructure and decking material.** Superstructure and decking shall be designed for the intended use. Decking shall be constructed of materials that will afford the desired combination of flexibility, resistance to shock, durability, strength and *fire resistance*.

~~5706.4.7.4~~ 5707.4.7.4 **Tanks allowed.** Tanks used exclusively for ballast water or Class II or III liquids are allowed to be installed on suitably designed wharves.

~~5706.4.7.5~~ 5707.4.7.5 **Transferring equipment.** Loading pumps capable of building up pressures in excess of the safe working pressure of cargo hose or loading arms shall be provided with bypasses, relief valves or other arrangements to protect the loading facilities against excessive pressure. Relief devices shall be tested not less than annually to determine that they function satisfactorily at their set pressure.

~~5706.4.7.6~~ 5707.4.7.6 **Piping, valves and fittings.** Piping valves and fittings shall be in accordance with Section ~~5703.6~~5703.5 except as modified by the following:

1. Flexibility of piping shall be ensured by appropriate layout and arrangement of piping supports so that motion of the wharf structure resulting from wave action, currents, tides or the mooring of vessels will not subject the pipe to repeated excessive strain.
2. Pipe joints that depend on the friction characteristics of combustible materials or on the grooving of pipe ends for mechanical continuity of piping shall not be used.
3. Swivel joints are allowed in piping to which hoses are connected and for articulated, swivel-joint transfer systems, provided that the design is such that the mechanical strength of the joint will not be impaired if the packing materials fail such as by exposure to fire.
4. Each line conveying Class I or II liquids leading to a wharf shall be provided with a block valve that has *ready access* and that is on shore, near the approach to the wharf and outside of any diked area. Where more than one line is involved, the valves shall be grouped in one location.
5. Means shall be provided for easy access to cargo line valves located below the wharf deck.
6. Piping systems shall contain a sufficient number of valves to operate the system properly and to control the flow of liquid in normal operation and in the event of physical damage.
7. Piping on wharves shall be bonded and grounded where Class I and II liquids are transported. Where excessive stray currents are encountered, insulating joints shall be installed. Bonding and grounding connections on piping shall be located on the wharf side of hose riser insulating flanges, where used, and shall be in a location provided with *ready access* for inspection.

8. Hose or articulated swivel-joint pipe connections used for cargo transfer shall be capable of accommodating the combined effects of change in draft and maximum tidal range, and mooring lines shall be kept adjusted to prevent surge of the vessel from placing stress on the cargo transfer system.
9. Hoses shall be supported to avoid kinking and damage from chafing.

~~5706.4.7.7~~ 5707.4.7.7 Loading and unloading. Loading or discharging shall not commence until the wharf superintendent and officer in charge of the tank vessel agree that the tank vessel is properly moored and connections are properly made.

~~5706.4.7.8~~ 5707.4.7.8 Mechanical work. Mechanical work shall not be performed on the wharf during cargo transfer, except under special authorization by the *fire code official* based on a review of the area involved, methods to be employed and precautions necessary.

~~5706.4.10.3~~ 5707.4.7.9 Obstruction of equipment.
Material shall not be placed on wharves in such a manner that would obstruct access to firefighting equipment or important pipeline control valves.

~~5706.4.10.4~~ 5707.4.7.10 Fire apparatus access.
Where the wharf is designed for vehicular traffic, an unobstructed fire apparatus access road to the shore end of the wharf shall be maintained in accordance with Chapter 5.

~~5706.4.8~~ 5707.4.8 Sources of ignition.
Class I, II or IIIA liquids shall not be used, drawn or dispensed where flammable vapors can reach a source of ignition. Smoking shall be prohibited except in designated locations. “No Smoking” signs complying with Section 310 shall be conspicuously posted where a hazard from flammable vapors is normally present.

~~5706.4.9~~ 5707.4.9 Drainage control.
Loading and unloading areas shall be provided with drainage control in accordance with Section ~~5704.2.10~~5705.2.1.11.

~~5706.4.10~~ 5707.4.10 Fire protection.
Fire protection shall be in accordance with Chapter 9 and Sections ~~5706.4.10.1~~5707.4.10.1 through ~~5706.4.10.4~~5707.4.10.2.

~~5706.4.10.1~~ 5707.4.10.1 Portable fire extinguishers.
Portable fire extinguishers with a rating of not less than 20-B and complying with Section 906 shall be located within 75 feet (22 860 mm) of hose connections, pumps and separator tanks.

~~5706.4.10.2~~ 5707.4.10.2 Fire hoses.
Where piped water is available, ready-connected fire hose in a size appropriate for the water supply shall be provided in accordance with Section 905 so that manifolds where connections are made and broken can be reached by not less than one hose stream.

~~5706.5~~ 5707.5 Bulk transfer and process transfer operations.
Bulk transfer and process transfer operations shall be *approved* and be in accordance with Sections ~~5706.5.1~~5707.5.1 through ~~5706.5.3.3~~5707.5.3.3. Motor fuel-dispensing facilities shall comply with Chapter 23.

~~5706.5.1~~ 5707.5.1 General.
~~The provisions of Sections 5706.5.1.1 through 5706.5.1.18 shall apply to bulk transfer and process transfer operations; Sections 5706.5.2 and 5706.5.2.1 shall apply to bulk transfer operations; Sections 5706.5.3 through 5706.5.3.3 shall apply to process transfer operations and Sections 5706.5.4 through 5706.5.4.5 shall apply to dispensing from tank vehicles and tank cars.~~The provisions of this section apply to bulk transfer and process transfer as follows:
1. Sections 5707.5.1.1 through 5707.5.1.18 apply to bulk transfer and process transfer.
2. Sections 5707.5.2 through 5707.5.2.1 apply to bulk transfer.

3. Sections 5707.5.3 through 5707.5.3.3 apply to process transfer.

See Section 5708.7 for dispensing from tank vehicles and tank cars into motor vehicles.

~~5706.5.1.1~~ 5707.5.1.1 Location. Bulk transfer and process transfer operations shall be conducted in *approved* locations. Tank cars shall be unloaded only on private sidings or railroad-siding facilities equipped for transferring *flammable* or *combustible liquids*. Tank vehicles and tank cars engaged in bulk transfer or process transfer operations shall be separated from buildings, above-ground tanks, combustible materials, *lot lines*, public streets, public alleys or *public ways* by a distance of 25 feet (7620 mm) for Class I liquids and 15 feet (4572 mm) for Class II and IIIA liquids measured from the nearest loading or unloading valve on the tank vehicle or tank car.

Exception: Buildings for pumps and shelters for personnel supporting transfer operations shall not be required to be separated from tank vehicles and tank cars engaged in bulk transfer or process transfer operations.

~~5706.5.1.2~~ 5707.5.1.2 Weather protection canopies.
Where weather protection canopies are provided, they shall be constructed in accordance with Section 5004.13. Weather protection canopies shall not be located within 15 feet (4572 mm) of a building or combustible material or within 25 feet (7620 mm) of building openings, *lot lines*, public streets, public alleys or *public ways*.

~~5706.5.1.3~~ 5707.5.1.3 Ventilation.
Ventilation shall be provided to prevent accumulation of vapors in accordance with Section ~~5705.3.7.5.1~~5706.4.2.1.

~~5706.5.1.4~~ 5707.5.1.4 Sources of ignition.
Sources of ignition shall be controlled or eliminated in accordance with Section 5003.7.

~~5706.5.1.5~~ 5707.5.1.5 Spill control and secondary containment.
Areas where transfer operations are located shall be provided with spill control and secondary containment in accordance with Section ~~5703.4~~5004.2. The spill control and secondary containment system shall have a design capacity capable of containing the capacity of the largest tank compartment located in the area where transfer operations are conducted. Containment of the rainfall volume specified in Section 5004.2.2.6 is not required.

~~5706.5.1.6~~ 5707.5.1.6 Fire protection.
Fire protection shall be in accordance with Section 5703.2.

~~5706.5.1.7~~ 5707.5.1.7 Static protection. Static protection shall be provided to prevent the accumulation of static charges during transfer operations. Bonding facilities shall be provided during the transfer through open domes where Class I liquids are transferred, or where Class II and III liquids are transferred into tank vehicles or tank cars that could contain vapors from previous cargoes of Class I liquids. Protection shall consist of a metallic bond wire permanently electrically connected to the fill stem. The fill pipe assembly shall form a continuous electrically conductive path downstream from the point of bonding. The free end of such bond wire shall be provided with a clamp or equivalent device for convenient attachment to a metallic part in electrical contact with the cargo tank of the tank vehicle or tank car. For tank vehicles, protection shall consist of a flexible bond wire of adequate strength for the intended service and the electrical resistance shall not exceed 1 megohm. For tank cars, bonding shall be provided where the resistance of a tank car to ground through the rails is 25 ohms or greater.

Such bonding connection shall be fastened to the vehicle, car or tank before dome covers are raised and shall remain in place until filling is complete and all dome covers have been closed and secured.

Exceptions:

1. Where vehicles and cars are loaded exclusively with products not having a static-accumulating tendency, such as asphalt, cutback asphalt, most crude oils, residual oils and water-miscible liquids.
2. Where Class I liquids are not handled at the transfer facility and the tank vehicles are used exclusively for Class II and III liquids.
3. Where vehicles and cars are loaded or unloaded through closed top or bottom connections whether the hose is conductive or nonconductive.

Filling through open domes into the tanks of tank vehicles or tank cars that contain vapor-air mixtures within the flammable range, or where the liquid being filled can form such a mixture, shall be by means of a downspout that extends to near the bottom of the tank.

~~**5706.5.1.8**~~ **5707.5.1.8 Stray current protection.** Tank car loading facilities where Class I, II or IIIA liquids are transferred through open domes shall be protected against stray currents by permanently bonding the pipe to not less than one rail and to the transfer apparatus. Multiple pipes entering the transfer areas shall be permanently electrically bonded together. In areas where excessive stray currents are known to exist, all pipes entering the transfer area shall be provided with insulating sections to isolate electrically the transfer apparatus from the pipelines.

~~**5706.5.1.9**~~ **5707.5.1.9 Top loading.**
When top loading a tank vehicle with Class I and II liquids without vapor control, valves used for the final control of flow shall be of the self-closing type and shall be manually held open except where automatic means are provided for shutting off the flow when the tank is full. Where used, automatic shutoff systems shall be provided with a manual shutoff valve located at a safe distance from the loading nozzle to stop the flow if the automatic system fails.
When top loading a tank vehicle with vapor control, flow control shall be in accordance with Section ~~5706.5.1.10~~5707.5.1.10. Self-closing valves shall not be tied or locked in the open position.

~~**5706.5.1.10**~~ **5707.5.1.10 Bottom loading.** When bottom loading a tank vehicle or tank car with or without vapor control, a positive means shall be provided for loading a predetermined quantity of liquid, together with an automatic secondary shutoff control to prevent overfill. The connecting components between the transfer equipment and the tank vehicle or tank car required to operate the secondary control shall be functionally compatible.

~~**5706.5.1.10.1**~~ **5707.5.1.10.1 Dry disconnect coupling.** When bottom loading a tank vehicle, the coupling between the liquid loading hose or pipe and the truck piping shall be a dry disconnect coupling.

~~**5706.5.1.10.2**~~ **5707.5.1.10.2 Venting.** When bottom loading a tank vehicle or tank car that is equipped for vapor control and vapor control is not used, the tank shall be vented to the atmosphere to prevent pressurization of the tank. Such venting shall be at a height equal to or greater than the top of the cargo tank.

~~**5706.5.1.10.3**~~ **5707.5.1.10.3 Vapor-tight connection.** Connections to the plant vapor control system shall be designed to prevent the escape of vapor to the atmosphere when not connected to a tank vehicle or tank car.

~~**5706.5.1.10.4**~~ **5707.5.1.10.4 Vapor-processing equipment.** Vapor-processing equipment shall be separated from above-ground tanks, warehouses, other plant buildings, transfer facilities or nearest *lot line* of adjoining property that can be built on by a distance of not less than 25 feet (7620 mm). Vapor-processing equipment shall be protected from physical damage by remote location, guard rails, curbs or fencing.

~~**5706.5.1.11**~~ **5707.5.1.11 Switch loading.** Tank vehicles or tank cars that have previously contained Class I liquids shall not be loaded with Class II or III liquids until such vehicles and all piping, pumps, hoses and meters connected thereto have been completely drained and flushed.

~~**5706.5.1.12**~~ **5707.5.1.12 Loading racks.**
Where provided, loading racks, *stairways* or platforms shall be constructed of noncombustible materials. Buildings for pumps or for shelter of loading personnel are allowed to be part of the loading rack. Wiring and electrical equipment located within 25 feet (7620 mm) of any portion of the loading rack shall be in accordance with Section 5703.1.1.

~~**5706.5.1.13**~~ **5707.5.1.13 Transfer apparatus.** Bulk and process transfer apparatus shall be of an *approved* type.

~~**5706.5.1.14**~~ **5707.5.1.14 Inside buildings.** Tank vehicles and tank cars shall not be located inside a building while transferring Class I, II or IIIA liquids, unless *approved* by the *fire code official*.

> **Exception:** Tank vehicles are allowed under weather protection canopies and canopies of automobile motor vehicle fuel-dispensing stations.

~~5706.5.1.15~~ 5707.5.1.15 Tank vehicle and tank car certification.
Certification shall be maintained for tank vehicles and tank cars in accordance with DOTn 49 CFR Parts 100–185.

~~5706.5.1.16~~ 5707.5.1.16 Tank vehicle and tank car stability.
Tank vehicles and tank cars shall be stabilized against movement during loading and unloading in accordance with Sections ~~5706.5.1.16.1~~5707.5.1.16.1 through ~~5706.5.1.16.3~~5707.5.1.16.3.

~~5706.5.1.16.1~~ 5707.5.1.16.1 Tank vehicles. When the vehicle is parked for loading or unloading, the cargo trailer portion of the tank vehicle shall be secured in a manner that will prevent unintentional movement.

~~5706.5.1.16.2~~ 5707.5.1.16.2 Chock blocks. Not less than two chock blocks not less than 5 inches by 5 inches by 12 inches (127 mm by 127 mm by 305 mm) in size and dished to fit the contour of the tires shall be used during transfer operations of tank vehicles.

~~5706.5.1.16.3~~ 5707.5.1.16.3 Tank cars. Brakes shall be set and the wheels shall be blocked to prevent rolling.

~~5706.5.1.17~~ 5707.5.1.17 Monitoring. Transfer operations shall be monitored by an *approved* monitoring system or by an attendant. Where monitoring is by an attendant, the operator or other competent person shall be present at all times.

~~5706.5.1.18~~ 5707.5.1.18 Security.
Transfer operations shall be surrounded by a noncombustible fence not less than 5 feet (1524 mm) in height. Tank vehicles and tank cars shall not be loaded or unloaded unless such vehicles are entirely within the fenced area.

Exceptions:

1. Motor fuel-dispensing facilities complying with Chapter 23.
2. Installations where adequate public safety exists because of isolation, natural barriers or other factors as determined appropriate by the *fire code official*.
3. Facilities or properties that are entirely enclosed or protected from entry.

~~5706.5.2~~ 5707.5.2 Bulk transfer.
Bulk transfer shall be in accordance with Sections ~~5706.5.1~~5707.5.1 and ~~5706.5.2.1~~5707.5.2.1.

~~5706.5.2.1~~ 5707.5.2.1 Vehicle motor. Motors of tank vehicles or tank cars shall be shut off during the making and breaking of hose connections and during the unloading operation.

Exception: Where unloading is performed with a pump deriving its power from the tank vehicle motor.

~~5706.5.3~~ 5707.5.3 Process transfer.
Process transfer shall be in accordance with Section ~~5706.5.1~~5707.5.1 and Sections ~~5706.5.3.1~~5707.5.3 through ~~5706.5.3.3~~5707.5.3.3.

~~5706.5.3.1~~ 5707.5.3.1 Piping, valves, hoses and fittings.
Piping, valves, hoses and fittings that are not a part of the tank vehicle or tank car shall be in accordance with Section ~~5703.6~~5703.5. Caps or plugs that prevent leakage or spillage shall be provided at all points of connection to transfer piping.

~~5706.5.3.1.1~~ 5707.5.3.1.1 Shutoff valves. *Approved* automatically or manually activated shutoff valves shall be provided where the transfer hose connects to the process piping, and on both sides of any exterior *fire-resistance-rated* wall through which the piping passes. Manual shutoff valves shall be arranged so that they are able to be accessed from grade. Valves shall not be locked in the open position.

~~5706.5.3.1.2~~ 5707.5.3.1.2 Hydrostatic relief. Hydrostatic pressure-limiting or relief devices shall be provided where pressure buildup in trapped sections of the system could exceed the design pressure of the components of the system.
Devices shall relieve to other portions of the system or to another *approved* location.

~~5706.5.3.1.3~~ **5707.5.3.1.3 Antisiphon valves.** Antisiphon valves shall be provided where the system design would allow siphonage.

~~5706.5.3.2~~ **5707.5.3.2 Vents.** Normal and emergency vents shall be maintained operable at all times.

~~5706.5.3.3~~ **5707.5.3.3 Motive power.** Motors of tank vehicles or tank cars shall be shut off during the making and breaking of hose connections and during the unloading operation.

Exception: When unloading is performed with a pump deriving its power from the tank vehicle motor.

~~5706.6~~ **5707.6 Tank vehicles and vehicle operation.**
Tank vehicles shall be designed, constructed, equipped and maintained in accordance with NFPA 385 and Sections ~~5706.6.1~~5707.6.1 through ~~5706.6.4~~5707.6.4.

~~5706.6.1~~ **5707.6.1 Operation of tank vehicles.**
Tank vehicles shall be utilized and operated in accordance with NFPA 385 and Sections ~~5706.6.1.1~~5707.6.1.1 through ~~5706.6.1.11~~ 5707.6.1.11.

~~5706.6.1.1~~ **5707.6.1.1 Vehicle maintenance.** Tank vehicles shall not be operated unless they are in proper state of repair and free from accumulation of grease, oil or other flammable substance, and leaks.

~~5706.6.1.2~~ **5707.6.1.2 Leaving vehicle unattended.** The driver, operator or attendant of a tank vehicle shall not remain in the vehicle cab and shall not leave the vehicle while it is being filled or discharged. The delivery hose, when attached to a tank vehicle, shall be considered to be a part of the tank vehicle.

~~5706.6.1.3~~ **5707.6.1.3 Vehicle motor shutdown.** Motors of tank vehicles or tractors shall be shut down during the making or breaking of hose connections. If loading or unloading is performed without the use of a power pump, the tank vehicle or tractor motor shall be shut down throughout such operations.

~~5706.6.1.4~~ **5707.6.1.4 Outage.** A cargo tank or compartment thereof used for the transportation of *flammable* or *combustible liquids* shall not be loaded to absolute capacity. The vacant space in a cargo tank or compartment thereof used in the transportation of *flammable* or *combustible liquids* shall be not less than 1 percent. Sufficient space shall be left vacant to prevent leakage from or distortion of such tank or compartment by expansion of the contents caused by rise in temperature in transit.

~~5706.6.1.5~~ **5707.6.1.5 Overfill protection.** The driver, operator or attendant of a tank vehicle shall, before making delivery to a tank, determine the unfilled capacity of such tank by a suitable gauging device. To prevent overfilling, the driver, operator or attendant shall not deliver in excess of that amount.

~~5706.6.1.6~~ **5707.6.1.6 Securing hatches.** During loading, hatch covers shall be secured on all but the receiving compartment.

~~5706.6.1.7~~ **5707.6.1.7 Liquid temperature.** Materials shall not be loaded into or transported in a tank vehicle at a temperature above the material's ignition temperature unless safeguarded in an *approved* manner.

~~5706.6.1.8~~ **5707.6.1.8 Bonding to underground tanks.** An external bond-wire connection or bond-wire integral with a hose shall be provided for the transferring of *flammable liquids* through open connections into underground tanks.

~~5706.6.1.9~~ **5707.6.1.9 Smoking.** Smoking by tank vehicle drivers, helpers or other personnel is prohibited while they are driving, making deliveries, filling or making repairs to tank vehicles.

~~5706.6.1.10~~ **5707.6.1.10 Hose connections.** Delivery of *flammable liquids* to underground tanks with a capacity of more than 1,000 gallons (3785 L) shall be made by means of *approved* liquid and vapor-tight connections between the delivery hose and tank fill pipe. Where underground tanks are equipped with any type of vapor recovery system, all connections required to be made for the safe and proper functioning of the particular vapor recovery process shall be made. Such connections shall be made liquid and vapor tight and remain connected throughout the unloading process. Vapors shall not be discharged at grade level during delivery.

~~**5706.6.1.10.1**~~ **5707.6.1.10.1 Simultaneous delivery.** Simultaneous delivery to underground tanks of any capacity from two or more discharge hoses shall be made by means of mechanically tight connections between the hose and fill pipe.

~~**5706.6.1.11**~~ **5707.6.1.11 Hose protection.** Upon arrival at a point of delivery and prior to discharging any *flammable* or *combustible liquids* into underground tanks, the driver, operator or attendant of the tank vehicle shall ensure that all hoses utilized for liquid delivery and vapor recovery, where required, will be protected from physical damage by motor vehicles. Such protection shall be provided by positioning the tank vehicle to prevent motor vehicles from passing through the area or areas occupied by hoses, or by other *approved* equivalent means.

~~**5706.6.2**~~ **5707.6.2 Parking.**
Parking of tank vehicles shall be in accordance with Sections ~~5706.6.2.1~~5707.6.2.1 through ~~5706.6.2.3~~5707.6.2.3.

Exception: In cases of accident, breakdown or other emergencies, tank vehicles are allowed to be parked and left unattended at any location while the operator is obtaining assistance.

~~**5706.6.2.1**~~ **5707.6.2.1 Parking near residential, educational and institutional occupancies and other high-risk areas.** Tank vehicles shall not be left unattended at any time on residential streets, or within 500 feet (152 m) of a residential area, apartment or hotel complex, educational facility, hospital or care facility. Tank vehicles shall not be left unattended at any other place that would, in the opinion of the *fire chief*, pose an extreme life hazard.

~~**5706.6.2.2**~~ **5707.6.2.2 Parking on thoroughfares.**
Tank vehicles shall not be left unattended on a public street, highway, public avenue or public alley.

Exceptions:

1. The necessary absence in connection with loading or unloading the vehicle. During actual fuel transfer, Section ~~5706.6.1.2~~ 5707.6.1.2 shall apply. The vehicle location shall be in accordance with Section ~~5706.6.2.1~~5707.6.2.1.
2. Stops for meals during the day or night, where the street is well lighted at the point of parking. The vehicle location shall be in accordance with Section ~~5706.6.2.1~~5707.6.2.1.

~~**5706.6.2.3**~~ **5707.6.2.3 Duration exceeding 1 hour.** Tank vehicles parked at one point for longer than 1 hour shall be located off of public streets, highways, public avenues or alleys, and in accordance with either of the following:

1. Inside of a bulk plant and either 25 feet (7620 mm) or more from the nearest *lot line* or within a building *approved* for such use.
2. At other *approved* locations not less than 50 feet (15 240 mm) from the buildings other than those *approved* for the storage or servicing of such vehicles.

~~**5706.6.3**~~ **5707.6.3 Garaging.** Tank vehicles shall not be parked or garaged in buildings other than those specifically *approved* for such use by the *fire code official*.

~~**5706.6.4**~~ **5707.6.4 Portable fire extinguisher.** Tank vehicles shall be equipped with a portable fire extinguisher complying with Section 906 and having a minimum rating of 2-A:20-B:C.
During unloading of the tank vehicle, the portable fire extinguisher shall be out of the carrying device on the vehicle and shall be 15 feet (4572 mm) or more from the unloading valves.

~~**5706.7**~~ **5707.7 Refineries.**
Plants and portions of plants in which *flammable liquids* are produced on a scale from crude petroleum, natural gasoline or other hydrocarbon sources shall be in accordance with Sections ~~5706.7.1~~5707.7.1 through ~~5706.7.3~~5707.7.3. Petroleum-processing plants and facilities or portions of plants or facilities in which *flammable* or *combustible liquids* are handled, treated or produced on a commercial scale from crude petroleum, natural gasoline, or other hydrocarbon sources shall also be in accordance with API 651, API 653, API 752, API 1615, API 2001, API 2003, API 2009, API 2015, API 2023, API 2201 and API 2350.

~~**5706.7.1**~~ **5707.7.1 Corrosion protection.**
Above-ground tanks and piping systems shall be protected against corrosion in accordance with API 651.

~~5706.7.2~~ 5707.7.2 Cleaning of tanks.
The safe entry and cleaning of petroleum storage tanks shall be conducted in accordance with API 2015.

~~5706.7.3~~ 5707.7.3 Storage of heated petroleum products.
Where petroleum-derived asphalts and residues are stored in heated tanks at refineries and bulk storage facilities or in tank vehicles, such products shall be in accordance with API 2023.

~~5706.8~~ 5707.8 Vapor recovery and vapor-processing systems.
Vapor-processing systems in which the vapor source operates at pressures from vacuum, up to and including 1 psig (6.9 kPa) or in which a potential exists for vapor mixtures in the flammable range, shall comply with Sections ~~5706.8.1~~5707.8.1 through ~~5706.8.5~~5707.8.5.

Exceptions:

1. Marine systems complying with federal transportation waterway regulations such as DOTn 33 CFR Parts 154 through 156, and CGR 46 CFR Parts 30, 32, 35 and 39.
2. Motor fuel-dispensing facility systems complying with Chapter 23.

~~5706.8.1~~ 5707.8.1 Over-pressure/vacuum protection.
Tanks and equipment shall have independent venting for over-pressure or vacuum conditions that might occur from malfunction of the vapor recovery or processing system.

Exception: For tanks, venting shall comply with Section ~~5704.2.7.3~~5705.2.1.3.

~~5706.8.2~~ 5707.8.2 Vent location. Vents on vapor-processing equipment shall be not less than 12 feet (3658 mm) from adjacent ground level, with outlets located and directed so that flammable vapors will disperse to below the lower flammable limit (LFL) before reaching locations containing potential ignition sources.

~~5706.8.3~~ 5707.8.3 Vapor collection systems and overfill protection.
The design and operation of the vapor collection system and overfill protection shall be in accordance with this section and Section 19.5 of NFPA 30.

~~5706.8.4~~ 5707.8.4 Liquid-level monitoring. A liquid knock-out vessel used in the vapor collection system shall have means to verify the liquid level and a high-liquid-level sensor that activates an alarm. For unpopulated facilities, the high-liquid-level sensor shall initiate the shutdown of liquid transfer into the vessel and shutdown of vapor recovery or vapor-processing systems.

~~5706.8.5~~ 5707.8.5 Overfill protection.
Storage tanks served by vapor recovery or processing systems shall be equipped with overfill protection in accordance with Section ~~5704.2.7.5.8~~5705.2.1.5.8.

SECTION ~~5707~~ 5708
~~ON-DEMAND~~ MOBILE FUELING OPERATIONS

Add new text as follows:

5708.1 General. Mobile fueling operations dispensing Class I, II or III liquids into the fuel tanks of motor vehicles shall comply with this section.
Exception: Transfer of liquid from tank vehicles to motor vehicles for private use on farms and rural areas and at construction sites, earth-moving projects, gravel pits and borrow pits is allowed when in accordance with Section 5707.2.8.

Revise as follows:

~~5707.1~~ 5708.2 ~~General~~ On-demand mobile fueling.

On-demand *mobile fueling* operations that dispense Class I, II and III liquids into the fuel tanks of motor vehicles shall comply with Sections ~~5707.1~~ 5708.2.1 through ~~5707.6.6~~ 5708.2.7.6.

Exception: Fueling from an approved portable container in cases of an emergency or for personal use.

~~5707.1.1~~ 5708.2.1 Approval required.
Mobile fueling operations shall not be conducted without first obtaining an operational permit in accordance with Section 105.5.18.

~~5707.1.2~~ 5708.2.2 Location.
Mobile fueling operations shall occur only at *approved* locations. The *fire code official* is authorized to approve individual locations or geographic areas where *mobile fueling* is allowed.

~~5707.2~~ 5708.2.3 Mobile fueling vehicle.
An on-demand *mobile fueling* vehicle shall be that which is utilized in on-demand fueling operations for the dispensing of Class I, II or III liquids into the fuel tanks of motor vehicles.

~~5707.2.1~~ 5708.2.3.1 Mobile fueling vehicle classifications.
An on-demand *mobile fueling* vehicle shall be characterized as one of the following:

1. **Tier 1 *mobile fueling* vehicle.** A tank vehicle that complies with NFPA 385 and that has chassis-mounted tanks where the aggregate capacity does not exceed 1,600 gallons (6057 L).
2. **Tier 2 *mobile fueling* vehicle.** A vehicle with one or more chassis-mounted tanks or containers that do not exceed 110 gallons (416 L) in capacity with an aggregate capacity that does not exceed 800 gallons (3028 L) or the weight capacity of the vehicle in accordance with DOTn.
3. **Tier 3 *mobile fueling* vehicle.** A vehicle that carries a maximum aggregate capacity of 60 gallons (227 L) of motor fuel in metal safety cans *listed* in accordance with UL 30 or other *approved* metal containers, each not to exceed 5 gallons (19 L) in capacity.

~~5707.2.2~~ 5708.2.3.2 Mobile fueling vehicle requirements.
Each *mobile fueling* vehicle shall comply with all local, state and federal requirements, as well as the following:

1. *Mobile fueling* vehicles with a chassis-mounted tank in excess of 110 gallons (416 L) shall also comply with the requirements of Section ~~5706.6~~5707.6 and NFPA 385.
2. The *mobile fueling* vehicle and its equipment shall be maintained in good repair.
3. Safety cans and *approved* metal containers shall be secured to the *mobile fueling* vehicle except when in use.
4. Fueling a motor vehicle from tanks or containers mounted in a trailer connected to a *mobile fueling* vehicle shall be prohibited.

~~5707.3~~ 5708.2.4 Required documents.
Documents developed to comply with Sections ~~5707.3.1~~5708.2.4.1 through ~~5707.3.3~~5708.2.4.3 shall be updated as necessary by the *owner* of the *mobile fueling* operation and shall be maintained in compliance with Section 110.3.

~~5707.3.1~~ 5708.2.4.1 Safety and emergency response plan. *Mobile fueling* operators shall have an *approved* written safety and emergency response plan that establishes policies and procedures for fire safety, spill prevention and control, personnel training and compliance with other applicable requirements of this code.

~~5707.3.2~~ 5708.2.4.2 Training records. *Mobile fueling* vehicles shall be operated only by designated personnel who are trained on proper fueling procedures and the safety and emergency response plan. Training records of operators shall be maintained.

~~5707.3.3~~ 5708.2.4.3 Site plan.
Where required by the *fire code official*, a site plan shall be developed for each location or area at which *mobile fueling* occurs. The site plan shall be in sufficient detail to indicate the following:

1. All buildings and structures.

2. *Lot lines* or property lines.
3. Electric car chargers.
4. Solar photovoltaic parking lot canopies.
5. Appurtenances on-site and their use or function.
6. All uses adjacent to the *lot lines* of the site.
7. Fueling locations.
8. Locations of all storm drain openings and adjacent waterways or wetlands.
9. Information regarding slope, natural drainage, curbing and impounding.
10. How a spill will be kept on the site property.
11. Scale of the site plan.

~~5707.4~~ <u>5708.2.5</u> Mobile fueling areas. During fueling, the *mobile fueling* vehicle and point of connection to the vehicle shall not be located on public streets, *public ways* or inside *buildings*. Fueling on the roof level of parking structures or other *buildings* is prohibited.

~~5707.4.1~~ <u>5708.2.5.1</u> Separation.
During fueling, the point of connection to the vehicle being fueled shall not take place within 25 feet (7620 mm) of buildings, *lot lines*, property lines or combustible storage. *Mobile fueling* vehicles shall not park within 10 feet (3048 mm) of buildings, *lot lines*, property lines or combustible storage.

Exceptions:

1. The *fire code official* shall be authorized to decrease the separation distance for dispensing from metal safety cans or other *approved* metal containers in accordance with Section ~~5707.2~~<u>5708.2.3.1</u>.
2. The point of fueling shall not take place within 10 feet (3048 mm) of buildings, *lot lines*, property lines or combustible storage where the *mobile fueling* vehicle has an *approved* vapor recovery system or is servicing vehicles with onboard refueling vapor recovery.

Where dispensing operations occur within 15 feet (4572 mm) of a storm drain, an *approved* storm drain cover or an *approved* equivalent method that will prevent any fuel from reaching the drain shall be used.

~~5707.4.2~~ <u>5708.2.5.2</u> Sources of ignition. Smoking, open flames and other sources of ignition shall be prohibited within 25 feet (7620 mm) of fuel dispensing activities. Signs prohibiting smoking or open flames within 25 feet (7620 mm) of the vehicle or the point of fueling shall be prominently posted on the *mobile fueling* vehicle. The engines of vehicles being fueled shall be shut off during fueling.

~~5707.4.3~~ <u>5708.2.5.3</u> Electrical equipment.
Mobile fueling shall not occur within 20 feet (6096 mm) of electrical equipment located within 18 inches (457 mm) of the ground unless such electrical equipment is rated for Class I, Division 2, hazardous locations in accordance with NFPA 70.

~~5707.5~~ <u>5708.2.6</u> Equipment.
Mobile fueling equipment shall comply with Sections ~~5707.5.1~~<u>5708.2.6.1</u> through ~~5707.5.5~~<u>5708.2.6.5</u>.

~~5707.5.1~~ <u>5708.2.6.1</u> Dispensing hoses and nozzles. Where equipped, the dispensing hose shall not exceed 50 feet (15 240 mm) in length. The dispensing nozzles and hoses shall be of an *approved* and *listed* type. Where metal-to-metal contact cannot be made between the nozzle and the fuel fill opening, a means for bonding the *mobile fueling* vehicle to the motor vehicle shall be provided and employed during fueling operations.

~~5707.5.2~~ <u>5708.2.6.2</u> Breakaway device.
A *listed* breakaway device shall be provided at the nozzle.

Exception: *Mobile fueling* vehicles equipped with an *approved* brake interlock tied to the nozzle holder that prohibits movement of the *mobile fueling* vehicle when the nozzle is removed from its holder or tied to the delivery of fuel that prevents activation of the pumping system.

~~5707.5.3~~ 5708.2.6.3 **Shutoff valve and fuel limit.** *Mobile fueling* vehicles shall be equipped with a *listed* shutoff valve assembly and a fuel limit switch set to a maximum of 30 gallons (116 L).

~~5707.5.4~~ 5708.2.6.4 **Fire extinguisher.**
An *approved* portable fire extinguisher complying with Section 906 with a minimum rating of4-A:80-B:C shall be provided on the *mobile fueling* vehicle with signage clearly indicating its location.

~~5707.5.5~~ 5708.2.6.5 **Spill kit.** *Mobile fueling* vehicles shall contain a minimum 5-gallon (19 L) spill kit of an *approved* type.

~~5707.6~~ 5708.2.7 **Operations.** *Mobile fueling* vehicles shall be constantly attended during fueling operations with brakes set and warning lights in operation. *Mobile fueling* vehicles shall not obstruct emergency vehicle access roads.

~~5707.6.1~~ 5708.2.7.1 **Dispensing hose.** Where equipped, *mobile fueling* vehicles shall be positioned in a manner to preclude traffic from driving over the dispensing hose. The dispensing hose shall be properly placed on an *approved* reel or in an *approved* compartment prior to moving the *mobile fueling* vehicle.

~~5707.6.2~~ 5708.2.7.2 **Drip control.** Operators shall place a drip pan or an absorbent pillow under the nozzle and each fuel fill opening prior to and during dispensing operations to catch drips.

~~5707.6.3~~ 5708.2.7.3 **Safety cones.** Safety cones or other visual barriers shall be employed as warning devices to highlight the vehicle fueling area.

~~5707.6.4~~ 5708.2.7.4 **Vehicle lights.** The *mobile fueling* vehicle flasher lights shall be in operation while dispensing operations are in progress.

~~5707.6.5~~ 5708.2.7.5 **Nighttime deliveries.** Nighttime deliveries shall be made only in areas deemed adequately lighted by the *fire code official.*

~~5707.6.6~~ 5708.2.7.6 **Spill reporting.**
Spills shall be reported in accordance with Section 5003.3.1.

~~5706.5.4~~ 5708.3 **Dispensing from tank vehicles and tank cars.**
Dispensing from tank cars into the fuel tanks of motor vehicles shall be prohibited. Dispensing from tank vehicles into the fuel tanks of motor vehicles shall be prohibited unless allowed by and conducted in accordance with Sections ~~5706.5.4.1~~5708.3.1 through ~~5706.5.4.5~~ 5708.3.4 or where permitted and approved in accordance with Sections 5708.2.1 through 5708.2.7.6..

~~5706.5.4.1~~ 5708.3.1 **Marine craft and special equipment.** Liquids intended for use as motor fuels are allowed to be transferred from tank vehicles into the fuel tanks of marine craft and special equipment where *approved* by the *fire code official*, and where:

1. The tank vehicle's specific function is that of supplying fuel to fuel tanks.
2. The operation is not performed where the public has access or where there is unusual exposure to life and property.
3. The dispensing line does not exceed 50 feet (15 240 mm) in length.
4. The dispensing nozzle is *approved*.
5. The operation shall be in accordance with Sections 2310.4.1 and 2310.4.2.

~~5706.5.4.2~~ 5708.3.2 **Emergency refueling.**
Where *approved* by the *fire code official*, dispensing of motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles is allowed during emergencies. Dispensing from tank vehicles shall be in accordance with Sections ~~5706.2.8~~5708.7.2.8 and 5706.6.

~~5706.5.4.3~~ 5708.3.3 Aircraft fueling.
Transfer of liquids from tank vehicles to the fuel tanks of aircraft shall be in accordance with Chapter 20.

~~5706.5.4.4 Fueling of vehicles at farms, construction sites and similar areas.~~
~~Transfer of liquid from tank vehicles to motor vehicles for private use on farms and rural areas and at construction sites, earth-moving projects, gravel pits and borrow pits is allowed in accordance with Section 5706.2.8.~~

~~5706.5.4.5~~ 5708.3.4 Commercial, industrial, governmental or manufacturing.
Dispensing of Class I, II and III motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles located at commercial, industrial, governmental or manufacturing establishments is allowed where *approved*, provided that such dispensing operations are conducted in accordance with the following:

1. Dispensing shall occur only at sites that have been issued a permit to conduct *mobile fueling*.
2. The *owner* of a *mobile fueling* operation shall provide to the jurisdiction a written response plan that demonstrates readiness to respond to a fuel spill and carry out appropriate mitigation measures, and describes the process to dispose properly of contaminated materials.
3. A detailed site plan shall be submitted with each application for a permit. The site plan shall indicate: all buildings, structures and appurtenances on site and their use or function; all uses adjacent to the *lot lines* of the site; the locations of all storm drain openings, adjacent waterways or wetlands; information regarding slope, natural drainage, curbing, impounding and how a spill will be retained on the site property; and the scale of the site plan.
   Provisions shall be made to prevent liquids spilled during dispensing operations from flowing into buildings or off-site. Acceptable methods include, but shall not be limited to, grading driveways, raising doorsills or other *approved* means.
4. The *fire code official* is allowed to impose limits on the times and days during which *mobile fueling* operations is allowed to take place, and specific locations on a site where fueling is permitted.
5. *Mobile fueling* operations shall be conducted in areas not open to the public or shall be limited to times when the public is not present.
6. *Mobile fueling* shall not take place within 15 feet (4572 mm) of buildings, property lines, combustible storage or storm drains.

   Exceptions:
   1. The distance to storm drains shall not apply where an *approved* storm drain cover or an *approved* equivalent that will prevent any fuel from reaching the drain is in place prior to fueling or a fueling hose being placed within 15 feet (4572 mm) of the drain. Where placement of a storm drain cover will cause the accumulation of excessive water or difficulty in conducting the fueling, such cover shall not be used and the fueling shall not take place within 15 feet (4572 mm) of a drain.
   2. The distance to storm drains shall not apply for drains that direct influent to *approved* oil interceptors.
7. The tank vehicle shall comply with the requirements of NFPA 385 and local, state and federal requirements. The tank vehicle's specific functions shall include that of supplying fuel to motor vehicle fuel tanks. The vehicle and all its equipment shall be maintained in good repair.
8. Signs prohibiting smoking or open flames within 25 feet (7620 mm) of the tank vehicle or the point of fueling shall be prominently posted on three sides of the vehicle including the back and both sides.
9. A portable fire extinguisher with a minimum rating of 40:BC shall be provided on the vehicle with signage clearly indicating its location.
10. The dispensing nozzles and hoses shall be of an *approved* and *listed* type.
11. The dispensing hose shall not be extended from the reel more than 100 feet (30 480 mm) in length.
12. Absorbent materials, nonwater-absorbent pads, a 10-foot-long (3048 mm) containment boom, an *approved* container with lid and a nonmetallic shovel shall be provided to mitigate a minimum 5-gallon (19 L) fuel spill.

13. Tank vehicles shall be equipped with a “fuel limit” switch such as a count-back switch, to limit the amount of a single fueling operation to not more than 500 gallons (1893 L) before resetting the limit switch.

    Exception: Tank vehicles where the operator carries and can utilize a remote emergency shutoff device that, when activated, immediately causes flow of fuel from the tank vehicle to cease.

14. Persons responsible for dispensing operations shall be trained in the appropriate mitigating actions in the event of a fire, leak or spill. Training records shall be maintained by the dispensing company.
15. Operators of tank vehicles used for *mobile fueling* operations shall have in their possession at all times an emergency communications device to notify the proper authorities in the event of an emergency.
16. The tank vehicle dispensing equipment shall be constantly attended and operated only by designated personnel who are trained to handle and dispense motor fuels.
17. Fuel dispensing shall be prohibited within 25 feet (7620 mm) of any source of ignition.
18. The engines of vehicles being fueled shall be shut off during dispensing operations.
19. Nighttime fueling operations shall only take place in adequately lighted areas.
20. The tank vehicle shall be positioned with respect to vehicles being fueled to prevent traffic from driving over the delivery hose.
21. During fueling operations, tank vehicle brakes shall be set, chock blocks shall be in place and warning lights shall be in operation.
22. Motor vehicle fuel tanks shall not be topped off.
23. The dispensing hose shall be properly placed on an *approved* reel or in an *approved* compartment prior to moving the tank vehicle.
24. The *fire code official* and other appropriate authorities shall be notified when a reportable spill or unauthorized discharge occurs.
25. Operators shall place a drip pan or an absorbent pillow under each fuel fill opening prior to and during dispensing operations. Drip pans shall be liquid-tight. The pan or absorbent pillow shall have a capacity of not less than 3 gallons (11.36 L). Spills retained in the drip pan or absorbent pillow need not be reported. Operators, when fueling, shall have on their person an absorbent pad capable of capturing diesel fuel overfills. Except during fueling, the nozzle shall face upward and an absorbent pad shall be kept under the nozzle to catch drips. Contaminated absorbent pads or pillows shall be disposed of regularly in accordance with local, state and federal requirements.

Reason: This proposal is a comprehensive reorganization of Chapter 57. The goals are to make the chapter easier to navigate, improve clarity for the user, and correlate the requirements with the provisions in Chapter 50. There are no changes in requirements or application. All of these revisions are entirely editorial and the majority of the changes are simply renumbering the sections to fit the reorganization of the chapter

The chapter is reorganized into the following main sections:

- 5701 General (only 5701.3 is shown in the proposal because there are no revisions to the remaining sections)
- 5702 Definitions (this section is not shown in the proposal because there are no revisions)
- 5703 General Requirements
- 5704 Storage in Containers and Portable Tanks
- 5705 Storage in Stationary Tanks (new section, requirements previously found in 5704)
- 5706 Dispensing, Use, Mixing and Handling (previously 5705)
- 5707 Special Operations (previously 5706)
- 5708 Mobile Fueling Operations (previously 5707)

Reformatting the chapter into these main sections achieves the following results:

- Storage is separated into "Containers and Portable Tanks" or "Stationary Tanks" to assist in clarifying the different requirements for each configuration (5704 and 5705)
- Tank design, fabrication and construction provisions now reside in a separate section (5705.2)

- Sections dealing with quantities above or below the MAQ are grouped
  - Indoor storage below MAQs and Indoor storage above MAQs have been separated (5704.2 and 5704.3). This provides clarity and correlates with the format in Chapter 50.
  - Indoor use/handling in quantities above or below MAQs have been separated into two sections (5706.3 and 5706.4)
  - Relocated alcohol-based hand rubs because requirements now apply both above and below MAQ (5706.2.12)
- Section 5703.4 is deleted, simply because it is repeated in several locations. This location is redundant and not needed. Spill control and secondary containment are still required.
- Section 5704.1 was reformatted to clarify is application. Section 5704 covers several methods of storage and the user is directed to the appropriate sections for each storage method.
- Application of spill control and secondary containment have been relocated and reformatted to clarify their application and correlate with secondary containment requirements in Chapter 50 (5704.3.7.3).
- Dispensing from tank vehicles is relocated from Special Operations to Mobile Fueling (5708.7) NOTE: a separate proposal has been submitted this cycle to relocate all Fueling Operations to Chapter 23. If that proposal is successful, Section 5708 should be deleted.
- The header is revised in Tables 5704.2.3.5.3(5) and 5704.2.3.5.3(6). The maximum spacing of 80 SF/head applies to the ceiling sprinkler system, not the in-rack sprinklers.
- Section 5705.2.4.4 is editorially revised to include the provisions from the subsequent three sections.
- Section 5706.1 was reformatted to clarify is application. Section 5704 covers several methods of use configurations and the user is directed to the appropriate sections for each method.
- Section 5706.4.3.3 has been revised to clarify when spill control is required vs. secondary containment
- Section 5707.5 is editorially revised and reformatted to clarify the difference between bulk transfer/process transfer and fueling operations.

A cross reference spreadsheet has been uploaded as an attachment. The spreadsheet identifies the 2024 section number and the proposed new section number for the 2027 edition.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

As extensive as this proposal is, it is entirely editorial. The reformatting and editorial clarifications make no changes to the requirements or their application.

F250-24

F251-24

IFC: 5701.6 (New)

Proponents: Adam Henson, U.S. Chemical Safety and Hazard Investigation Board (adam.henson@csb.gov)

2024 International Fire Code

Add new text as follows:

5701.6 Process Hazard Analysis. Where flammable and combustible liquids are stored or used in excess of the maximum allowable quantity per control area specified in Table 5003.1.1(1) process hazard analyses shall be conducted to ensure reasonable protection of people and property from dangerous conditions involving flammable and combustible liquids. The process hazard analysis shall be conducted utilizing a methodology suitable for the complexity of the process and shall consider factors internal and external to the organization. Recommendations from such analyses shall be addressed in a timely manner.

Reason: On May 1, 2002, there was a fire at the Third Coast Industries petroleum products facility in Friendswood, TX. The fire began as a relatively small one of unknown origin that eventually spread all through the facilities operations for blending and packaging motor oils, hydraulic oils, and engine and other lubricants.

The fire began overnight while the facility was unattended. It was discovered in progress by the facility's security guard who determined it was too severe to fight. Firefighters arrived on scene within minutes, but had insufficient means to fight the fire. The fire burned for more than 24 hours and consumed 1.2 million gallons of combustible and flammable liquids destroying the site. One hundred nearby residents were evacuated, a school was temporarily closed, and significant environmental cleanup was necessary due to fumes and runoff.

Approximately 98 percent of the materials at Third Coast were Class IIIB combustible liquids meaning they had a flash point of 200 Deg F or greater. They also had 4,400 gallons of methanol (Class IB), 3,500 gallons of mineral spirits (Class II), and 9,500 gallons of petroleum distillate (Class IIIA) in storage tanks intermingled with their Class IIIB products and raw materials. Based on the high flash points of most of their raw materials and products, Third Coast may have underestimated the fire hazard present at their facility.

During its investigation the CSB concluded that Third Coast had not analyzed the hazards of their facility. If they had, the deficiencies in onsite water supply, fire detection and alarm equipment, and drainage and containment for combustible liquids could have been identified and addressed prior to the fire preventing the loss of the facility, the evacuation of the community, and the damage done to the environment.

As part of its investigation into this incident, the CSB reviewed the requirements of the International Fire Code chapters on Hazardous Materials – General Provisions and Flammable and Combustible Liquids both then and again now. Nothing in the code requires process hazard analysis unless someone wants to exercise the Performance-Based Design Alternative described at 5001.3 of the IFC.

As the result of the investigation, the CSB issued the following recommendation to the International Code Council:

CSB Recommendation No. 2002-03-I-TX-R3Revise the International Fire Code to address the following issues: For facilities that are not staffed around the clock, specify circumstances where automatic fire detection is needed. Narrow exemptions for Class IIIB liquids. Expand fire protection analysis requirements to include all areas of a facility where there may be flammable or combustible fire risks.

The language proposed is intended to satisfactorily implement the objectives of this recommendation.

Bibliography: U.S. Chemical Safety and Hazard Investigation Board (CSB), "Petroleum Products Facility Incident (Destruction of Facility)," 06 March 2003. [Online]. Available: https://www.csb.gov/file.aspx?DocumentId=5611. [Accessed 30 November 2023].

Cost Impact: Increase

Estimated Immediate Cost Impact:

$5,000

Estimated Immediate Cost Impact Justification (methodology and variables):

There are no material costs associated with this code change. The labor cost is based on 8 hours of work by an outside consultant at $500 an hour, 8 hours of work by plant management at $56 an hour, 8 hours of work by plant engineering at $48 an hour, and 4 hours of work by a plant employee at $20 an hour.

The cost can be reduced if plant personnel can conduct a PHA without the help of a consultant. The cost of conducting a PHA is directly proportional to the complexity of the process being analyzed. The process in this example represents a storage process or a simple manufacturing process.

Consultant (8 Hours x $500) + Plant Management (8 Hours x $56) + Plant Engineering (8 Hours x $48) + Plant Employee (4 Hours x $20) = $4,912 (Rounded to $5,000)

Labor Cost Source:

- Consultant – Anecdotal Based on Experience and Quote
- Plant Management – https://www.ziprecruiter.com/Salaries/Plant-Manager-Salary
- Plant Engineering – https://www.ziprecruiter.com/Salaries/Plant-Engineer-Salary
- Plant Employee - https://www.ziprecruiter.com/Salaries/Chemical-Operator-Salary

Estimated Life Cycle Cost Impact:

N/A

Estimated Life Cycle Cost Impact Justification (methodology and variables):

N/A

F251-24

F252-24

IFC: 5704.2.13.1.4, 5704.2.14.1

Proponents: Chad Sievers, NYS, NYS DOS (chad.sievers@dos.ny.gov); Jeanne Rice, NYSDOS (jeanne.rice@dos.ny.gov); China Clarke, New York State Dept of State, Manager Technical Support Unit (china.clarke@dos.ny.gov); Kevin Duerr-Clark, NYS DOS, NYS DOS (kevin.duerr-clark@dos.ny.gov); Brian Tollisen, NYS Department of State, NYS Department of State (brian.tollisen@dos.ny.gov); Daniel Carroll, New York State Department of State, Department of State (daniel.carroll@dos.ny.gov); John R Addario - NYS Department of State, NEW YORK STATE CODES DIVISION, New York State Department of State Division of Building Standards and Codes (john.addario@dos.ny.gov)

2024 International Fire Code

Revise as follows:

5704.2.13.1.4 Tanks abandoned in place . ~~Tanks abandoned in place shall be as follows:~~ The abandoning of underground tanks in place shall comply with all of the following:

1. *Flammable* and *combustible liquids* shall be removed from the tank and connected piping.
2. The suction, inlet, gauge, vapor return and vapor lines shall be disconnected.
3. The tank shall be filled completely with an *approved* inert solid material.
4. Remaining underground piping shall be capped or plugged.
5. A record of tank size, location and date of abandonment shall be retained.
6. All exterior above-grade fill piping shall be permanently removed when tanks are abandoned or removed.
7. The owner of tanks with automatic delivery shall notify the supplier or suppliers in writing a minimum of 24 hours prior to the abandonment, instructing them to discontinue deliveries.

5704.2.14.1 Removal. Removal of above-ground and underground tanks shall comply ~~be in accordance~~ with all of the following:

1. *Flammable* and *combustible liquids* shall be removed from the tank and connected piping.
2. Piping at tank openings that is not to be used further shall be disconnected.
3. Piping shall be removed from the ground.

   Exception: Piping is allowed to be abandoned in place where the *fire code official* determines that removal is not practical. Abandoned piping shall be capped and safeguarded as required by the *fire code official*.
4. Tank openings shall be capped or plugged, leaving a $^1/_8$-inch to $^1/_4$-inch-diameter (3.2 mm to 6.4 mm) opening for pressure equalization.
5. Tanks shall be purged of vapor and inerted prior to removal.
6. All exterior above-grade fill and vent piping shall be permanently removed.

   Exception: Piping associated with bulk plants, terminal facilities and refineries.
7. The *owner* of tanks with automatic delivery shall notify the supplier or suppliers in writing a minimum of 24 hours prior to the removal, instructing the supplier to discontinue deliveries.

Reason: This was done to help minimize the chances of a supplier attempting to fill a tank that has been abandoned or removed, resulting in a spill and costly remediation.

Cost Impact: Increase

Estimated Immediate Cost Impact:

The notification required by this proposed change will have a slight additional cost of $11.50 at the end of the tank's life. This cost is due to office staff emailing the supplier, notifying them that service must cease as the tank is out of service.

Estimated Immediate Cost Impact Justification (methodology and variables):

This will be a one-time fee at the end of the tank's life.

Office staff $18-23 /hr

https://www.salary.com/research/salary/listing/office-worker-hourly-wages

Estimated time to write an email to discontinue service: 30 minutes max.

0.5 hr x $23= **$11.50**

F252-24

F253-24

IFC: 5704.2.13.1.4, 5704.2.14, 5704.2.14.1, 5704.2.14.2

Proponents: Daniel Carroll, NYS, NYS DOS (daniel.carroll@dos.ny.gov); Chad Sievers, NYS, NYS DOS (chad.sievers@dos.ny.gov); Kevin Duerr-Clark, NYS DOS, NYS DOS (kevin.duerr-clark@dos.ny.gov); John R Addario - NYS Department of State, NEW YORK STATE CODES DIVISION, New York State Department of State Division of Building Standards and Codes (john.addario@dos.ny.gov); Jeanne Rice, NYS DOS, NYS DOS (jeanne.rice@dos.ny.gov); China Clarke, New York State Dept of State, Manager Technical Support Unit (china.clarke@dos.ny.gov); Brian Tollisen, NYS Department of State, NYS Department of State (brian.tollisen@dos.ny.gov)

2024 International Fire Code

Revise as follows:

5704.2.13.1.4 Tanks abandoned in place. Tanks abandoned in place shall be as follows:

1. ~~*Flammable* and *combustible liquids* shall be removed from the tank and connected piping.~~The entire contents of the tank and related piping shall be emptied, and the tank purged of all vapor. The contents of the storage tank and related piping shall be removed from the premises or property and disposed of in accordance with applicable local, state, or federal rules and regulations.
2. The suction, inlet, gauge, vapor return and vapor lines shall be disconnected and either be permanently removed, capped, plugged, or filled completely with an *approved* inert solid material.
3. ~~The tank~~ Tanks shall be filled completely with an *approved* inert solid material.
4. Remaining underground piping shall be capped or plugged.
5. A record of tank size, location and date of abandonment shall be retained.
6. All exterior above-grade fill piping shall be permanently removed when tanks are abandoned or removed, or the fill pipe shall be filled completely with an *approved* inert solid material.

5704.2.14 Removal and disposal of tanks.
Removal and disposal of tanks shall comply with Sections 5704.2.14.1 and 5704.2.14.2.

Revise as follows:

5704.2.14.1 Removal. Removal of above-ground and underground tanks shall be in accordance with all of the following:

1. ~~*Flammable* and *combustible liquids* shall be removed from the tank and connected piping.~~The entire contents of the tank and related piping shall be emptied, purged of all vapor, and inerted.
2. Piping at tank openings that is not to be used further shall be disconnected.
3. Piping shall be removed from the ground.

   ~~Exception~~Exceptions:

   1. Piping is allowed to be abandoned in place where the *fire code official* determines that removal is not practical. Abandoned piping shall be capped and safeguarded as required by the *fire code official*.
   2. Piping that is reused for the installation of a new tank and meets the applicable requirements for the new installation shall be allowed to remain where *approved* by the *fire code official*.

4. Tank openings shall be capped or plugged, leaving a $^1/_8$-inch to $^1/_4$-inch-diameter (3.2 mm to 6.4 mm) opening for pressure equalization.
5. Tanks shall be purged of vapor and inerted prior to removal.

6. All exterior above-grade fill and vent piping shall either be permanently removed or filled completely with an *approved* inert solid material.

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Exception: Piping associated with bulk plants, terminal facilities and refineries.

5704.2.14.2 Disposal. ~~Tanks shall be disposed of in accordance with federal, state and local regulations.~~
The tank and related piping, and the contents of the tank and related piping shall be removed from the premises and disposed of in accordance with applicable local, state, or federal rules and regulations

Reason: This change provides some additional clarity on the proper removal and disposal of the materials within tanks that are abandoned in place and those removed and disposed of. It also attempts to clarify scenarios where either reuse of existing piping is necessary for replacement tank installations, or for when removal of all piping would be unnecessarily onerous.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

These changes provide some more flexibility in the abandonment and removal of tanks while clarifying what would already be required by local, state, and federal laws.

F253-24

F254-24

IFC: 5704.3.6, 5704.3.7.5.1, 5704.3.8.4

Proponents: Kevin Scott, KH Scott & Associates LLC, KH Scott & Associates LLC (khscottassoc@gmail.com)

2024 International Fire Code

Revise as follows:

5704.3.6 Wholesale and retail sales uses.
Flammable and *combustible liquids* in Group M occupancy wholesale and retail sales uses shall be in accordance with Sections 5704.3.6.1 through 5704.3.6.5, or Sections 10.10.2, 12.3.6, 16.4.1 through 16.4.3, 16.5.1 through ~~16.5.2.12~~ 16.5.3.18, Figures 16.4.1(a) through 16.4.1(c) and Tables ~~16.5.2.1~~16.5.3.1 through ~~16.5.2.12,~~16.5.3.1.18 of NFPA 30.

5704.3.7.5.1 Fire-protection systems.
Liquid storage rooms shall be protected by *automatic sprinkler systems* installed in accordance with Chapter 9 and Tables 5704.3.6.3(4) through 5704.3.6.3(7) and Table 5704.3.7.5.1, or Sections 16.4.1 through 16.4.3, 16.5.1 through 16.5.3.18, and Figures 16.4.1(a) through 16.4.1(c) and Tables 16.5.3.1 through 16.5.3.18 of NFPA 30. In-rack sprinklers shall also comply with NFPA 13.Automatic foam-water systems and automatic aqueous film-forming foam (AFFF) water sprinkler systems shall not be used except where *approved*.
Protection criteria developed from fire modeling or full-scale fire testing conducted at an *approved* testing laboratory are allowed in lieu of the protection as shown in Tables 5704.3.6.3(2) through 5704.3.6.3(7) and Table 5704.3.7.5.1 where *approved*.

5704.3.8.4 Automatic sprinkler systems. Liquid storage warehouses shall be protected by *automatic sprinkler systems* installed in accordance with Chapter 9 and Tables 5704.3.6.3(4) through 5704.3.6.3(7) and Table 5704.3.7.5.1, or Sections 16.4.1 through 16.4.3, 16.5.1 through ~~16.5.3.12~~ 16.5.3.18, and Figures 16.4.1(a) through 16.4.1(c) and Tables 16.5.3.1 through ~~16.5.3.12~~ 16.5.3.18 of NFPA 30. In-rack sprinklers shall also comply with NFPA 13.Automatic foam-water systems and automatic AFFF water sprinkler systems shall not be used except where *approved*.
Protection criteria developed from fire modeling or full-scale fire testing conducted at an *approved* testing laboratory are allowed in lieu of the protection as shown in Tables 5704.3.6.3(2) through 5704.3.6.3(7) and Table 5704.3.7.5.1 where *approved*.

Reason: This proposal is intended to correct several inconsistencies between requirements for Flammable Liquid Storage Rooms, Flammable Liquid Storage Warehouses, and Flammable Liquids in Retail.

This proposal corrects the NFPA 30 references, and adds an the same NFPA 30 reference to the Flammable Liquid Storage Rooms.

The requirements for fire sprinkler design in Retail facilities and Flammable Liquid Storage Warehouses reference specific criteria in NFPA 30 as an acceptable alternative. The format and section numbers in NFPA 30 are slightly different in the 2024 NFPA 30 document, so the revisions to Sections 5704.3.8.4 and 5704.3.6 have been revised to correct the references.

The more significant change is for Flammable Liquid Storage Rooms. Section 5704.3.7.5.1 does not contain similar language to reference NFPA 30. The criteria in NFPA 30 contains sprinkler design for additional storage configurations, beyond what is contained in the Chapter 57, and the NFPA 30 referenced sections are also applicable to Flammable Liquid Storage Rooms. Therefore, the reference to criteria in NFPA 30 is added to the provisions for Flammable Liquid Storage Rooms.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal does not provide any new requirements. It allows the use of NFPA 30 sprinkler design criteria as an option to the sprinkler design criteria in Chapter 57.

F254-24

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IFC: TABLE 5704.3.6.3(7), TABLE 5704.3.6.3(8), 5704.3.6.3, TABLE 5704.3.6.3(1), 5704.3.7.5.1, TABLE 5704.3.7.5.1, TABLE 5704.3.4.1, 5704.3.8.4

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Delete without substitution:

~~TABLE 5704.3.6.3(7) AUTOMATIC AFFF WATER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN METAL CONTAINERS GREATER THAN 5-GALLON CAPACITY[a, b]~~

CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND			IN-RACK SPRINKLER ARRANGEMENT AND DEMAND[c]				DURATION AFFF SUPPLY (minimum)	DURATION WATER SUPPLY (hours)
	Density (gpm/ft²)	Area (square feet) High-temperature sprinklers	Area (square feet) Ordinary temperature sprinklers	On-end storage of drumson pallets, up to 25 feet	Minimum nozzle pressure (psi)	Number of sprinklers operating	Hose stream demand[d] (gpm)		
IA, IB, IC and II	0.30	1,500	2,500	~~1. Ordinary temperature sprinkler up to 10 feet apart horizontally~~ ~~2. One line sprinklers above each level of storage~~ ~~3. Locate in longitudinal flue space, staggered vertically~~ ~~4. Shields required for multiple-level~~	30	Three sprinklers per level	500	15	2

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m², 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m².~~

a. ~~System shall be a closed-head wet system with approved devices for proportioning aqueous film-forming foam.~~

b. ~~Except as modified herein, in-rack sprinklers shall be installed in accordance with NFPA 13.~~

c. ~~The height of storage shall not exceed 25 feet.~~

d. ~~Hose stream demand includes 1¹/₂-inch inside hose connections, where required.~~

Revise as follows:

TABLE ~~5704.3.6.3(8)~~ 5704.3.6.3(7) AUTOMATIC SPRINKLER PROTECTION REQUIREMENTS FOR CLASS I LIQUID STORAGE IN METAL CONTAINERS OF 1-GALLON CAPACITY OR LESS WITH UNCARTONED OR CASE-CUT SHELF DISPLAY UP TO 6.5 FEET, AND PALLETIZED STORAGE ABOVE IN A DOUBLE-ROW RACK ARRAY[a]

STORAGE HEIGHT	CEILING SPRINKLER DESIGN AND DEMAND				IN-RACK SPRINKLER ARRANGEMENT AND DEMAND				MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLERS AND HOSE STREAM (hours)
	Density (gpm/ft²)	Area (square feet) High temperature	Area (square feet) Ordinary temperature	Maximum spacing	Racks up to 9 feet deep	Racks 9 to 12 feet	Minimum nozzle pressure	Number of sprinklers operating		

STORAGE HEIGHT	CEILING SPRINKLER DESIGN AND DEMAND				IN-RACK SPRINKLER ARRANGEMENT AND DEMAND				MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLERS AND HOSE STREAM (hours)
	Density (gpm/ft)	Area (square feet) High temperature	Area (square feet) Ordinary temperature	Maximum spacing	Racks up to 9 feet deep	Racks 9 to 12 feet	Minimum nozzle pressure	Number of sprinklers operating		
Maximum 20-foot storage height	0.60	2,000[b]	Not Applicable	100 ft^2/head	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. One line of sprinklers at the 6-foot level and the 11.5-foot level of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	Not Applicable	30 psi (standard orifice) or 14 psi (large orifice)	1. Six sprinklers each on two levels 2. Hydraulically most remote 12 sprinklers	500	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. This table shall not apply to racks with solid shelves.

b. Using extra-large orifice sprinklers under a ceiling 30 feet or less in height. Minimum aisle width is 7.5 feet.

5704.3.6.3 Fire protection and storage arrangements.

Fire protection and container storage arrangements shall be in accordance with Table 5704.3.6.3(1) or the following:

1. Storage on shelves shall not exceed 6 feet (1829 mm) in height, and shelving shall be metal.
2. Storage on pallets or in piles greater than 4 feet 6 inches (1372 mm) in height, or where the ceiling exceeds 18 feet (5486 mm) in height, shall be protected in accordance with Table 5704.3.6.3(4), and the storage heights and arrangements shall be limited to those specified in Table 5704.3.6.3(2).
3. Storage on racks greater than 4 feet 6 inches (1372 mm) in height, or where the ceiling exceeds 18 feet (5486 mm) in height shall be protected in accordance with ~~Tables~~Table 5704.3.6.3(5)~~,~~ or 5704.3.6.3(6), ~~and 5704.3.6.3(7)~~or NFPA 30, as appropriate, and the storage heights and arrangements shall be limited to those specified in Table 5704.3.6.3(3).

Combustible commodities shall not be stored above *flammable* and *combustible liquids*.

TABLE 5704.3.6.3(1) MAXIMUM STORAGE HEIGHT IN CONTROL AREA

TYPE OF LIQUID	NONSPRINKLERED AREA (feet)	SPRINKLERED AREA[a] (feet)	SPRINKLERED WITH IN-RACK PROTECTION[a, b] (feet)
Flammable liquids:			
Class IA	4	4	4
Class IB	4	8	12
Class IC	4	8	12
Combustible liquids:			
Class II	6	8	12
Class IIIA	8	12	16
Class IIIB	8	12	20

For SI: 1 foot = 304.8 mm.

a In buildings protected by an automatic sprinkler system, the storage height for containers and portable tanks shall not exceed the maximum storage height permitted for the fire protection scheme set forth in NFPA 30 or the maximum storage height demonstrated in a full-scale fire test, whichever is greater. NFPA 30 criteria and fire test results for metallic containers and portable tanks shall not be applied to nonmetallic containers and portable tanks.

b. In-rack protection shall be in accordance with Table 5704.3.6.3(5)~~,~~ or 5704.3.6.3(6), or ~~5704.3.6.3(7)~~NFPA 30.

5704.3.7.5.1 Fire-protection systems.

Liquid storage rooms shall be protected by *automatic sprinkler systems* installed in accordance with Chapter 9 and Tables 5704.3.6.3(4) through 5704.3.6.3(~~7~~6) ~~and Table 5704.3.7.5.1~~, or NFPA 30. In-rack sprinklers shall also comply with NFPA 13.
Automatic foam-water systems ~~and automatic aqueous film-forming foam (AFFF) water sprinkler systems~~ shall not be used except where *approved*.

~~Protection criteria developed from fire modeling or full-scale fire testing conducted at an *approved* testing laboratory are allowed in lieu of the protection as shown in Tables 5704.3.6.3(2) through 5704.3.6.3(7) and Table 5704.3.7.5.1 where *approved*.~~

Delete without substitution:

~~TABLE 5704.3.7.5.1 AUTOMATIC AFFF-WATER PROTECTION REQUIREMENTS FOR SOLID-PILE AND PALLETIZED STORAGE OF LIQUIDS IN METAL CONTAINERS OF 5-GALLON CAPACITY OR LESS[a, b]~~

PACKAGE TYPE	CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND Density (gpm/ft^2)	Area (square feet)	Temperature rating	Maximum spacing	Orifice size (inch)	STORAGE HEIGHT (feet)	HOSE DEMAND (gpm)[c]	DURATION AFFF SUPPLY (minimum)	DURATION WATER SUPPLY (hours)
Cartoned	IB, IC, II and III	0.40	2,000	286°F	100 ft^2/head	0.531	11	500	15	2
Uncartoned	IB, IC, II and III	0.30	2,000	286°F	100 ft^2/head	0.5 or 0.531	12	500	15	2

~~For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2, °C = (°F − 32)/1.8.~~

a. ~~System shall be a closed-head wet system with *approved* devices for proportioning aqueous film-forming foam.~~

b. ~~Maximum ceiling height of 30 feet.~~

c. ~~Hose stream demand includes $1^1/_2$-inch inside hose connections, where required.~~

Revise as follows:

TABLE 5704.3.4.1 MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN WHOLESALE AND RETAIL SALES OCCUPANCIES[a]

TYPE OF LIQUID	MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA (gallons)		
	Sprinklered[b] in accordance with footnote densities and arrangements	Sprinklered in accordance with Tables 5704.3.6.3(4) through 5704.3.6.3(~~8~~7) ~~and Table 5704.3.7.5.1~~, or NFPA 30	Nonsprinklered
Class IA	60	60	30
Class IB, IC, II and IIIA	7,500[c]	15,000[c]	1,600
Class IIIB	Unlimited	Unlimited	13,200

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 gallon = 3.785 L, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. Control areas shall be separated from each other by not less than a 1-hour fire barrier.

b. To be considered as sprinklered, a building shall be equipped throughout with an *approved* automatic sprinkler system with a design providing minimum densities as follows:

   1. For uncartoned commodities on shelves 6 feet or less in height where the ceiling height does not exceed 18 feet, quantities are those allowed with a minimum sprinkler design density of Ordinary Hazard Group 2.

   2. For cartoned, palletized or racked commodities where storage is 4 feet 6 inches or less in height and where the ceiling height does not exceed 18 feet, quantities are those allowed with a minimum sprinkler design density of 0.21 gallon per minute per square foot over the most remote 1,500-square-foot area.

c. Where wholesale and retail sales or 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. A control area separation is not required. The cumulative amounts, including amounts attained by having an additional control area, shall not exceed 30,000 gallons.

5704.3.8.4 Automatic sprinkler systems.

Liquid storage warehouses shall be protected by *automatic sprinkler systems* installed in accordance with Chapter 9 and Tables 5704.3.6.3(4) through 5704.3.6.3(~~7~~6) ~~and Table 5704.3.7.5.1~~, or ~~Sections 16.4.1 through 16.4.3, 16.5.1 through 16.5.3.12, and Figures 16.4.1(a) through 16.4.1(c) and Tables 16.5.3.1 through 16.5.3.12 of~~ NFPA 30. In-rack sprinklers shall also comply with NFPA 13. Automatic foam-water systems ~~and automatic AFFF water sprinkler systems~~ shall not be used except where *approved*.

~~Protection criteria developed from fire modeling or full-scale fire testing conducted at an *approved* testing laboratory are allowed in lieu of the protection as shown in Tables 5704.3.6.3(2) through 5704.3.6.3(7) and Table 5704.3.7.5.1 where *approved*.~~

Reason: This proposal is designed to eliminate the reference to AFFF (aqueous film forming foam) from the IFC. AFFF contains PFAS (polyfluoroalkyl substances or perfluoroalkyl substances). PFAS is referred to as a “forever chemical”, and U.S. EPA has determined that exposure to PFAS can have detrimental health effects. EPA and some states have taken actions to reduce PFAS exposure, and the continued requirement for AFFF foam systems needs to be removed from the code.

Industry is developing other foam agents known as NFF (nonfluorinated foam), or SFFF (synthetic fluorine free foam), which does not contain PFAS. Several foam manufacturers have developed NFF foam concentrates which have been tested and several are now listed under UL 162 Foam Equipment and Liquid Concentrates.

This proposal will retain the reference to foam fire-extinguishing systems or foam-water sprinkler systems in the code, but remove the criteria specifying AFFF. The IFC will continue to require foam systems and specify they comply with NFPA 30 and NFPA 11. NFPA 30 establishes density and application rates for foam-water sprinkler systems and NFPA 11 provides criteria on the foam equipment and acceptable foam concentrates.

The application rates and design criteria for NFF will be different than those in the IFC for AFFF so specific design criteria and references to AFFF are revised or deleted as follows:

1. Table 5704.3.6.3(7) is deleted because this table only addresses AFFF systems. The NFPA 30 criteria is more current than the table in the IFC; is more restrictive than the IFC; and offers more storage configurations than the IFC. The 2022 NFPA 30 provides criteria for this specific storage arrangement. Table 16.5.3.3 from NFPA 30 is below, and the criteria in the table for the rack storage of flammable and combustible liquids is highlighted:

2022 NFPA 30

Table 16.5.3.3 – Design Criteria for Foam-Water Sprinkler Protection of Single- or Double-Row Rack Storage of Class IB, IC, Class II, Class IIIA, and Class IIIB Liquids [Any FP, BP ≥100ºF] in Metal Containers, Portable Tanks, and IBCs

Liquid Type / Flash Point	Container Capacity gallons	Container Type	Maximum Ceiling Height feet	Maximum Storage Height ft	Ceiling Sprinkler Protection				In-Rack Sprinkler Protection				Notes	Fire Test Reference
					Sprinkler Type		Design		Sprinkler Type		Design			
					K-Factor	Response / Temp / Orientation	Density (gpm/ft²)	Area (sq ft)	K-Factor	Response / Temp / Orientation	Minimum Discharge Flow (gpm)	Layout		
Class IB, IC, II and IIIA	≤6.5	Non Relieving	30	25	≥8.0	SR or QR / High / Any	0.30	2,000	≥5.6	SR or QR / Ord / Any	30	3	1, 2, 4, 5	1
		Relieving	30	25	≥8.0	SR or QR / High / Any	0.30	2,000	≥5.6	SR or QR / Ord / Any	30	4	1, 2, 4, 5	4
	>6.5 and ≤60	Non Relieving	30	25	≥8.0	SR / High / Any	0.30	3,000	≥5.6	SR or QR / Ord / Any	30	3	1, 3, 4, 5	2
		Relieving	30	25	≥8.0	SR / High / Any	0.30	3,000	≥5.6	SR or QR / Ord / Any	30	4	1, 3, 4, 5	5
	Portable tanks and IBCs	Relieving	30	25	≥8.0	SR / High / Any	0.30	3,000	≥5.6	SR or QR / Ord / Any	30	4	1, 3, 4, 5	5
Class IIIB	≤60	Non Relieving	50	40	≥8.0	SR / High / Any	0.30	2,000	≥5.6	SR or QR / Ord / Any	30	4	1, 5	3
		Relieving	50	40	≥8.0	SR / High / Any	0.30	2,000	≥5.6	SR or QR / Ord / Any	30	4	1, 5	6

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft² = 0.09 m², 1 gpm/ft² = 40.7 L/min/m² = 40.7 mm/min.

For definitions of abbreviations used in the Response column, see 16.5.1.9(4). See also 16.5.1.9(5).

Notes:

(1) In-rack sprinkler design based on the six most hydraulically remote sprinkler in each of the upper three levels.

(2) Design area can be reduced to 1500 ft² when using a preprimed foam-water system installed in accordance with NFPA 11 and maintained according to NFPA 25.

(3) Design area can be reduced to 2000 ft² when using a preprimed foam-water system installed in accordance with NFPA 11 and maintained according to NFPA 25.

(4) In-rack sprinkler hydraulic design can be reduced to three sprinklers operating per level, with three levels operating simultaneously, when using a preprimed foam-water system installed in accordance with NFPA 11 and maintained according to NFPA 25.

(5) See 16.5.3.3.1 for additional criteria.

2. Table 5704.3.6.3(8) is renumbered to Table 5704.3.6.3(7) which was deleted in Item 1 above.
3. Section 5704.3.6.3 is revised to replace the reference to Table 5704.3.6.3(7) which was deleted in Item 1 above. This is replaced with a reference to NFPA 30.
4. Table 5704.3.6.3(1) is revised to remove the reference to Table 5704.3.6.3(7), which was deleted in Item 1 above. A reference to NFPA 30 is added to send the user to the foam-water system criteria in NFPA 30.
5. Section 5704.3.7.5.1 is revised to remove the reference to Table 5704.3.6.3(7), which was deleted in Item 1 above. This is replaced with a reference to NFPA 30. The reference to AFFF is removed in the 2nd paragraph. The section simply requires foam systems. The 3rd paragraph is deleted. This paragraph essentially states that Alternative Methods of Compliance are acceptable. The provisions for Alternative Methods were significantly revised in the 2024 IFC, so this paragraph just states what is already in Chapter 1. The 3rd paragraph is redundant, so no code requirements are lost by removing this paragraph and Chapter 1 provisions will govern.
6. Table 5704.3.7.5.1 is deleted because this table only addresses AFFF systems. The 2022 NFPA 30 provides criteria for this specific storage arrangement. Table 16.5.3.4 from NFPA 30 is below, and the criteria in the table for storage of flammable and combustible liquids in small containers is highlighted:

2022 NFPA 30

Table 16.5.3.4 – Design Criteria for Foam-Water Sprinkler Protection of Palletized and Stacked Storage of Class IB, IC, Class II, and Class IIIA Liquids [FP <200°F, BP ≥100°F] Liquids in Metal Containers, Portable Tanks, and IBCs

Liquid Type / Flash Point	Container Capacity gallons	Container Type	Packaging	Maximum Ceiling Height feet	Maximum Storage Height ft	Ceiling Sprinkler Protection				Notes	Fire Test Reference
						Sprinkler Type		Design			
						K-Factor	Response / Temp / Orientation	Density (gpm/ft^2)	Area (sq ft)		
Class IB, IC, II and IIIA	≤6.5	Non Relieving	Cartoned	30	11	≥11.2	SR or QR / High / Any	0.40	3,000	1, 2, 4, 5	1
		Non Relieving	Uncartoned	30	12	≥8.0	SR or QR / High / Any	0.30	3,000	1, 2, 4, 5	4
	>6.5 and ≤60	Non Relieving	Cartoned or Uncartoned	30	5 1 high	≥8.0	SR / High / Any	0.30	3,000	1, 3, 4, 5	2
		Relieving	Cartoned or Uncartoned	30	6.5 2 high	≥8.0	SR / High / Any	0.30	3,000	1, 3, 4, 5	5
			Cartoned or Uncartoned	33	10 3 high	≥11.2	SR / High / Any	0.45	3,000	1, 3, 4, 5	5
		Relieving	Cartoned or Uncartoned	33	13.75 4 high	≥11.2	SR / High / Any	0.60	3,000	1, 3, 4, 5	5
	Portable tanks and IBCs	Relieving	—	30	1 or 2 high	≥8.0	SR / High / Any	0.30	3,000	1, 3, 4, 5	5

For SI units, 1 gal = 3.8 L, 1 ft = 0.3 m, 1 ft^2 = 0.09 m^2, 1 gp13.75m/ft^2 = 40.7 L/min/m^2 = 40.7 mm/min.

For definitions of abbreviations used in the Response column, see 16.5.1.9(4). See also 16.5.1.9(5).

Notes:

(1) Design area can be reduced to 2000 ft2 when using a preprimed foam-water system installed in accordance with NFPA 11 and maintained according to NFPA 25.

(2) Both ¾ in. (20 mm) and 2 in. (50 mm) listed pressure-relieving mechanisms are required on containers greater than 6.5 gal (23 L) capacity. See Section 16.3.6.

(3) Drums placed on open slatted pallet, not nested, to allow pressure relief from drums on lower levels.

7. Table 5704.3.4.1 is revised to remove the reference to Tables 5704.3.6.3(7) and 5704.3.7.5.1 which were deleted in Items 1 and 6 above. This is replaced with a reference to NFPA 30.
8. Section 5704.3.8.4 is revised to remove the reference to Tables 5704.3.6.3(7) and 5704.3.7.5.1, which were deleted in Items 1 and 6 above. Additionally, the specific sections in NFPA 30 are removed leaving a simple reference to NFPA 30 for the design of the fire sprinkler system. The reference to AFFF is removed in the 2nd paragraph. The section simply requires foam systems. The 3rd paragraph is deleted. This paragraph essentially states that Alternative Methods of Compliance are acceptable. The provisions for Alternative Methods were significantly revised in the 2024 IFC, so this paragraph just states what is already in Chapter 1. The 3rd paragraph is redundant, so no code requirements are lost by removing this paragraph and Chapter 1 provisions will govern.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Bibliography: NFPA 30, 2022 Edition. National Fire Protection Association, 1 Battery March Park, Quincy, Massachusetts 02169, Tables 15.5.3.3 and 16.5.3.4.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00. It is only assumed that the cost for construction will increase however compliance with state regulations will likely prohibit the use of AFFF. In addition, the use of AFFF foam is not mandated by the code, it is an optional method of protection. Since AFFF is banned from use, its replacement synthetic foam, will also be an option for use as a protection scheme.

Estimated Immediate Cost Impact Justification (methodology and variables):

The increase is based on a percentage of gallon to gallon cost increase from AFFF to SFF.

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IFC: 5704.3.8.5, TABLE 5704.3.6.3(5), TABLE 5704.3.6.3(6)

Proponents: Kevin Scott, KH Scott & Associates LLC, self (khscottassoc@gmail.com)

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Delete without substitution:

~~**5704.3.8.5 Warehouse hose lines.**~~
~~In liquid storage warehouses, either $1^{1}/_{2}$-inch (38 mm) lined or 1-inch (25 mm) hard rubber hose lines shall be provided in sufficient number to reach all liquid storage areas and shall be in accordance with Section 903 or 905.~~

Revise as follows:

TABLE 5704.3.6.3(5) AUTOMATIC SPRINKLER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN METAL CONTAINERS OF 5-GALLON CAPACITY OR LESS WITH OR WITHOUT CARTONS ON CONVENTIONAL WOOD PALLETS[a]

CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND: Density (gpm/ft^2)	CEILING SPRINKLER DESIGN AND DEMAND: Area (square feet) High-temperature sprinklers	CEILING SPRINKLER DESIGN AND DEMAND: Area (square feet) Ordinary temperature sprinklers	IN-RACK SPRINKLER ARRANGEMENT AND DEMAND: Maximum spacing	IN-RACK: Racks up to 9 feet deep	IN-RACK: Racks more than 9 feet to 12 feet deep	IN-RACK: 30 psi (standard orifice) 14 psi (large orifice)	IN-RACK: Number of sprinklers operating	MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLER AND HOSE STREAM (hours)
I (maximum 25-foot height) Option 1	0.40	3,000	5,000	80 ft^2/head	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. One line sprinklers above each level of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. One line sprinklers above each level of storage 3. Locate in transverse flue spaces, staggered vertical and within 20 inches of aisle 4. Shields required where multiple-level	30 psi (0.5-inch orifice)	1. Eight sprinklers if only one level 2. Six sprinklers each on two levels if only two levels 3. Six sprinklers each on top three levels, if three or more levels 4. Hydraulically most remote	750	2
I (maximum 25-foot height) Option 2	0.55	2,000[b]	Not Applicable	100 ft^2/head	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. See 2 above 3. See 3 above 4. See 4 above	1. Ordinary temperature, quick-response sprinklers, maximum 8 feet 3 inches horizontal spacing 2. See 2 above 3. See 3 above 4. See 4 above	14 psi (0.53-inch orifice)	See 1 through 4 above	500	2
I and II (maximum 14-foot storage height) (maximum three tiers)	0.55[c]	2,000[d]	Not Applicable	100 ft^2/head	Not Applicable None for maximum 6-foot-deep racks	Not Applicable	Not Applicable	Not Applicable	500	2
II (maximum 25-foot height)	0.30	3,000	5,000	100 ft^2/head	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. One line sprinklers between levels at nearest 10-foot vertical intervals 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. Two lines between levels at nearest 10-foot vertical intervals 3. Locate in transverse flue spaces, staggered vertical and within 20 inches of aisle 4. Shields required where multiple-level	30 psi	Hydraulically most remote—six sprinklers at each level, up to a maximum of three levels	750	2

CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND			IN-RACK SPRINKLER ARRANGEMENT AND DEMAND					MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLER AND HOSE STREAM (hours)
	Density (gpm/ft)	Area (square feet) High-temperature sprinklers	Area (square feet) Ordinary temperature sprinklers	Maximum spacing	Racks up to 9 feet deep	Racks more than 9 feet to 12 feet deep	30 psi (standard orifice) 14 psi (large orifice)	Number of sprinklers operating		
III (40-foot height)	0.25	3,000	5,000	120 ft^2/head	Same as for Class II liquids	Same as for Class II liquids	30 psi	Same as for Class II liquids	500	2

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. The ~~design area contemplates~~ sprinkler designs in this table require the installation of a standpipe system and assume the use of Class II standpipe systems. Where Class I standpipe systems are used, the area of application shall be increased by 30 percent without revising density.

b. Using listed or approved extra-large orifices, high-temperature quick-response or standard element sprinklers under a maximum 30-foot ceiling with minimum 7.5-foot aisles.

c. For friction lid cans and other metal containers equipped with plastic nozzles or caps, the density shall be increased to 0.65 gpm per square foot using listed or approved extra-large orifice, high-temperature quick-response sprinklers.

d. Using listed or approved extra-large orifice, high-temperature quick-response or standard element sprinklers under a maximum 18-foot ceiling with minimum 7.5-foot aisles and metal containers.

TABLE 5704.3.6.3(6) AUTOMATIC SPRINKLER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN METAL CONTAINERS GREATER THAN 5-GALLON CAPACITY[a]

CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND			IN-RACK SPRINKLER ARRANGEMENT AND DEMAND					MINIMUM HOSE STREAM DEMAND (gpm)	MINIMUM DURATION SPRINKLER AND HOSE STREAM (hours)
	Density (gpm/ft^2)	Area (square feet) High-temperature sprinklers	Area (square feet) Ordinary temperature sprinklers	Maximum spacing	On-side storage racks up to 9-foot-deep racks	On-end storage (on pallets) up to 9-foot-deep racks	Minimum nozzle pressure	Number of sprinklers operating		
IA (maximum 25-foot height)	0.60	3,000	5,000	80 ft^2/head	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. One line sprinklers above each tier of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	1. Ordinary temperature sprinklers 8 feet apart horizontally 2. One line sprinklers above each tier of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multiple-level	30 psi	Hydraulically most remote—six sprinklers at each level	1,000	2
IB, IC and II (maximum 25-foot height)	0.60	3,000	5,000	100 ft^2/head	1. See 1 above 2. One line sprinklers every three tiers of storage 3. See 3 above 4. See 4 above	1. See 1 above 2. See 2 above 3. See 3 above 4. See 4 above	30 psi	Hydraulically most remote—six sprinklers at each level	750	2
III (maximum 40-foot height)	0.25	3,000	5,000	120 ft^2/head	1. See 1 above 2. One line sprinklers every sixth level (maximum) 3. See 3 above 4. See 4 above	1. See 1 above 2. One line sprinklers every third level (maximum) 3. See 3 above 4. See 4 above	15 psi	Hydraulically most remote—six sprinklers at each level	500	1

For SI: 1 foot = 304.8 mm, 1 square foot = 0.0929 m^2, 1 pound per square inch = 6.895 kPa, 1 gallon = 3.785 L, 1 gallon per minute =

3.785 L/m, 1 gallon per minute per square foot = 40.75 L/min/m^2.

a. The ~~design assumes~~ sprinkler designs in this table require the installation of a standpipe system and assume the use of Class II standpipe systems. Where a Class I standpipe system is used, the area of application shall be increased by 30 percent without revising density.

Reason: This proposal removes the requirement for hoselines in liquid storage warehouses. Liquid storage warehouses are a Group H occupancy and are allowed to store an unlimited amount of flammable and combustible liquids. A 1" rubber hose line in warehouse filled with 55-gallon drums of flammable and combustible liquids will have little practical effect. Liquid storage warehouses are required to be protected with a complete fire sprinkler system. The fire sprinkler system will provide better protection for the hazard in the warehouse than a 1" hose line. In many cases, a single fire sprinkler will discharge as much water as the 1" hoseline.

Hoselines and Class II standpipes at one time provided the best fire protection available. Fire sprinkler systems have improved in their effectiveness and water application capabilities over the past couple decades. It is time to remove this hoseline requirement from the code.

Tables 5704.3.6.3(5) and (6) are both based on the inclusion of a standpipe system. However, in Footnote a both tables include the option of using a Class I standpipe system. Those two footnotes are revised to specify that a standpipe system is required in order to utilize these tables.

Class II standpipes are not required in the NFPA 30 standard for these facilities. But when the IFC requires a Class II standpipe, the code requirement supersedes the standard language, even though designer uses the sprinkler design tables in NFPA 30.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00 but may be a larger reduction.

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal will reduce the cost of installing fire hose and fire hose connections in liquid storage warehouses.

F256-24

F257-24

IFC: 5705.3.9 (New), 5705.3.9.1 (New), 5705.3.9.2 (New), 5705.3.9.3 (New), 5705.3.9.4 (New)

Proponents: Adam Henson, U.S. Chemical Safety and Hazard Investigation Board (adam.henson@csb.gov)

2024 International Fire Code

Add new text as follows:

5705.3.9 Heating Flammable and Combustible Liquids Above Their Flashpoints Indoors. Heating flammable and combustible liquids indoors shall be done in accordance with Section 5705.3.9.1 through 5705.3.9.4.

5705.3.9.1 Venting Vapors. Process vessels used to heat flammable and combustible liquids shall be sealed from the room they are located in and the vapors vented to a safe location.

5705.3.9.2 Opening the Vessel. If the vessel needs to be opened, the room ventilation shall meet the requirements of 5705.3.7.5.1 and the process heating controls shall be interlocked with the ventilation to shut down process heat if the ventilation fails or is turned off.

5705.3.9.3 Excess Temperature Control. The process vessel shall be equipped with an excess temperature control. This control shall automatically shut down heating and initiate cooling if necessary. Redundant controls shall be provided where determined necessary by risk assessment.

5705.3.9.4 Explosion Control. Explosion control shall be provided in accordance with Section 911.

Reason: On November 22, 2006, there was an explosion at the CAI/Arnel manufacturing facility in Danvers, MA. The explosion was caused by flammable liquid vapors released from a 2000-gallon tank used in the production of ink. A steam valve on the tank heater was unintentionally left open causing the flammable liquid to vaporize after which it accumulated in the building's production area where it found an ignition source and ignited. This occurred overnight after all the workers had left for the day.

At least 10 members of the public required hospital treatment for cuts and bruises. More than 300 residents were evacuated from within a half-mile radius from the facility. The explosion and subsequent fire destroyed the facility, damaged dozens of nearby homes, businesses, and boats, and shattered windows as far away as two miles. Twenty-four homes and six businesses were damaged beyond repair. During the fire, thousands of gallons of flammable liquids stored inside the building and approximately 51,000 pounds of nitrocellulose material burned. The fire lasted for more than 17 hours.

The facility had ventilation in accordance with NFPA/OSHA requirements, but the ventilation had been shut down by the employees before they left as was common. This was done to avoid neighbor complaints and reduce heat loss despite the open top mix tanks that were known to contain flammable liquids, operated in conjunction with heaters supplied by a continuously operated steam system, and which were sometimes, including this night, operated overnight. Earlier in the day, CAI employees began mixing an ink batch in Mix Tank 3. The batch was comprised of a more than 2,000-gallon flammable liquid mixture of heptane, isopropyl alcohol, and propyl alcohol. After the tank was charged with raw materials the production manager opened the steam valve around 3:00 PM to begin heating the mixture. Around 5:30 PM the production manager returned to the work platform to check the mixture temperature which he recalled was about 90 Deg F. The production manager believes they shut the steam valve at this time prior to leaving for the day.

During its investigation the CSB concluded that the production supervisor most likely forgot to perform the critical step of shutting the steam valve prior to leaving for the day due to a combination of distraction and a lack of formal work procedures. The CSB concluded further that the boiling point for the batch of ink in Mix Tank 3 was 165.6 Deg F, that between 232 to 239 Deg F. steam was supplied to the mixing tank, and that a temperature limit control could have prevented overheating the batch. Finally, the CSB concluded that had Mix Tank 3 been sealed and vented, or the ventilation system left on, flammable liquid vapor from Mix Tank 3 would likely have been exhausted out of the building preventing the buildup of the vapors within the building.

As part of its investigation into this incident, the CSB reviewed the requirements of the International Fire Code chapters on Hazardous Materials – General Provisions and Flammable and Combustible Liquids both then and again now. Nothing in the code requires temperature limit controls and/or sealed and vented process vessels when heating flammable and combustible limits above their flash points.

As the result of the investigation, the CSB issued the following recommendation to the International Code Council:

CSB Recommendation No. 2007-03-I-MA-R11

Revise the International Fire Code: Chapter 20: - Specifically include "printing inks" in the definition of "organic coating." - Define equipment specifically discussed in the standard, such as open and closed kettles. - Require heated tanks and vessels containing flammable and combustible liquids to have equipment to prevent overheating, such as: devices to stop the heating process if the temperature exceeds the safe operating limits; devices to stop the heating process if the flammable vapor control equipment malfunctions (e.g., building ventilation system or heated tank vent); and a heating medium that is unable to heat the tank above safe operating temperatures. Chapters 20, 27, and 34: -Define "open", "closed", and "sealed and vented" process tanks. -Define "non-listed" process tanks. -Prohibit heating flammable and combustible liquids above their flashpoints in tanks inside buildings unless the tanks are sealed and vented to the building exterior.

The language proposed is intended to satisfactorily implement the objectives of this recommendation.

Bibliography: U.S. Chemical Safety and Hazard Investigation Board (CSB), "Confined Vapor Cloud Explosion", 13 May 2008. [Online]. Available: https://www.csb.gov/assets/1/20/CSBFinalReportCAIExplosion.pdf?13735. [Accessed 30 November 2023].

Cost Impact: Increase

Estimated Immediate Cost Impact:

$8,240 for Venting and $21,555 for Temperature Limit Control

Estimated Immediate Cost Impact Justification (methodology and variables):

The simplest means of venting the vapors from a heated process vessel is to create an opening in the top of the vessel, install piping through the roof to the outside, and install an end of the line flame arrestor. The flame arrestor is not technically necessary to accomplish the purpose sought by the code change proposal, but is necessary for safe operation. The cost to accomplish this is $480 for piping, $2,000 for a flame arrestor, and $5,760 for labor according to the information contained within “Appendix D: Capital Cost Guidelines” of *Rules of Thumb in Engineering Practice*.

$480 (Piping) + $2,000 (Flame Arrestor) + $5,760 (Labor (All)) = $8,240

The cost of installing a temperature limit control is $21,555. $16,300 for materials and $5,255 for labor. This is according to the information contained within “Appendix D: Capital Cost Guidelines” of *Rules of Thumb in Engineering Practice*.

Temperature Sensor ($6,000 (Materials) + $1,200 (Labor) = $7,200

Hi-Lo Shutoff ($5,500 (Materials) + $3,575 (Labor) = $9,075

Control Valve ($4,800 (Materials) + $480 (Labor) = $5,280

Total: **=** $21,555

Cost Source: Woods, P. D. (2007). *Rules of Thumb in Engineering Practice.* Weinheim, Germany: Wiley-VCH.

Estimated Life Cycle Cost Impact:

N/A

Estimated Life Cycle Cost Impact Justification (methodology and variables):

N/A

F257-24

F258-24

IFC: 5705.5, 5705.5.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Jeff O'Neil, Chair, Committee on Healthcare (ahc@iccsafe.org); Jonathan Flannery, Pandemic Task Force Code Development Working Group, PTF CDWG (jflannery@aha.org)

2024 International Fire Code

Revise as follows:

5705.5 Alcohol-based hand rubs classified as Class I or II liquids.
The use of dispensers containing alcohol-based hand rubs classified as Class I or II liquids shall be in accordance with all of the following:

1. The maximum capacity of each dispenser shall be 68 ounces (2 L).
2. The minimum separation between dispensers shall be 48 inches (1219 mm).
3. Dispensers shall not be located above, below or closer than 1 inch (25 mm) to an electrical receptacle, switch, appliance, device or other ignition source. The wall space between the dispenser and the floor or intervening counter top shall be free of electrical receptacles, switches, appliances, devices or other ignition sources.
4. Wall mounted ~~Dispensers~~ dispensers and dispensers on stands shall be located so that the bottom of the dispenser is not less than 42 inches (1067 mm) and not more than 48 inches (1219 mm) above the finished floor.
5. Dispensers shall not obstruct required means of egress or be placed within 3 feet (914 mm) of an open flame, heating device or other ignition source.
6. Dispensers shall not release their contents except when the dispenser is manually activated. Facilities shall be permitted to install and use automatically activated “touch free” alcohol-based hand-rub dispensing devices with the following requirements:
   6.1. The facility or persons responsible for the dispensers shall test the dispensers each time a new refill is installed in accordance with the manufacturer’s care and use instructions.

   6.2. Dispensers shall be designed and must operate in a manner that ensures accidental or malicious activations of the dispensing device are minimized. At a minimum, all devices subject to or used in accordance with this section shall have the following safety features:
      6.2.1. Any activations of the dispenser shall only occur when an object is placed within 4 inches (98 mm) of the sensing device.

      6.2.2. The dispenser shall not dispense more than the amount required for hand hygiene consistent with label instructions as regulated by the United States Food and Drug Administration (USFDA).

      6.2.3. An object placed within the activation zone and left in place will cause only one activation.
7. Storage and use of alcohol-based hand rubs shall be in accordance with the applicable provisions of Sections 5704 and 5705.
8. Dispensers located in occupancies with carpeted floors shall only be allowed in *smoke compartments* or *fire areas* equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.

5705.5.1 Corridor installations. In addition to the provisions of Section 5705.5, where dispensers containing alcohol-based hand rubs are located in *corridors* or rooms and areas open to the *corridor*, they shall be in accordance with all of the following:

1. Where located in a corridor, dispensers shall be wall mounted

~~1~~2. Level 2 and 3 aerosol ~~containers~~ dispensers shall not be ~~allowed~~ permitted in *corridors*.

~~2~~3. The maximum capacity of each ~~Class I or II~~ liquid dispenser shall be 41 ounces (1.21 L) and the maximum capacity of each Level 1 aerosol dispenser shall be 18 ounces (0.51 kg).

~~3~~4. The maximum quantity <u>of alcohol-based hand rub solution in dispensers </u>allowed in a *corridor* within a *control area* shall be 10 gallons (37.85 L) of Class I or II liquids or 1135 ounces (32.2 kg) of Level 1 aerosols, or a combination of Class I or II liquids and Level 1 aerosols not to exceed, in total, the equivalent of 10 gallons (37.85 L) or 1,135 ounces (32.2 kg) such that the sum of the ratios of the liquid and aerosol quantities divided by the allowable quantity of liquids and aerosols, respectively, shall not exceed one.

~~4~~5. Projections into a *corridor* shall be in accordance with Section 1003.3.3.

Reason: This is a simple clean-up to the changes approved last cycle.

1. Provides a clarification of requirements to differentiate permanent wall-mounted dispenser requirements which have been in the IFC for many cycles from other types of dispensers such as floor-supported, desktop or counter located that are currently being used.

2. ABHR dispensers are often located on countertops or desktops in areas other than corridors that would not comply with the height minimum and maximum requirement. Provides correlation for the allowance for these types of free-standing dispensers permitted by this section.

3. The new Item #1 clarifies that ABHR dispensers in corridors must be wall mounted to reduce the risk of movable dispensers and dispensers on stands being tipped-over creating an obstruction to the required corridor width. Dispensers in “rooms or areas open to the corridor” can be free-standing or placed on a countertop or desktop as these would not create corridor obstructions.

4. The moved Items #2, #3 and #4 are editorial only to provide better clarity of the existing requirements.
5. Exception #4 in 5705.5 provides minor editorial changes for consistency in terminology usage with other sections of section 5705.5.*Just for easy reference*: [BE] CORRIDOR. An enclosed exit access component that defines and provides a path of egress travel.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC), ICC Committee for Healthcare (CHC) and the Pandemic Task Force Code Development Work Group (PTF CDWG).

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

The ICC/NEHA Pandemic Task Force (PTF) was organized and tasked with researching the effects of the COVID-19 pandemic on the built environment and developing a roadmap and proposing needed resources – including guidelines, recommended practices, publications and updates to the International Codes® (I-Codes®) – that are necessary to overcome the numerous challenges that may be faced during future pandemics and to construct and manage safe, sustainable and affordable occupancy of the built environment. The ICC Pandemic Task Force Code Development Work Group (PTF CDWG) has conducted a comprehensive review of current code requirements as they relate to the prevention of the transmission of diseases and other serious health concerns and suggested revisions to current code requirements based on this assessment.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is simply clarifying the intended application of the ABHR requirements as revised for the 2024 IFC.

F258-24

F259-24

IFC: 5705.5

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Jeff O'Neil, Chair, Committee on Healthcare (ahc@iccsafe.org); Jonathan Flannery, Pandemic Task Force Code Development Working Group, PTF CDWG (jflannery@aha.org)

2024 International Fire Code

Revise as follows:

5705.5 Alcohol-based hand rubs classified as Class I or II liquids.
The use of dispensers containing alcohol-based hand rubs classified as Class I or II liquids shall be in accordance with all of the following:

1. In health care facilities, the maximum capacity of each dispenser shall be 41 ounces (1.21 L) in rooms, corridors and areas open to corridors and 68 ounces (2.0 L) in care suites. In all other facilities, the maximum capacity of each wall-mounted dispenser shall be 68 ounces (2 L) and any other dispenser shall be 1 gallon (4 L).

2. The aggregate quantity within a control area, or smoke compartment in health care facilities, shall not exceed 30 gallons (37.85 L) of liquids or 1135 ounces (32.2 kg) of Level 1 aerosols, or a combination of liquids and aerosols not to exceed, in total, the equivalent of 30 gallons (37.85 L) or 1,135 ounces (32.2 kg) such that the sum of the ratios of the liquid and aerosol quantities divided by the allowable quantity of liquids and aerosols, respectively, shall not exceed one.
   Exception: In a single story building with only one control area, the aggregate quantity limit shall be based on 1 gal per 900 sq. ft. (84 sq. m)

~~2~~3. The minimum separation between dispensers shall be 48 inches (1219 mm).

~~3~~4. Dispensers shall not be located above, below or closer than 1 inch (25 mm) to an electrical receptacle, switch, appliance, device or other ignition source. The wall space between the dispenser and the floor or intervening counter top shall be free of electrical receptacles, switches, appliances, devices or other ignition sources.

~~4~~5. Dispensers shall be located so that the bottom of the dispenser is not less than 42 inches (1067 mm) and not more than 48 inches (1219 mm) above the finished floor.

~~5~~6. Dispensers shall not obstruct required means of egress or be placed within 3 feet (914 mm) of an open flame, heating device or other ignition source.

~~6~~7. Dispensers shall not release their contents except when the dispenser is manually activated. Facilities shall be permitted to install and use automatically activated "touch free" alcohol-based hand-rub dispensing devices with the following requirements:

   ~~6~~7.1. The facility or persons responsible for the dispensers shall test the dispensers each time a new refill is installed in accordance with the manufacturer's care and use instructions.

   ~~6~~7.2. Dispensers shall be designed and must operate in a manner that ensures accidental or malicious activations of the dispensing device are minimized. At a minimum, all devices subject to or used in accordance with this section shall have the following safety features:

      ~~6.2.1.~~ 7.2.1 Any activations of the dispenser shall only occur when an object is placed within 4 inches (98 mm) of the sensing device.

      ~~6.2.2.~~ 7.2.2 The dispenser shall not dispense more than the amount required for hand hygiene consistent with label instructions as regulated by the United States Food and Drug Administration (USFDA).

      ~~6.2.3.~~ 7.2.3 An object placed within the activation zone and left in place will cause only one activation.

~~7~~8. Storage and use of alcohol-based hand rubs shall be in accordance with the applicable provisions of Sections 5704 and 5705.

Reason: This proposal adds two new reasonable requirements for maximum quantity limitations of alcohol-based hand rub dispensers in use throughout buildings in control areas, smoke compartments, rooms, corridors and rooms that open to corridors. These MAQ limitations are based on experience over the past 4 years of the pandemic by both health care facilities and other occupancy types. The higher quantity of allowable alcohol-based hand rub solution in dispensers is increased from 10 Gallons to 30 Gallons per control area. This is a reasonable increase in MAQ and is supported by the increased quantities that have been safely utilized in all public buildings during the pandemic.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC), ICC Committee for Healthcare (CHC) and the Pandemic Task Force Code Development Work Group (PTF CDWG)

This proposal is submitted by the ICC Fire Code Action Committee (FCAC) and ICC Committee for Healthcare (CHC). FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

The ICC/NEHA Pandemic Task Force (PTF) was organized and tasked with researching the effects of the COVID-19 pandemic on the built environment and developing a roadmap and proposing needed resources – including guidelines, recommended practices, publications and updates to the International Codes® (I-Codes®) – that are necessary to overcome the numerous challenges that may be faced during future pandemics and to construct and manage safe, sustainable and affordable occupancy of the built environment. The ICC Pandemic Task Force Code Development Work Group (PTF CDWG) has conducted a comprehensive review of current code requirements as they relate to the prevention of the transmission of diseases and other serious health concerns and suggested revisions to current code requirements based on this assessment.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal does not impose any requirements that would increase construction cost. There is no requirement for the installation of alcohol-based hand rub dispensers imposed by this proposal. Installation of dispensers is a choice and where installed, reasonable MAQ limitation for a Class I or Class II liquid is an appropriate safety measure.

F259-24

F260-24

IFC: 5705.5, 5705.5.2 (New), TABLE 5003.1.1(5); IBC: TABLE 307.1.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Jeff O'Neil, Chair, Committee on Healthcare (ahc@iccsafe.org)

2024 International Fire Code

Revise as follows:

5705.5 Alcohol-based hand rubs classified as Class I or II liquids.
The use of dispensers containing alcohol-based hand rubs classified as Class I or II liquids shall be in accordance with all of the following:

1. The maximum capacity of each dispenser shall be 68 ounces (2 L).
2. The minimum separation between dispensers shall be 48 inches (1219 mm).
3. Dispensers shall not be located above, below or closer than 1 inch (25 mm) to an electrical receptacle, switch, appliance, device or other ignition source. The wall space between the dispenser and the floor or intervening counter top shall be free of electrical receptacles, switches, appliances, devices or other ignition sources.
4. Dispensers shall be located so that the bottom of the dispenser is not less than 42 inches (1067 mm) and not more than 48 inches (1219 mm) above the finished floor.
5. Dispensers shall not obstruct required means of egress or be placed within 3 feet (914 mm) of an open flame, heating device or other ignition source.
6. Dispensers shall not release their contents except when the dispenser is manually activated. Facilities shall be permitted to install and use automatically activated “touch free” alcohol-based hand-rub dispensing devices with the following requirements:
   - 6.1. The facility or persons responsible for the dispensers shall test the dispensers each time a new refill is installed in accordance with the manufacturer’s care and use instructions.
   - 6.2. Dispensers shall be designed and must operate in a manner that ensures accidental or malicious activations of the dispensing device are minimized. At a minimum, all devices subject to or used in accordance with this section shall have the following safety features:
     - 6.2.1. Any activations of the dispenser shall only occur when an object is placed within 4 inches (98 mm) of the sensing device.
     - 6.2.2. The dispenser shall not dispense more than the amount required for hand hygiene consistent with label instructions as regulated by the United States Food and Drug Administration (USFDA).
     - 6.2.3. An object placed within the activation zone and left in place will cause only one activation.
7. Storage ~~and use~~ of alcohol-based hand rub ~~rubs~~ <u>solution not in use</u> shall be in accordance with <u>Section 5705.5.2</u> ~~the applicable provisions of Sections 5704 and 5705~~.
8. Dispensers located in occupancies with carpeted floors shall only be allowed in *smoke compartments* or *fire areas* equipped throughout with an *approved automatic sprinkler system* in accordance with Section 903.3.1.1 or 903.3.1.2.

Add new text as follows:

<u>**5705.5.2** **Storage of alcohol-based hand rub solutions classified as Class I or II liquids.**.</u> <u>The indoor storage of alcohol-based hand rub solution, classified as Class I or II liquids flammable or combustible, shall be in accordance with all of the following:</u>

<u>**Exception:** Alcohol-based hand rub dispensers for personal use with an aggregate of not more than 16 oz (474 ml) at a workstation shall not be included in determining the MAQ.</u>

1. <u>The maximum capacity of individual alcohol-based hand rub solution storage containers shall be 1 gallon (4 L) and the container shall be constructed of a material compatible with the alcohol-based solution.</u>

2. Storage of alcohol-based hand rub solutions in basements or below grade shall be protected throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

5705.5.2 TABLE MAXIMUM ALLOWABLE QUANTITY OF ALCOHOL-BASED HAND RUB SOLUTION IN STORAGE[e]

STORAGE LOCATION	SPRINKLERED	NONSPRINKLERED
Open storage areas[c]	60 Gal	30 Gal
Non-dedicated storage room[a]	120 Gal	60 Gal
Non-dedicated storage room; 1-HR fire separation[a,d]	240 Gal	120 Gal
Non-dedicated storage room; 2-HR fire separation[a,d]	360 Gal	240 Gal
Dedicated storage room[b]	360 Gal	240 Gal
Dedicated storage room; 1-HR fire separation[b,d]	600 Gal	240 Gal
Dedicated storage room; 2-HR fire separation[b,d]	720 Gal	240 Gal

a. Non-dedicated storage room is an enclosed storage room complying with the applicable storage requirements of this code.

b. Dedicated storage room is an enclosed storage room used only for the storage of alcohol-based hand rub solution.

c. The number of open storage areas is limited to 1 per story or fire area with a maximum, of 4 per building

d. Fire separation shall be fire resistance-rated construction separating the dedicated storage room from the remainder of the building.

e. The maximum allowable quantity is for per control area, or smoke compartment in health care facilities.

Revise as follows:

TABLE 5003.1.1(5) HAZARDOUS MATERIALS EXEMPTIONS[a]

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.
Corrosive	Building materials	The quantity of commonly used building materials that are classified as corrosive materials is not limited.
	Personal and household products	The quantity of personal and household products that are classified as corrosive materials is not limited in retail displays, provided that the products are in original packaging.
	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
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	Aerosols	Buildings and structures occupied for the storage of aerosol products, aerosol cooking spray products, or plastic aerosol 3 products shall be classified as Group S-1.
	Alcoholic beverages	The 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 not exceeding 1.3 gallons.
	Cleaning establishments with combustible liquid solvents	The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140°F is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers or 1-hour horizontal assemblies, or both, constructed in accordance with the *International Building Code*.
		The quantity of combustible liquid solvents having a flash point at or above 200°F is not limited.
	Closed piping systems	The quantity of flammable and combustible liquids and gases utilized for the operation of machinery or equipment is not limited.
	Flammable finishing operations using flammable and combustible liquids	Buildings and structures occupied for the application of flammable finishes shall comply with Section 416.
	Fuel	The quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited.
		The quantity of gaseous fuels in piping systems and fixed appliances regulated by the *International Fuel Gas Code* is not limited.
		The quantity of liquid fuels in piping systems and fixed appliances regulated by the *International Mechanical Code* is not limited.
	Fuel oil	The quantity of fuel oil storage complying with Section 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 shall be provided in the construction documents. The quantity of alcohol-based hand rubs classified as Class I or II liquids in storage in accordance with Section 5705.5.2.
	Retail and wholesale sales occupancies with flammable and combustible liquids	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Highly toxic and toxic materials	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Any	Agricultural materials	The quantity of agricultural materials stored or utilized for agricultural purposes on the premises is not limited.
	Energy storage	The quantity of hazardous materials in stationary storage battery systems is not limited.
		The quantity of hazardous materials in stationary fuel cell power systems is not limited.
		The quantity of hazardous materials in capacitor energy storage systems is not limited.
	Refrigeration systems	The quantity of refrigerants in refrigeration systems is not limited.

For SI: 1 gallon = 3.785 L, °C = (°F – 32)/1.8.

a. Exempted materials and conditions listed in this table are required to comply with provisions of this code that are not based on exceeding maximum allowable quantities in Section 5003.

2024 International Building Code

Revise as follows:

TABLE 307.1.1 HAZARDOUS MATERIALS EXEMPTIONS[a]

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.
Corrosive	Building materials	The quantity of commonly used building materials that are classified as corrosive materials is not limited.
	Personal and household products	The quantity of personal and household products that are classified as corrosive materials is not limited in retail displays, provided that the products are in original packaging.

	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
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	Aerosols	Buildings and structures occupied for the storage of aerosol products, aerosol cooking spray products, or plastic aerosol 3 products shall be classified as Group S-1.
	Alcoholic beverages	The 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 not exceeding 1.3 gallons.
	Cleaning establishments with combustible liquid solvents	The quantity of combustible liquid solvents used in closed systems and having a flash point at or above 140ºF is not limited. To qualify for this allowance, equipment shall be listed by an approved testing agency and the occupancy shall be separated from all other areas of the building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 711, or both
		The quantity of combustible liquid solvents having a flash point at or above 200ºF is not limited.
	Closed piping systems	The quantity of flammable and combustible liquids and gases utilized for the operation of machinery or equipment is not limited.
	Fuel	The quantity of liquid or gaseous fuel in fuel tanks on vehicles or motorized equipment is not limited.
		The quantity of gaseous fuels in piping systems and fixed appliances regulated by the International Fuel Gas Code is not limited.
		The quantity of liquid fuels in piping systems and fixed appliances regulated by the International Mechanical Code is not limited.
	Flammable finishing operations using flammable and combustible liquids	Buildings and structures occupied for the application of flammable finishes shall comply with Section 416.
	Fuel oil	The quantity of fuel oil storage complying with Section 605.4.2 of the *International Fire Code* 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 of the *International Fire Code* is not limited. The location of the ABHR dispensers shall be provided in the construction documents. The quantity of alcohol-based hand rubs classified as Class I or II liquids in storage in accordance with Section 5705.5.2 of the *International Fire Code.*
	Retail and wholesale sales occupancies with flammable and combustible liquids	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Highly toxic and toxic materials	Retail and wholesale sales occupancies	The quantity of medicines, foodstuffs or consumer products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids, with the remainder of the solutions not being flammable, is not limited. To qualify for this allowance, such materials shall be packaged in individual containers not exceeding 1.3 gallons.
Any	Agricultural materials	The quantity of agricultural materials stored or utilized for agricultural purposes on the premises is not limited.
	Energy storage	The quantity of hazardous materials in stationary storage battery systems is not limited.
		The quantity of hazardous materials in stationary fuel cell power systems is not limited.
		The quantity of hazardous materials in capacitor energy storage systems is not limited.
	Refrigeration Systems	The quantity of refrigerants in refrigeration systems is not limited.

For SI: 1 gallon = 3.785L, °C = (°F - 32)/1.8.

a. Exempted materials and conditions listed in this table are required to comply with applicable provisions of the International Fire Code.

Reason: The main purpose of this proposal is to add a new Section (5705.5.2) for storage requirements and quantity limitations. This new section adds reasonable storage quantity limits and requirements based on experience over the past 4 years of the pandemic.

Two key points to consider.1. Alcohol-based hand-sanitizer solutions at the 60 - 95% level recommended by CDC are classified as Class IB based on flashpoint. However, alcohol type polar solvents have other characteristics that differentiate them from the more volatile petroleum-based flammable (ignitable) liquids: quick evaporation, water-soluble, respond well to water based automatic fire sprinklers. 2. The proposed storage quantity allowances are for ABHR replacement solution stored in their factory containers intended for replacement qualities of one dispenser can be compared to MAQs permitted for Class IB flammable liquids in Group M Occupancies for wholesale and retail sales uses (Table5704.3.4.1) need to explain this comparison; the values don't match. The proposal addresses storage of alcohol-based rub solutions in a maximum individual container size of 1 gallon; provides maximum storage quantities for sprinklered and nonsprinklered buildings and incorporates allowances for higher storage quantities based on whether the storage room is for only alcohol-based sanitizer solutions and whether the storage room has 1 or 2 hour fire resistance rated construction for compartmentation of the hazard. The current MAQs for Class IB flammable liquids (typical classification for an alcohol-based hand rub solutions) is 120 gallons with 100% increase for sprinklers and approved storage cabinets). The quantities in Table 5705.5.2 are modeled after these MAQ allowances recognizing: the storage challenges created during the pandemic and the experience of storage in these amounts without unreasonable fire risk or notable fire incidents; the benefit of fire sprinkler protection and fire separations for hazard mitigation for ABHR solution in storage.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC), ICC Committee for Healthcare (CHC) and the Pandemic Task Force Code Development Work Group (PTF CDWG).

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**.

The Committee on Healthcare (CHC) was established by the ICC Board of Directors in 2011 to pursue opportunities to study and develop effective and efficient provisions for Hospital, Nursing Homes, Assisted Living and Ambulatory Care Facilities. This committee was formed in cooperation with the American Society for Healthcare Engineering (ASHE). In July of 2017, the ICC Board made CHC a standing committee. In 2023 the CHC has held several virtual meetings open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the CHC website at CHC webpage.

The ICC/NEHA Pandemic Task Force (PTF) was organized and tasked with researching the effects of the COVID-19 pandemic on the built environment and developing a roadmap and proposing needed resources – including guidelines, recommended practices, publications and updates to the International Codes® (I-Codes®) – that are necessary to overcome the numerous challenges that may be faced during future pandemics and to construct and manage safe, sustainable and affordable occupancy of the built environment. The ICC Pandemic Task Force Code Development Work Group (PTF CDWG) has conducted a comprehensive review of current code requirements as they relate to the prevention of the transmission of diseases and other serious health concerns and suggested revisions to current code requirements based on this assessment.

Cost Impact: Increase

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

Storage of ABHR solution is not mandated by this code requirement, but the storage of large quantities of ABHR may necessitate the construction of separated storage room (fire resistance-rated construction) or the installation of an automatic fire sprinkler system. In those instances there could be a cost for construction for new buildings or a cost of construction to renovate an existing building. However, these requirements provide an increase in amounts of hazardous materials thus further avoiding classification as a Group H occupancy.

F260-24

F261-24

IFC: SECTION 5706, 5706.5.4.5, SECTION 5707, 5707.2, 5707.2.2, 5707.2.1

Proponents: Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com); Darcy Davidson, Carlsbad Fire Department, California Fire Prevention Officers (darcy.davidson@carlsbadca.gov)

2024 International Fire Code

SECTION 5706
SPECIAL OPERATIONS

Delete without substitution:

~~5706.5.4.5 Commercial, industrial, governmental or manufacturing~~.
~~Dispensing of Class I, II and III motor vehicle fuel from tank vehicles into the fuel tanks of motor vehicles located at commercial, industrial, governmental or manufacturing establishments is allowed where *approved*, provided that such dispensing operations are conducted in accordance with the following:~~

1. ~~Dispensing shall occur only at sites that have been issued a permit to conduct *mobile fueling*.~~
2. ~~The *owner* of a *mobile fueling* operation shall provide to the jurisdiction a written response plan that demonstrates readiness to respond to a fuel spill and carry out appropriate mitigation measures, and describes the process to dispose properly of contaminated materials.~~
3. ~~A detailed site plan shall be submitted with each application for a permit. The site plan shall indicate: all buildings, structures and appurtenances on site and their use or function; all uses adjacent to the *lot lines* of the site; the locations of all storm drain openings, adjacent waterways or wetlands; information regarding slope, natural drainage, curbing, impounding and how a spill will be retained on the site property; and the scale of the site plan.~~
   ~~Provisions shall be made to prevent liquids spilled during dispensing operations from flowing into buildings or off-site. Acceptable methods include, but shall not be limited to, grading driveways, raising doorsills or other *approved* means.~~
4. ~~The *fire code official* is allowed to impose limits on the times and days during which *mobile fueling* operations is allowed to take place, and specific locations on a site where fueling is permitted.~~
5. ~~*Mobile fueling* operations shall be conducted in areas not open to the public or shall be limited to times when the public is not present.~~
6. ~~*Mobile fueling* shall not take place within 15 feet (4572 mm) of buildings, property lines, combustible storage or storm drains.~~

   ~~Exceptions:~~

   1. ~~The distance to storm drains shall not apply where an *approved* storm drain cover or an *approved* equivalent that will prevent any fuel from reaching the drain is in place prior to fueling or a fueling hose being placed within 15 feet (4572 mm) of the drain. Where placement of a storm drain cover will cause the accumulation of excessive water or difficulty in conducting the fueling, such cover shall not be used and the fueling shall not take place within 15 feet (4572 mm) of a drain.~~
   2. ~~The distance to storm drains shall not apply for drains that direct influent to *approved* oil interceptors.~~
7. ~~The tank vehicle shall comply with the requirements of NFPA 385 and local, state and federal requirements. The tank vehicle's specific functions shall include that of supplying fuel to motor vehicle fuel tanks. The vehicle and all its equipment shall be maintained in good repair.~~
8. ~~Signs prohibiting smoking or open flames within 25 feet (7620 mm) of the tank vehicle or the point of fueling shall be prominently posted on three sides of the vehicle including the back and both sides.~~
9. ~~A portable fire extinguisher with a minimum rating of 40:BC shall be provided on the vehicle with signage clearly indicating its location.~~

~~10. The dispensing nozzles and hoses shall be of an *approved* and *listed* type.~~

~~11. The dispensing hose shall not be extended from the reel more than 100 feet (30 480 mm) in length.~~

~~12. Absorbent materials, nonwater-absorbent pads, a 10-foot-long (3048 mm) containment boom, an *approved* container with lid and a nonmetallic shovel shall be provided to mitigate a minimum 5-gallon (19 L) fuel spill.~~

~~13. Tank vehicles shall be equipped with a "fuel limit" switch such as a count-back switch, to limit the amount of a single fueling operation to not more than 500 gallons (1893 L) before resetting the limit switch.~~

~~**Exception:** Tank vehicles where the operator carries and can utilize a remote emergency shutoff device that, when activated, immediately causes flow of fuel from the tank vehicle to cease.~~

~~14. Persons responsible for dispensing operations shall be trained in the appropriate mitigating actions in the event of a fire, leak or spill. Training records shall be maintained by the dispensing company.~~

~~15. Operators of tank vehicles used for *mobile fueling* operations shall have in their possession at all times an emergency communications device to notify the proper authorities in the event of an emergency.~~

~~16. The tank vehicle dispensing equipment shall be constantly attended and operated only by designated personnel who are trained to handle and dispense motor fuels.~~

~~17. Fuel dispensing shall be prohibited within 25 feet (7620 mm) of any source of ignition.~~

~~18. The engines of vehicles being fueled shall be shut off during dispensing operations.~~

~~19. Nighttime fueling operations shall only take place in adequately lighted areas.~~

~~20. The tank vehicle shall be positioned with respect to vehicles being fueled to prevent traffic from driving over the delivery hose.~~

~~21. During fueling operations, tank vehicle brakes shall be set, chock blocks shall be in place and warning lights shall be in operation.~~

~~22. Motor vehicle fuel tanks shall not be topped off.~~

~~23. The dispensing hose shall be properly placed on an *approved* reel or in an *approved* compartment prior to moving the tank vehicle.~~

~~24. The *fire code official* and other appropriate authorities shall be notified when a reportable spill or unauthorized discharge occurs.~~

~~25. Operators shall place a drip pan or an absorbent pillow under each fuel fill opening prior to and during dispensing operations. Drip pans shall be liquid-tight. The pan or absorbent pillow shall have a capacity of not less than 3 gallons (11.36 L). Spills retained in the drip pan or absorbent pillow need not be reported. Operators, when fueling, shall have on their person an absorbent pad capable of capturing diesel fuel overfills. Except during fueling, the nozzle shall face upward and an absorbent pad shall be kept under the nozzle to catch drips. Contaminated absorbent pads or pillows shall be disposed of regularly in accordance with local, state and federal requirements.~~

SECTION 5707
ON-DEMAND MOBILE FUELING OPERATIONS

5707.2 Mobile fueling vehicle.

An on-demand *mobile fueling* vehicle shall be that which is utilized in on-demand fueling operations for the dispensing of Class I, II or III liquids into the fuel tanks of motor vehicles.

Revise as follows:

~~5707.2.2~~ <u>5707.2.1</u> Mobile fueling vehicle requirements.

Each *mobile fueling* vehicle shall comply with all local, state and federal requirements, as well as the following:

~~1. *Mobile fueling* vehicles with a chassis-mounted tank in excess of 110 gallons (416 L) shall also comply with the requirements of Section 5706.6 and NFPA 385.~~

~~2.~~ 1 The on-demand *mobile fueling* vehicle and its equipment shall be maintained in good repair.

~~3.~~ 2 Safety cans ~~and *approved* metal containers~~ shall be secured to the *mobile fueling* vehicle except when in use.

~~4.~~ 3. Fueling a motor vehicle from tanks or containers mounted in a trailer connected to a *mobile fueling* vehicle shall be prohibited.

~~5707.2.1~~ 5707.2.2 Mobile fueling vehicle classifications.
An on-demand *mobile fueling* vehicle shall be characterized as one of the following:

1. ~~**Tier 1 *mobile fueling* vehicle.** A tank vehicle that complies with NFPA 385 and that has chassis-mounted tanks where the aggregate capacity does not exceed 1,600 gallons (6057 L)~~ On-demand mobile fueling vehicles complying with Section 5706.6 and NFPA 385 with one or more chassis-mounted tanks or containers not exceeding an aggregate capacity of 3,000 gallons (11,356 L)..
2. ~~**Tier 2 *mobile fueling* vehicle.** A vehicle with one or more chassis-mounted tanks or containers that do not exceed 110 gallons (416 L) in capacity with an aggregate capacity that does not exceed 800 gallons (3028 L) or the weight capacity of the vehicle in accordance with DOTn~~ On-demand mobile fueling vehicles with one or more chassis-mounted tanks or containers and each tank or container does not exceed 110 gallons (416 L) shall not exceed an aggregate capacity of 800 gallons (3028 L)..
3. ~~**Tier 3 *mobile fueling* vehicle.** A vehicle that carries a maximum aggregate capacity of 60 gallons (227 L) of motor fuel in metal safety cans *listed* in accordance with UL 30 or other *approved* metal containers, each not to exceed 5 gallons (19 L) in capacity~~ Safety cans carried on mobile fueling vehicles shall be listed in accordance with UL 30 and shall not exceed 5 gallons (19 L) in capacity. The aggregate capacity of such safety cans shall not exceed 60 gallons (227 L).

.

Reason: This proposal is intended to correct a conflict within the code, eliminate duplicate sections addressing the same activity and improve the language for On-Demand Mobile Fueling.

The proposal seeks to delete Section 5706.5.4.5 commonly known as Fleet Fueling. It is a form of mobile fueling which is now covered by Section 5707. There is no need to have two sections of the code covering the same activity.

Additionally, the addition of the Class I liquids to 5706.5.4.5 created serious conflicts between the levels of safety provided because 5706.5.4.5 was written to address hazards of Class II and Class III liquids two decades ago, and Section 5707 was written to specifically include and address the hazards of Class I liquid dispensing. See table for the serious disparities.

	Class II and III Section 5706.5.4.5	Class I Section 5707
Separation from buildings and lot lines	15’	25’
Tank Vehicle/mobile fuel vehicle fuel limits	None	1600/800/60 gal
Fuel limit switch	500 gal	30 gal
Dispensing hose length	100’	50’
Fire extinguisher rating	40:BC	4A:80-BC
Approval and listing of nozzles and hoses	None	Required
Listed breakaway at nozzle	None	Required
Safety Cones	None	Required
Vehicle Flashers	None	Required
Night delivery lighting	None	Required

What was commonly referred to as Fleet Fueling can easily comply with Section 5707 On-Demand Mobile Fueling with the proper safety protocols.

In Section 5707, Section 5707.2.1 and Section 5707.2.2 have been re-ordered to have the vehicle requirements comes first, then the vehicle classifications.

In the new Section 5707.2.1 Item 1 has been deleted and Item 1 under new Section 5707.2.2 has been modified to cover that topic.

In new Section 5707.2.1 Item 2 the "other approved metal" reference has been deleted as subjective language and to ensure "safety cans" are utilized.

In new Section 5707.2.2 The scoping has been changed from "classification" to "capacity". Though requested by industry the "tier" concept was not embraced and the core issue was always capacity.

New Section 5707.2.2 Item 1 has been modified to eliminate the tier language and to reference Section 5706.6 besides NFPA 385 to capture existing IFC requirements and the capacity has been increased to 3,000 gallons which is typically the size of a small oil delivery vehicle commonly on the road, this change recognizes that in some jurisdictions these vehicles are already in use for mobile fueling and to adjust the section due to the deletion of fleet fueling language.

New Section 5707.2.2 Item 2 has been modified to eliminate the Tier language and to eliminate a reference to DOTn weight capacity as that is an issue enforced by law enforcement agencies and DOT.

New Section 5707.2.3 has been modified to eliminate the Tier language and to delete reference to "other approved metal containers" to default to "safety cans".

The proposed changes eliminate duplication of sections covering the same topic, eliminate serious differences in safety levels provided, and increases the NFPA 385 compliant vehicle capacity to recognize capacities currently being safely utilized and which reduce the number of vehicle fills and trips necessary.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There are no construction cost impacts, this language regulates mobile fueling activities utilizing vehicles.

F261-24

F262-24

IFC: 5803.1.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Robert J Davidson, Davidson Code Concepts LLC, Self (rjd@davidsoncodeconcepts.com); Julius Ballanco, P.E., JB Engineering and Code Consulting, P.C., Self (jbengineer@aol.com)

2024 International Fire Code

Revise as follows:

5803.1.1 Special limitations for indoor storage and use.
Flammable gases shall not be stored or used in Group A, E, I or R occupancies or in offices in Group B occupancies.

Exceptions:

1. Cylinders of nonliquefied *compressed gases* not exceeding a capacity of 250 cubic feet (7.08 m^3) or liquefied gases not exceeding a capacity of 40 pounds (18 kg) each at *normal temperature and pressure (NTP)* used for maintenance purposes, patient care or operation of equipment.
2. Food service operations in accordance with Section 6103.2.1.7.
3. Hydrogen gas systems located in a hydrogen fuel gas room constructed in accordance with Section 421 of the International Building Code.
4. <u>The temporary storage of Category 1B Flammable Gas refrigerants in machinery rooms during refrigeration equipment and system maintenance, that requires the refrigerant to be removed from the equipment.</u>

Reason: During maintenance of refrigeration systems, the refrigerant is temporarily captured in compressed gas cylinders in the machinery room the refrigeration system is located within, then when maintenance or repair work is completed, the refrigerant is reloaded into the equipment. The new exception permits this necessary activity and correlates with the industry standards these activities are conducted under.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This added language addresses an operational issue not new construction. It clarifies that the prohibition in Section 5803.1.1 was not intended to apply to temporary storage of Category 1B Flammable Gas refrigerants in machinery rooms during refrigeration equipment and system maintenance.

F262-24

F263-24

IFC: TABLE 6104.3

Proponents: Bruce Swiecicki, National Propane Gas Association, National Propane Gas Association (bswiecicki@npga.org)

2024 International Fire Code

Revise as follows:

TABLE 6104.3 LOCATION OF LP-GAS CONTAINERS

LP-GAS CONTAINER CAPACITY (water gallons)[h]	MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS AND BUILDINGS, PUBLIC WAYS[g] OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT ON		MINIMUM SEPARATION BETWEEN LP-GAS CONTAINERS[b, c] (feet)
	Mounded or underground LP-gas containers[a] (feet)	Above-ground LP-gas containers[b] (feet)	
Less than 125[c, d]	10	5[e]	None
125 to 250	10	10	None
251 to 500	10	10	3
501 to 2,000	10	25[e, f]	3
2,001 to 30,000	50	50	5
30,001 to 70,000	50	75	(0.25 of sum of diameters of adjacent LP-gas containers)
70,001 to 90,000	50	100	
90,001 to 120,000	50	125	

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

a. Minimum distance for underground LP-gas containers shall be measured from the pressure relief device and the filling or liquid-level gauge vent connection at the container, except that all parts of an underground LP-gas container shall be not less than 10 feet from a building or lot line of adjoining property that can be built on.

b. For other than installations in which the overhanging structure is 50 feet or more above the relief-valve discharge outlet. In applying the distance between buildings and ASME LP-gas containers with a water capacity of 125 gallons or more, not less than 50 percent of this horizontal distance shall also apply to all portions of the building that project more than 5 feet from the building wall and that are higher than the relief valve discharge outlet. This horizontal distance shall be measured from a point determined by projecting the outside edge of such overhanging structure vertically downward to grade or other level on which the LP-gas container is installed. Distances to the building wall shall be not less than those prescribed in this table.

c. Where underground multicontainer installations are composed of individual LP-gas containers having a water capacity of 125 gallons or more, such containers shall be installed so as to provide access at their ends or sides to facilitate working with cranes or hoists.

d. At a consumer site, if the aggregate water capacity of a multiple-container installation, comprised of individual LP-gas containers having a water capacity of less than 125 gallons, is 500 gallons or more, the minimum distance shall comply with the appropriate portion of this table, applying the aggregate capacity rather than the capacity per LP-gas container. If more than one such installation is made, each installation shall be separated from other installations by not less than 25 feet. Minimum distances between LP-gas containers need not be applied.

e. The following shall apply to above-ground containers installed alongside buildings:

1. LP-gas containers of less than a 125-gallon water capacity are allowed without a separation distance where in compliance with Items 2, 3 and 4.

2. Department of Transportation (DOTn) specification LP-gas containers shall be located and installed so that the discharge from the container pressure relief device is not less than 3 feet horizontally from building openings below the level of such discharge and shall not be beneath buildings unless the space is well ventilated to the outside and is not enclosed for more than 50 percent of its perimeter. The discharge from LP-gas container pressure relief devices shall be located not less than 5 feet from exterior sources of ignition, openings into direct-vent (sealed combustion system) appliances or mechanical ventilation air intakes.

3. ASME LP-gas containers of less than a 125-gallon water capacity shall be located and installed such that the discharge from pressure relief devices shall not terminate in or beneath buildings and shall be located not less than 5 feet horizontally from building openings below the level of such discharge and not less than 5 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances, or mechanical ventilation air intakes.

4. The filling connection and the vent from liquid-level gauges on either DOTn or ASME LP-gas containers filled at the point of installation shall be not less than 10 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances or mechanical ventilation air intakes.

f. This distance is allowed to be reduced to not less than 10 feet for a single LP-gas container of 1,200-gallon water capacity or less, provided that such container is not less than 25 feet from other LP-gas containers of more than 125-gallon water capacity.

g. Above-ground LP-gas containers with a water capacity of 2,000 gallons or less shall be separated from public ways by a distance of not less than 5 feet. Containers with a water capacity greater than 2,000 gallons shall be separated from public ways in accordance with this table.

h. Containers greater than 120,000 gallons water capacity shall comply with NFPA 58.

Reason: Table 6104.3 currently stops its entries at 120,000 gallons water capacity. NFPA 58 provides three additional entries that address containers between 120,000-200,000 gallons; 200,001-1,000,000 gallons; and, greater than 1,000,000 gallons. These installations are not addressed by the current Table 6104.3, so reference is made to NFPA 58 for the requirements.

Bibliography: NFPA 58 "Liquefied Petroleum Gas Code," 2024 edition published by the National Fire Protection Association.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The cost of construction will not change as a result of this proposal. This proposal is simply providing guidance on what to do when amounts exceed 120,000 gallons in size. There is no change to the cost of installing a propane container on site due to this proposal.

F263-24

F264-24

IFC: 6104.3.2, 6104.3.3 (New)

Proponents: Gregory Wilson, Federal Emergency Management Agency, FEMA (gregory.wilson2@fema.dhs.gov); Rebecca Quinn, RCQuinn Consulting, Inc., FEMA Building Science (rebecca@rcquinnconsulting.com)

2024 International Fire Code

6104.3.2 Special hazards.
LP-gas containers shall be located with respect to special hazards including, but not limited to, above-ground *flammable* or *combustible liquid* tanks, oxygen or gaseous hydrogen containers, flooding or electric power lines as specified in Section 6.5.3 of NFPA 58.

Add new text as follows:

6104.3.3 **Flood hazard areas.** LP-gas containers located in *flood hazard areas* established in Section 1612.3 of the *International Building Code* shall be located and installed in accordance with ASCE 24.

Reason: Section 6104.3.2 requires location of LP-gas containers "with respect to flooding" but does not provide specifics on what that means. This proposal adds a pointer on the minimum I-Code requirements for LP-gas containers located in flood hazard areas. The proposed change is not a new requirement; it is simply adding a reference to existing requirements for utilities and equipment in flood hazard areas.

Bibliography: *Flood Resistant Design and Construction,* ASCE/SEI 24-14

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal does not increase or decrease the initial construction costs or life-cycle costs because it does not change any requirements; it only points to existing requirements for development in flood hazard areas.

F264-24

F265-24

IFC: 6107.2

Proponents: Bruce Swiecicki, National Propane Gas Association, National Propane Gas Association (bswiecicki@npga.org)

2024 International Fire Code

Revise as follows:

6107.2 Smoking and other sources of ignition.
"No Smoking" signs complying with Section 310 shall be posted where required by the *fire code official*. Smoking within 25 feet (7620 mm) of a point of transfer, while filling operations are in progress at LP-gas containers or vehicles, shall be prohibited.
Control of other sources of ignition shall comply with Chapter 3 of this code and Section ~~6.25~~ 6.26 of NFPA 58.

Reason: This proposal will update the reference to the 2024 edition of NFPA 58.

Bibliography: NFPA 58 "LP-Gas Code," 2024 edition, National Fire Protection Association.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no cost impact for this proposal as it is simply updating to the correction section within the referenced standard.

F265-24

F266-24

IFC: 6107.3

Proponents: Bruce Swiecicki, National Propane Gas Association, National Propane Gas Association (bswiecicki@npga.org)

2024 International Fire Code

Revise as follows:

6107.3 Clearance to combustibles. ~~Weeds, grass, brush, trash and other combustible materials shall be kept not less than 10 feet (3048 mm) from LP-gas tanks or containers.~~Combustible materials shall not accumulate or be stored within 10 ft (3048 mm) of a container.

Reason: Vegetation of any kind is not considered to be a hazard. This requirement applies to stored or accumulated fuel-dense combustible materials such as wood pallets, boxes and other materials that when ignited, can impinge flames on the container. This proposal is consistent with the current requirements in NFPA 58.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no cost impact for this proposal as it is simply clarifying intent and is consistent with NFPA 58.

F266-24

F267-24

IFC: 6108.1

Proponents: Bruce Swiecicki, National Propane Gas Association, National Propane Gas Association (bswiecicki@npga.org)

2024 International Fire Code

Revise as follows:

6108.1 General.
Fire protection shall be provided for installations having LP-gas storage containers with a water capacity of more than 4,000 gallons (15 140 L), as required by Section ~~6.29~~ 6.30 of NFPA 58.

Reason: This proposal will update the text in the IFC to the current section in the 2024 edition of NFPA 58.

Bibliography: NFPA 58 "LP-Gas Code," 2024 edition, National Fire Protection Association.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no cost impact for this proposal as it is simply updating to the correct section within the referenced standard.

F267-24

F268-24

IFC: 6109.11.2

Proponents: Bruce Swiecicki, National Propane Gas Association, National Propane Gas Association (bswiecicki@npga.org)

2024 International Fire Code

Revise as follows:

6109.11.2 Construction.
The construction of such buildings and rooms shall comply with requirements for Group H occupancies in the *International Building Code*, Chapter 10 of NFPA 58 and both of the following:

1. Adequate vents shall be provided to the outside at both top and bottom, located not less than 5 feet (1524 mm) from building openings.
2. The entire area shall be classified for the purposes of ignition source control in accordance with Section ~~6.25~~ 6.26 of NFPA 58.

Staff Analysis: There is an errata that corrects the edition of NFPA 58 to 2024 in the 2024 IFC.

Reason: This proposal will update the reference to the current section of the 2024 edition of NFPA 58.

Bibliography: NFPA 58 "LP-Gas Code," 2024 edition, National Fire Protection Association.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

There is no cost impact due to this proposal as it simply updates to the correct section of the standard.

F268-24

F269-24

IFC: CHAPTER 62, SECTION 6201, 6201.1, 6201.2, SECTION 6202, 6202.1, SECTION 6203, 6203.1, 6203.1.1, 6203.1.1.1, 6203.1.1.2, 6203.1.1.3, 6203.1.1.4, 6204.1.7, TABLE 6204.1.7, 6203.1.3 (New), 6203.1.4 (New), 6203.1.5 (New), TABLE 6203.1.5 (New), 6203.1.6 (New), 6203.1.7 (New), 6203.1.7.1 (New), 6203.1.7.2 (New), 6203.1.7.3 (New), 6203.1.8 (New), 6203.1.9 (New), 6203.1.10 (New), 6203.1.11 (New), 6203.1.12 (New), 6203.1.13 (New), 6204.1.14 (New), 6203.1.15 (New), 6203.2, SECTION 6204, 6204.1, 6204.1.1 (New), 6204.1.1, 6204.1.2, TABLE 6204.1.2, 6204.1.3, 6204.1.4, 6204.1.5, 6204.1.6, 6204.1.8, 6204.1.9, 6204.1.10 (New), 6204.1.10, 6204.1.12 (New), 6204.1.11, 6204.1.11.1, 6204.1.15 (New), 6204.2, 6204.2.1, 6204.2.2, 6204.2.3, 6204.2.4, 6204.2.5, SECTION 6205, 6205.1, 6205.2 (New), (New), 903.2.5.6 (New), 5003.9.8, 5004.8.1; IBC: 903.2.5.6 (New)

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Kris Jaggari, Nouryon/OPPSD Representative (kris.jaggari@nouryon.com)

2024 International Fire Code

CHAPTER 62 ORGANIC PEROXIDES

SECTION 6201 GENERAL

Revise as follows:

6201.1 Scope. The storage and use of *organic peroxides* shall be in accordance with this chapter and Chapter 50.Storage of ~~U~~u nclassified detonable *organic peroxides* that are capable of *detonation* in their normal shipping containers under conditions of fire exposure shall ~~be stored in accordance~~ comply with Chapter 56.

6201.2 Permits.
Permits shall be required for organic peroxides as set forth in Section 105.5.

SECTION 6202 DEFINITION

6202.1 Definition.
The following term is defined in Chapter 2:
ORGANIC PEROXIDE.

- **Class I.**
- **Class II.**
- **Class III.**
- **Class IV.**
- **Class V.**
- **Unclassified detonable.**

SECTION 6203 GENERAL REQUIREMENTS

6203.1 Quantities not exceeding the maximum allowable quantity per control area.
The storage and use of *organic peroxides* in amounts not exceeding the *maximum allowable quantity per control area* indicated in Section 5003.1 shall be in accordance with Sections 5001, 5003, 6201 and 6203.

6203.1.1 Special limitations for indoor storage and use by occupancy.

The indoor storage and use of *organic peroxides* shall be in accordance with Sections 6203.1.1.1 through 6203.1.1.4.

Revise as follows:

6203.1.1.1 Group A, E, I or U occupancies.
In Group A, E, I or U occupancies, ~~any amount of~~ unclassified detonable and Class I organic peroxides shall be stored in accordance with the following:

1. The quantity of *detonable organic peroxides* shall not exceed 1 pound (0.5 kg).
2. The quantity of Class I *organic peroxides* shall not exceed 5 pounds (2.3 kg).
3~~1~~. Unclassified detonable and Class I *organic peroxides* shall be stored in hazardous materials storage cabinets complying with Section 5003.8.7.
4~~2~~. The hazardous materials storage cabinets shall not contain other storage.

6203.1.1.2 Group R occupancies. Unclassified detonable and Class I *organic peroxides* shall not be stored or used within Group R occupancies.

6203.1.1.3 Group B, F, M or S occupancies. Unclassified detonable and Class I *organic peroxides* shall not be stored or used in offices, or retail sales areas of Group B, F, M or S occupancies.

6203.1.1.4 Classrooms.
In classrooms in Group B, F or M occupancies, any amount of unclassified detonable and Class I *organic peroxides* shall be stored in accordance with the following:

1. Unclassified detonable and Class I *organic peroxides* shall be stored in hazardous materials storage cabinets complying with Section 5003.8.7.
2. The hazardous materials storage cabinets shall not contain other storage.

Revise as follows:

~~6204.1.7~~ 6203.1.2 Storage ~~arrangement~~.
Storage ~~arrangements for~~ of *organic peroxides* shall be in accordance with Table ~~6204.1.7~~ 6203.1.2 and ~~shall comply with all of~~ the following.

1. Containers and packages in storage areas shall be closed.
~~2.~~ ~~Bulk storage shall not be in piles or bins.~~
2. Storage in hazardous materials storage cabinets shall be in accordance with Section 5003.8.7 and be designed to vent an overpressure event.
3. Refrigerators or freezers for storage of *organic peroxides* shall be listed for Class I, Division 2 locations and be designed to vent an overpressure event.
4. A minimum separation distance of 3 feet (900 mm) shall be maintained between hazardous materials storage cabinets, refrigerators or freezers and other storage.
5~~3~~. A minimum ~~2-foot (610 mm)~~1-foot (305 mm) clear space shall be maintained between storage and uninsulated metal or combustible walls.
6. A minimum 6-inch (152 mm) clear space shall be maintained between storage and insulated metal or noncombustible walls.
7. For temperature-controlled storage areas, a minimum 3-inch (76 mm) clear space shall be maintained between pallets.
8~~4~~. Fifty-five-gallon (208 L) drums shall not be stored more than one drum high.
9. Intermediate bulk containers shall be permitted to be stacked two-high provided such storage is in accordance with the *organic peroxide* manufacturer's storage instructions.

10. *Organic peroxides* shall be stored in a manner to prevent contamination.

TABLE ~~6204.1.7~~ 6203.1.2 STORAGE OF ORGANIC PEROXIDES

ORGANIC PEROXIDE CLASS	PILE CONFIGURATION				MAXIMUM QUANTITY PER BUILDING
	Maximum width (feet)	Maximum height (feet)	Minimum distance to next pile (feet)	~~Minimum distance to walls (feet)~~	
I	6	8	4[a]	~~4[b]~~	Note ~~c~~b
II	10	8	4[a]	~~4[b]~~	Note ~~c~~b
III	10	8	4[a]	~~4[b]~~	Note ~~c~~b
IV	16	10	3[a, ~~d~~c]	~~4[b]~~	No Requirement
V	No Requirement	No Requirement	No Requirement	~~No Requirement~~	No Requirement

For SI: 1 foot = 304.8 mm.

a. Not less than one main aisle with a minimum width of 8 feet shall divide the storage area.

~~b. Distance to noncombustible walls is allowed to be reduced to 2 feet.~~

b~~c~~. See Table ~~6204.1.2~~6204.1.3 for maximum quantities.

c~~d~~. The distance shall be not less than one-half the pile height.

Add new text as follows:

6203.1.3 Containers. Containers in *organic peroxide* storage shall meet the following:

1. Containers and packages shall be closed when not in use.
2. Containers shall be DOTn containers approved for the specific hazard classification.
3. Glass containers shall not be permitted.
4. Class I and II *organic peroxides* shall not be stored in intermediate bulk containers.
5. Metal containers and intermediate bulk containers shall be provided with emergency vent relief in accordance with *organic peroxide* manufacturer's recommendations.
6. Containers of liquid *organic peroxides* shall not be filled to more than 90-percent capacity.
7. Empty containers shall be disposed of in compliance with applicable regulations.

6203.1.4 Storage tanks. Storage tanks containing *organic peroxides* shall comply with Section 5003.2 and the following:

1. Only Transport Type F *organic peroxides* shall be permitted to be stored in tanks.
2. Storage tanks shall be equipped with a pressure relief device. The pressure relief device shall be designed and sized in accordance with the *organic peroxide* manufacturer's recommendations.
3. Indoor storage tanks shall have the emergency relief vent ducted to the exterior of the building.
4. Storage tanks shall be constructed of materials compatible with the *organic peroxide* it is designed to contain.
5. Storage tanks shall be designed to prevent overfilling in accordance with Section 5003.2.7 and the maximum fill level shall not exceed a capacity of 90 percent.
6. Storage tanks shall not exceed a capacity of 26,500 gallons (100 m^3).
7. Storage tanks shall have a minimum shell-to-shell separation distance of 25 feet (7620 mm).

    Exception: A 2-hour fire-resistance-rated wall without openings extending not less than 30 inches (762 mm) above and to the sides of the storage tanks shall be permitted in lieu of such distance.
8. Storage tanks shall be bonded and grounded.

9. Outdoor storage tanks shall be separated from buildings, property lines, process or use areas a minimum distance of 50 feet (15 200 mm).
10. Outdoor storage tanks shall be provided with lightning protection in accordance with NFPA 780.
11 Electrical equipment related to *organic peroxide* storage tanks shall be in accordance with Article 500 of NFPA 70.

6203.1.5 Dosing vessels. *Dosing vessels* for *organic peroxides*shall comply with Section 6203.1.4 and the following:

1. *Dosing vessels* are permitted to be designed with a hinged cover to serve as the emergency relief vent.
2. *Dosing vessels* with hinged covers shall be separated from other use areas by a minimum clear space of 25 feet (7620 mm) or a 1-hour fire-resistance-rated wall without openings extending not less than 30 inches (762 mm) above and to the sides of the *dosing vessels*.
3. Individual *dosing vessels* shall not exceed the maximum capacities in Table 6203.1.5.

TABLE 6203.1.5 MAXIMUM CAPACITY OF ORGANIC PEROXIDE DOSING VESSELS

TRANSPORT TYPE	CAPACITY gallons (liters)
B	8 (30)
C	26 (100)
D	53 (200)
E	396 (1,500)
F	1321 (5,000)

6203.1.6 Incompatible materials. Any quantity of Class I and II *organic peroxides* shall be separated from incompatible materials in accordance with Section 5003.9.8. Classes III, IV and V *organic peroxides* exceeding 5 pounds (2 kg) or 0.5 gallons (2 L) shall be separated from incompatible materials in accordance with Section 5003.9.8.

6203.1.7 Temperature control. *Organic peroxide* materials that must be kept at temperatures other than normal ambient temperatures to prevent hazardous reactions shall be provided with an approved means to maintain the temperature within the manufacturer's recommended storage temperature.

6203.1.7.1 Temperature monitoring and display. Temperature controlled storage areas shall be continuously monitored in accordance with 5004.8.1 and the temperature shall be displayed near the entrance to the area.

6203.1.7.2 Storage temperature. The maximum temperature allowed in a temperature-controlled storage area shall be posted near each entrance to the storage area.

6203.1.7.3 Standby power. Standby power shall be provided in accordance with Section 1203 for equipment used to maintain the controlled temperature.

6203.1.8 Open flames prohibited. *Organic peroxide* storage areas shall be free of fire, sparks, open flames and smoking. A sign shall be affixed outside of the storage area to indicate the prohibition of ignition sources.

6203.1.9 **Hot work.** Hot work shall be conducted in accordance with Chapter 35. *Organic peroxides* shall be removed from the hot work area prior to, and during, all hot work operations.

6203.1.10 **Heating Systems.** Hot water, steam at pressures less than 15 psig (103 kPa)] or indirectly heated warm air shall be used for heating systems.

6203.1.11 **Container Contact.** Heating coils, radiators, air diffusers, cooling coils, piping and ducts shall be installed to ensure no direct contact with *organic peroxide* containers.

6203.1.12 **Combustible waste.** *Organic peroxide* storage or use areas shall be free of storage of combustible waste.

6203.1.13 **Impact sensitivity.** Impact sensitive *organic peroxide* materials shall be protected from impact.

6204.1.14 **Use area requirements.** Use and handing of *organic peroxides* shall comply with the following requirements:

1. Quantities in the use area shall not exceed amounts necessary for the planned use.
2. *Organic peroxides* shall remain in a labelled container until transferred into process equipment.
3. *Organic peroxide* containers shall be closed when not in use.
4. Residual unused *organic peroxides* shall not be returned to the original container to avoid contamination.
5. *Organic peroxides* shall be kept away from sparks, open flames, hot surfaces and other ignition sources.
6. *Organic peroxides* shall be separated from incompatible materials and flammable or combustible liquids.
7. Dispensing of *organic peroxides* shall be accomplished with dedicated equipment.
8. *Organic peroxides* shall be handled with non-sparking tools.

6203.1.15 **Liquid transfer.** Liquid transfer shall comply with Section 5005.1.10 and the following:

1. All equipment used to handle or transfer *organic peroxides* shall be bonded and grounded.
2. The transfer system used for the transfer of *organic peroxides* shall be designed, operated and maintained in accordance with the *organic peroxide* manufacturer's recommendations.
3. The transfer of *organic peroxide* formulations with a flash point of 100°F (38°C) or less shall be designed to avoid accumulation of vapors.

6203.2 Quantities exceeding the maximum allowable quantity per control area.
The storage and use of *organic peroxides* in amounts exceeding the *maximum allowable quantity per control area* indicated in Section 5003.1 shall be in accordance with Chapter 50 and this chapter.

SECTION 6204
STORAGE

6204.1 Indoor storage.
Indoor storage of *organic peroxides* in amounts exceeding the *maximum allowable quantity per control area* indicated in Table 5003.1.1(1) shall be in accordance with Sections 5001, 5003, 5004 and this chapter.
Indoor storage of unclassified detonable *organic peroxides* that are capable of *detonation* in their normal shipping containers under conditions of fire exposure shall be stored in accordance with Chapter 56.

Add new text as follows:

6204.1.1 Flood Protection. Buildings and storage areas containing *organic peroxides* and required emergency equipment shall be located at or above the design flood elevation as established in Chapter 16 of the International Building Code.

Revise as follows:

~~6204.1.1~~6204.1.2 Detached storage.
Storage of *organic peroxides* shall be in detached buildings where required by Section 5003.8.2.

~~6204.1.2~~6204.1.3 Distance from detached buildings to exposures.
In addition to the requirements of the *International Building Code*, detached storage buildings for Class I, II, III, IV and V *organic peroxides* shall be located in accordance with Table ~~6204.1.2~~6204.1.3. Detached buildings containing quantities of unclassified detonable *organic peroxides* in excess of those set forth in Table 5003.8.2 shall be located in accordance with Table 5604.5.2(1).

TABLE ~~6204.1.2~~ 6204.1.3 ORGANIC PEROXIDES—DISTANCE TO EXPOSURES FROM DETACHED STORAGE BUILDINGS OR OUTDOOR STORAGE AREAS

ORGANIC PEROXIDE CLASS	MAXIMUM STORAGE QUANTITY (POUNDS) AT MINIMUM SEPARATION DISTANCE[b,c,d]					
	Distance to buildings, lot lines, public streets, public alleys, public ways or means of egress			Distance between individual detached storage buildings or individual outdoor storage areas		
	50 feet	100 feet	150 feet	20 feet	75 feet	100 feet
I	2,000	20,000	175,000	2,000	20,000	175,000
II	100,000	200,000	No Limit	100,000[a]	No Limit	No Limit
III	200,000	No Limit	No Limit	200,000[a]	No Limit	No Limit
IV	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
V	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg.

a. Where the amount of organic peroxide stored exceeds this amount, the minimum separation shall be 50 feet.

b. When different classes of organic peroxides are stored in the same storage area, the aggregate sum of the ratios of the actual quantity divided by the allowed quantity for each class shall not exceed one.

c. Interpolation is permitted between tabular values.

d. The quantity of organic peroxides shall be allowed to be increased if a specially designed fire protection system to protect the organic peroxide storage area is acceptable to the fire code official.

~~6204.1.3~~6204.1.4 Liquid-tight floor.
In addition to the requirements of Section 5004.12, floors of storage areas shall be of liquid-tight construction.

~~6204.1.4~~6204.1.5 Electrical wiring and equipment.
In addition to the requirements of Section 5003.9.4, electrical wiring and equipment in storage areas ~~for Class I or II organic peroxides~~ or approved cabinets of refrigerated Class I, II and III *organic peroxides* or any *organic peroxide* that gives of flammable vapors or decomposes to release flammable decomposition products, shall comply with the requirements for electrical Class I, Division 2, locations.

~~6204.1.5~~6204.1.6 Smoke detection.
~~An~~ Rooms or areas where Class I, II or III *organic peroxides* are stored shall be provided with an *approved* ~~supervised~~ smoke detection system which activates audible and visible alarms throughout the building in accordance with Section 907.~~shall be provided in rooms or areas where Class I, II or III organic peroxides are stored. Activation of the smoke detection system shall sound a local alarm.~~

~~**Exception:** A smoke detection system shall not be required in detached storage buildings equipped throughout with an *approved automatic fire-extinguishing system* complying with Chapter 9.~~

~~6204.1.6~~6204.1.7 Maximum quantities.

Maximum ~~allowable~~ quantities per building in a mixed occupancy building shall not exceed the amounts set forth in Table 5003.8.2. Maximum ~~allowable~~ quantities per building in a detached storage building shall not exceed the amounts specified in Table ~~6204.1.2~~ 6204.1.3.

6204.1.8 Location in building. The storage of Class I or II *organic peroxides* shall be on the ground floor. Class III *organic peroxides* shall not be stored in *basements*.

Revise as follows:

6204.1.9 ~~Contamination~~Separation from incompatible materials. ~~*Organic peroxides* shall be stored in their original DOTn shipping containers. *Organic peroxides* shall be stored in a manner to prevent contamination.~~Incompatible materials are prohibited in storage rooms for Class I, II and III *organic peroxides*.

Add new text as follows:

6204.1.10 Separation from flammable and combustible liquids and flammable solids. *Flammable and combustible liquids* and *flammable solids* are prohibited in storage rooms for Class I, II and III *organic peroxides*, unless those materials are also classified as *organic peroxides*.

Revise as follows:

~~6204.1.10~~6204.1.11 Explosion control.
Indoor storage rooms, areas and buildings containing unclassified detonable and Class I *organic peroxides* shall be provided with explosion control in accordance with Section 911.

Add new text as follows:

6204.1.12 Lightning. Structures containing *organic peroxides* shall be provided with lightning protection in accordance with NFPA 780.

Revise as follows:

~~6204.1.11~~6204.1.13 Standby power.
Standby power shall be provided in accordance with Section 1203 for the following systems used to protect ~~Class I and unclassified detonable~~ *organic peroxides*:

1. Exhaust ventilation system for organic peroxides also classified as flammable liquids.

   Exception: Exhaust ventilation systems are not required for temperature-controlled organic peroxides in storage.

2. Treatment system for organic peroxides also classified as toxic or highly toxic.
3. Smoke detection system.
4. Temperature control system.
5. *Fire alarm system*.
6. *Emergency alarm system*.

~~6204.1.11.1~~6204.1.13.1 Fail-safe engineered systems. Standby power shall not be required for mechanical exhaust ventilation, treatment systems and temperature control systems where *approved* fail-safe engineered systems are installed.

Add new text as follows:

6204.1.14 Separation from use areas. Storage areas shall be separated from use and dispensing areas by a clear space of not less than 25 feet (7620 mm) or by fire barriers and horizontal assemblies with a minimum fire-resistance rating of 1-hour.

6204.1.15 **Use and dispensing prohibited.** Use and dispensing of *organic peroxides* in the storage area is prohibited.

6204.2 Outdoor storage.
Outdoor storage of *organic peroxides* in amounts exceeding the *maximum allowable quantities per control area* indicated in Table 5003.1.1(3) shall be in accordance with Sections 5001, 5003, 5004 and this chapter.

Revise as follows:

6204.2.1 Distance from storage to exposures.
Outdoor storage areas for *organic peroxides* shall be located in accordance with Table ~~6204.1.2~~6204.1.3.

6204.2.2 Electrical wiring and equipment.
In addition to the requirements of Section 5003.9.4, electrical wiring and equipment in outdoor storage areas containing ~~unclassified detonable, Class I or Class II~~ *organic peroxides* that release flammable vapors or when decomposing release flammable decomposition products shall comply with the requirements for electrical Class I, Division 2, locations.

6204.2.3 Maximum quantities.
Maximum quantities of *organic peroxides* in outdoor storage shall be in accordance with Table ~~6204.1.2~~6204.1.3.

6204.2.4 Storage arrangement.
Storage arrangements shall be in accordance with Table ~~6204.1.7~~6203.1.2.

6204.2.5 Separation.
In addition to the requirements of Section 5003.9.8, outdoor storage areas for *organic peroxides* in amounts exceeding those specified in Table 5003.8.2 shall be located ~~a minimum distance of 50 feet (15 240 mm)~~ the minimum separation distance specified in Table 6204.1.3 from other hazardous material storage.

SECTION 6205
USE

6205.1 General.
The use of *organic peroxides* in amounts exceeding the *maximum allowable quantity per control area* indicated in Table 5003.1.1(1) or 5003.1.1(3) shall be in accordance with Sections 5001, 5003, 5005 and this chapter.

Add new text as follows:

6205.2 **Noncombustible floor.** Except for surfacing, floors of areas where liquid or solid hazardous materials are dispensed or used shall be of noncombustible, liquid-tight construction.

Add new definition as follows:

DOSING VESSSEL. A vessel containing a daily use quantity of an *organic peroxide* where the *organic peroxide* is transferred to reaction vessels or process equipment. Dosing vessels can be open or closed use and can include metering vessels, mixing vessels, day storage tanks or intermediate bulk containers (IBCs).

Add new text as follows:

903.2.5.6 **Organic peroxides.** An automatic sprinkler system shall be provided throughout buildings where *organic peroxides* are manufactured, stored or handled in quantities exceeding the *maximum allowable quantity per control area.* The sprinkler system design criteria shall be in accordance with NFPA 400.

Revise as follows:

5003.9.8 Separation of incompatible materials. *Incompatible materials* in storage and storage of materials that are incompatible with materials in use shall be separated where the stored materials are in containers having a capacity of more than 5 pounds (2 kg), 0.5 gallon (2 L) or any amount of *compressed gases* and Class I or II *organic peroxides*. Separation shall be accomplished by:

1. Segregating *incompatible materials* in storage by a distance of not less than 20 feet (6096 mm).
2. Isolating *incompatible materials* in storage by a noncombustible partition extending not less than 18 inches (457 mm) above and to the sides of the stored material.
3. Storing liquid and solid materials in hazardous material storage cabinets.
4. Storing *compressed gases* in gas cabinets or exhausted enclosures in accordance with Sections 5003.8.5 and 5003.8.6.

Materials that are incompatible shall not be stored within the same cabinet or exhausted enclosure.

5004.8.1 Temperature control. Materials that must be kept at temperatures other than normal ambient temperatures to prevent a hazardous reaction shall be provided with an *approved* means to maintain the temperature within a safe range. Redundant temperature control equipment that will automatically operate on failure of the primary temperature control system shall be provided. Upon failure of the primary temperature control equipment, audible and visual alarm signals shall activate in the room or area and at a constantly attended location or supervising station. Where *approved*, alternative means that prevent a hazardous reaction are allowed.

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Add new text as follows:

903.2.5.6 Organic peroxides. An automatic sprinkler system shall be provided throughout buildings where *organic peroxides* are manufactured, stored or handled in quantities exceeding the *maximum allowable quantity per control area*. The sprinkler system design criteria shall be in accordance with NFPA 400.

Reason: Organic peroxides are hazardous materials with key hazard characteristics of thermal instability, explosivity and flammability with high burning rates. Organic peroxides can undergo self-accelerating decomposition and may result in fire and/or explosion when exposed to heat or when they come in contact with incompatible materials. The decomposition is further accelerated when the containers are confined. An organic peroxide safety incident can occur even when storing small quantities. There are many organic peroxides that are temperature controlled and failure of refrigeration equipment or using improper equipment even when storing even small quantities can result in fire and explosion. An organic peroxide fire can significantly impact the inventory in the storage area, the storage building itself, personnel, nearby property, local community and the environment. Exposure to heat or incompatible materials, materials of construction and addressing confinement are, therefore, very important aspects that code needs to address to ensure safe storage, handling and use of organic peroxides. The current IFC code related to organic peroxides in Chapter 62 and other chapters is missing many critical requirements for the safe storage, handling and use of organic peroxides. The comprehensive code changes proposed revise existing sections and add many additional sections with preventive and protective requirements for the safe storage, handling and use of organic peroxides. Preventive and protective requirements code changes include the following:

- Storage section with well-defined storage requirements for all organic peroxides' storage types including control area (below MAQ) storage to comply with applicable requirements of Chapter 62 in addition to Chapter 50 and other requirements.
- Containers section is added to outline container requirements for the safe storage of organic peroxides.
- Intermediate Bulk Containers (IBCs), Storage tanks and Dosing vessels are used in the industry and requirements are added for the safe storage of organic peroxides.
- Incompatible materials are required to be segregated from organic peroxides storage in control area storage.
- Temperature control section with requirements is added as temperature control, monitoring, sign display and standby power are very critical for organic peroxides storage.
- Open flames prohibited, Hot work, Heating systems, Cooling systems, Container contact, Combustible waste, Lightning sections are added, as organic peroxides can undergo self-accelerating decomposition and may result in fire and/or explosion when exposed to heat or flames.
- Impact sensitivity section is added to provide guidance to code user when storing impact sensitive organic peroxides.

- Use area requirements for safe use of organic peroxides is added.
- Liquid transfer section is added with the requirements for the safe transfer of organic peroxides.
- Flood Protection section is added as this is important for temperature controlled organic peroxides, as coming in contact with ambient flood water can result in decomposition of organic peroxides which may cause explosion and/or fire. Also, various electrically operated emergency equipment should be protected from flood water to prevent loss of power.
- Code change proposals in footnotes under Table 6204.1.3 provide clear guidance to code users on how to use the table when presented with different scenarios.
- Electrical wiring and equipment section is modified to require appropriate classification for products where needed.
- Smoke detection section code change proposal clarifies the requirement of audio and visual alarm activation when the smoke detection system is provided in organic peroxide storage areas.
- Standby power section is revised to ensure this applies to relevant organic peroxides' classes above MAQs.
- Flammable and combustible liquids, flammable solids and incompatible materials are prohibited in Group H occupancy storage rooms.
- Use and dispensing prohibited section is added as it is important that organic peroxide dispensing or transferring and using is not done in storage areas as any potential incidents that may result can jeopardize the entire organic peroxide storage.
- Noncombustible floor section with non-combustible and liquid tight requirements is added.
- Sprinkler protection requirement section is added in Chapter 9 which references NFPA 400 for sprinkler density.
- 5003.9.8 section is revised to ensure organic peroxides storage is segregated from incompatible materials in control area storage for any quantity of Class I or Class II organic peroxides. These classifications present severe explosion and fire hazards and separation from incompatible materials is appropriate even below the ½ pound or ½ gallon thresholds.
- 5004.8.1 is modified to specify where materials must be under a temperature-controlled environment, automatic operation of the backup system is necessary. Failure of the primary temperature control system will result in automatic start of the backup system and notification of primary system failure. Such notification is required in the room where the temperature-controlled materials are stored and at a constantly attended location or supervising station. Certain organic peroxide materials require temperature control and loss of temperature control can result in significant events.
- Dosing vessels are commonly used in organic peroxide industry and Chapter 62 proposed changes includes requirements for the safe storage of organic peroxides in dosing vessels. Dosing vessel is not defined in the current code and the definition as proposed addresses this deficiency.

Most of the code change proposals are already followed by the industry as the Organic Peroxide Producers Safety Division (OPPSD) has been in the lead to publish storage guidance for the safe storage, handling and use of organic peroxides and supporting users as required. With the comprehensive changes proposed, the IFC Chapter 62 and other chapters' organic peroxides code will be harmonized with Organic Peroxide Producers Safety Division (OPPSD) requirements for safe storage, handling and use of organic peroxides, NFPA 400 organic peroxides code in the USA, prominent European codes like Dutch PGS 8, German BGV B4 and French organic peroxides storage codes. The comprehensive changes took into consideration the learnings from recent and old organic peroxides fire incidents as well. The code proposals also address the Chemical Safety Board (CSB) recommendations that arose from a major organic peroxide incident in the recent years.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**.

Bibliography: Safety and Handling of Organic Peroxides - American Chemistry Council

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

It is expected that there will not be an increase in cost of construction with the implementation of these proposals as the code change proposals are already followed by the industry. The Organic Peroxide Producers Safety Division (OPPSD) has been at the forefront to publish storage guidance (ACC Safety-and-Handling-of-Organic-Peroxides.pdf) for the safe storage, handling and use of organic peroxides and supporting users as required. The code changes are critical requirements for safe storage, handling and use of organic peroxides. Failure to follow and implement these requirements can lead to an organic peroxide explosion and or fire that can significantly impact the inventory in the storage area, the storage building itself, personnel, nearby property, local community and the environment. Users are educated and made aware of the hazards and risk associated with storing, handling and use of organic peroxides prior to the supply of the products.

Cost impact justification is based on the fact that OPPSD has established a good product stewardship program for the safe storage, handling and use of organic peroxides. Organic peroxide manufacturers adhere to this stewardship program and also provide a good guidance to the users of the organic peroxides and ensure the storage, handling and use of these products in in compliance with the stewardship program.

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IFC: SECTION 202, 202, 202 (New), 6201.1, 6202.1, 6203.1.1, 6203.1.1.1, 6203.1.1.2, 6203.1.1.3, 6203.1.1.4, 6204.1, 6204.1.2, TABLE 6204.1.2, 6204.1.4, 6204.1.5, TABLE 6204.1.7, 6204.1.8, 6204.1.10, 6204.1.11, 6204.2.2, TABLE 105.5.22, 203.6.3, 203.6.5, TABLE 911.1, TABLE 2704.2.2.1, TABLE 5003.1.1(1), TABLE 5003.1.1(3), TABLE 5003.8.2, TABLE 5004.2.2, 5004.7.1, TABLE 5005.2.1.4, E102.1.8.1, E102.1.8.1.1 (New), E102.1.8.1.2 (New), TABLE E102.1.8.1.2 (New), E102.1.8.1.3 (New), TABLE E102.1.8.2 (New), E102.1.8.2 (New), E102.1.8.3 (New), TABLE E102.1.8.3 (New), TABLE E105.1, TABLE F101.2, TABLE H102.1; IBC: SECTION 202, [F] TABLE 307.1(1), [F] 307.3, [F] 307.5, [F] TABLE 414.5.1, [F] TABLE 415.6.5, [F]TABLE 415.11.1.1

Proponents: Kris Jaggari, Nouryon/OPPSD Representative (kris.jaggari@nouryon.com)

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Revise as follows:

ORGANIC PEROXIDE.
An organic compound that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. ~~Organic peroxides can present an explosion hazard (detonation or deflagration) or they can be shock sensitive. They can also decompose into various unstable compounds over an extended period of time.~~ Organic peroxide formulation is a pure or technically pure organic peroxide or a mixture of organic peroxides with an active oxygen (aO) concentration greater than 1 percent alone or in combination with one or more materials. Organic peroxide storage classification is based on the organic peroxide transportation type and burning rate. The transport type for organic peroxide formulations is determined by the UN Manual of Tests and Criteria, Part II. The methods used to determine the burning rate of organic peroxide formulations are spelled out in the Storage of Organic Peroxides in The Netherlands (also known as PGS 8). Terms such as accelerator, catalyst, initiator, and curing agent are sometimes used to describe organic peroxide formulations and are misleading because they can also refer to materials that are not or do not contain organic peroxides, some of which might present increased hazard when mixed with organic peroxides.

Class I. Describes those formulations that are capable of *deflagration* but not *detonation*. This class comprises of organic peroxide formulations with transport classification Type B, those with transport classification Type C and Type D with large-scale burning rate equal to or higher than 300 kg/min, and those with transport classification Type C and Type D with small-scale burning rate equal to or higher than 9.0 kg/min × m^2 unless the large-scale burning rate is lower than 300 kg/min.

Class IIA. Describes those formulations that burn very rapidly and that pose a moderate reactivity hazard. This class comprises of organic peroxide formulations with transport classification Type C and Type D with a large-scale burning rate equal to or higher than 140 kg/min but lower than 300 kg/min and those with transport classification Type E with a large-scale burning rate equal to or higher than 140 kg/min, those with Type C and Type D if the small-scale burning rate is equal to or higher than 2.2 kg/min × m^2 but lower than 9.0 kg/min × m^2, and Type E if the small-scale burning rate is equal to or higher than 2.2 kg/min × m^2.

Add new definition as follows:

Class IIB. Describes those formulations that burn rapidly and that pose a moderate reactivity hazard. This class comprises of organic peroxide formulations with transport classification Type C with a large-scale burning rate lower than 140 kg/min, those with transport classification Type D and Type E with a large-scale burning rate equal to or higher than 60 kg/min but lower than 140 kg/min, those with transport classification Type C if the small-scale burning rate is lower than 2.2 kg/min × m^2, and those with transport classification Type D and Type E if the small-scale burning rate is equal to or higher than 0.9 kg/min × m^2 but lower than 2.2 kg/min × m^2.

Revise as follows:

Class III. Describes those formulations that burn rapidly and that pose a moderate reactivity hazard.
This class comprises of organic peroxide formulations with transport classification Type D with a large-scale burning rate lower than 60 kg/min, those with transport classification Type E with a large-scale burning rate equal to or higher than 10 kg/min but lower than 60 kg/min, those with transport classification Type F with a large-scale burning rate equal to or higher than 10 kg/min, and those with transport classification Type D and Type E if the small-scale burning rate is lower than 0.9 kg/min × m^2, and those with transport classification Type F irrespective of the small scale burning rate.

Class IV. Describes those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard. This class comprises of organic peroxide formulations of transport classification Type E or Type F with a large-scale burning rate lower than 10 kg/min.

Class V. Describes those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard. This class comprises of organic peroxide formulations of transport classification Type G without additional subsidiary risks.

~~Unclassified detonable~~ Detonable. *Organic peroxides* that are capable of *detonation*. These peroxides pose an extremely high-explosion hazard through rapid explosive decomposition.

6201.1 Scope.
The storage and use of *organic peroxides* shall be in accordance with this chapter and Chapter 50.
~~Unclassified detonable~~ Detonable *organic peroxides* that are capable of *detonation* in their normal shipping containers under conditions of fire exposure shall be stored in accordance with Chapter 56.

6202.1 Definition.
The following term is defined in Chapter 2:
ORGANIC PEROXIDE.

Class I.
Class IIA.
Class IIB.
Class III.
Class IV.
Class V.
~~Unclassified detonable~~ Detonable.

6203.1.1 Special limitations for indoor storage and use by occupancy.
The indoor storage and use of *organic peroxides* shall be in accordance with Sections 6203.1.1.1 through 6203.1.1.4.

Revise as follows:

6203.1.1.1 Group A, E, I or U occupancies.
In Group A, E, I or U occupancies, any amount of ~~unclassified~~ detonable and Class I organic peroxides shall be stored in accordance with the following:

1. ~~Unclassified detonable~~ Detonable and Class I *organic peroxides* shall be stored in hazardous materials storage cabinets complying with Section 5003.8.7.
2. The hazardous materials storage cabinets shall not contain other storage.

6203.1.1.2 Group R occupancies. ~~Unclassified d~~Detonable and Class I *organic peroxides* shall not be stored or used within Group R occupancies.

6203.1.1.3 Group B, F, M or S occupancies. ~~Unclassified detonable~~ Detonable and Class I *organic peroxides* shall not be stored or used in offices, or retail sales areas of Group B, F, M or S occupancies.

6203.1.1.4 Classrooms.
In classrooms in Group B, F or M occupancies, any amount of ~~unclassified~~ detonable and Class I *organic peroxides* shall be stored in accordance with the following:

1. ~~Unclassified detonable~~ Detonable and Class I *organic peroxides* shall be stored in hazardous materials storage cabinets complying with Section 5003.8.7.
2. The hazardous materials storage cabinets shall not contain other storage.

6204.1 Indoor storage.

Indoor storage of *organic peroxides* in amounts exceeding the *maximum allowable quantity per control area* indicated in Table 5003.1.1(1) shall be in accordance with Sections 5001, 5003, 5004 and this chapter.

Indoor storage of ~~unclassified~~ detonable *organic peroxides* that are capable of *detonation* in their normal shipping containers under conditions of fire exposure shall be stored in accordance with Chapter 56.

6204.1.2 Distance from detached buildings to exposures.

In addition to the requirements of the *International Building Code*, detached storage buildings for Class I, IIA, IIB,III, IV and V *organic peroxides* shall be located in accordance with Table 6204.1.2. Detached buildings containing quantities of ~~unclassified~~ detonable *organic peroxides* in excess of those set forth in Table 5003.8.2 shall be located in accordance with Table 5604.5.2(1).

TABLE 6204.1.2 ORGANIC PEROXIDES—DISTANCE TO EXPOSURES FROM DETACHED STORAGE BUILDINGS OR OUTDOOR STORAGE AREAS

ORGANIC PEROXIDE CLASS	MAXIMUM STORAGE QUANTITY (POUNDS) AT MINIMUM SEPARATION DISTANCE					
	Distance to buildings, lot lines, public streets, public alleys, public ways or means of egress			Distance between individual detached storage buildings or individual outdoor storage areas		
	50 feet	100 feet	150 feet	20 feet	75 feet	100 feet
I	2,000	20,000	175,000	2,000	20,000	175,000
IIA	100,000	200,000	No Limit	100,000[a]	No Limit	No Limit
IIB	175,000	No Limit	No Limit	175,000 [a]	No Limit	No Limit
III	200,000	No Limit	No Limit	200,000[a]	No Limit	No Limit
IV	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit
V	No Limit	No Limit	No Limit	No Limit	No Limit	No Limit

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg.

a. Where the amount of organic peroxide stored exceeds this amount, the minimum separation shall be 50 feet.

6204.1.4 Electrical wiring and equipment.

In addition to the requirements of Section 5003.9.4, electrical wiring and equipment in storage areas for Class I, IIA or IIB *organic peroxides* shall comply with the requirements for electrical Class I, Division 2, locations.

6204.1.5 Smoke detection. An *approved* supervised smoke detection system in accordance with Section 907 shall be provided in rooms or areas where Class I, IIA, IIB or III *organic peroxides* are stored. Activation of the smoke detection system shall sound a local alarm.

Exception: A smoke detection system shall not be required in detached storage buildings equipped throughout with an *approved automatic fire-extinguishing system* complying with Chapter 9.

TABLE 6204.1.7 STORAGE OF ORGANIC PEROXIDES

ORGANIC PEROXIDE CLASS	PILE CONFIGURATION				MAXIMUM QUANTITY PER BUILDING
	Maximum width (feet)	Maximum height (feet)	Minimum distance to next pile (feet)	Minimum distance to walls (feet)	
I	6	8	4[a]	4[b]	Note c
IIA	10	8	4[a]	4[b]	Note c
IIB	10	8	4[a]	4[b]	Note c
III	10	8	4[a]	4[b]	Note c
IV	16	10	3[a, d]	4[b]	No Requirement
V	No Requirement	No Requirement	No Requirement	No Requirement	No Requirement

For SI: 1 foot = 304.8 mm.

a. Not less than one main aisle with a minimum width of 8 feet shall divide the storage area.

b. Distance to noncombustible walls is allowed to be reduced to 2 feet.

c. See Table 6204.1.2 for maximum quantities.

d. The distance shall be not less than one-half the pile height.

6204.1.8 Location in building. The storage of Class I, IIA or IIB *organic peroxides* shall be on the ground floor. Class III *organic peroxides* shall not be stored in *basements*.

6204.1.10 Explosion control.
Indoor storage rooms, areas and buildings containing ~~unclassified~~ detonable and Class I *organic peroxides* shall be provided with explosion control in accordance with Section 911.

6204.1.11 Standby power.
Standby power shall be provided in accordance with Section 1203 for the following systems used to protect Class I and ~~unclassified~~ detonable *organic peroxides*:

1. Exhaust ventilation system.
2. Treatment system.
3. Smoke detection system.
4. Temperature control system.
5. *Fire alarm system*.
6. *Emergency alarm system*.

6204.2.2 Electrical wiring and equipment.
In addition to the requirements of Section 5003.9.4, electrical wiring and equipment in outdoor storage areas containing ~~unclassified~~ detonable, Class I, IIA or ~~Class~~ IIB *organic peroxides* shall comply with the requirements for electrical Class I, Division 2, locations.

TABLE 105.5.22 PERMIT AMOUNTS FOR HAZARDOUS MATERIALS

TYPE OF MATERIAL	AMOUNT
Combustible liquids	See Section 105.5.18
Corrosive materials	
Gases	See Section 105.5.9
Liquids	55 gallons
Solids	1,000 pounds
Explosive materials	See Section 105.5.16
Flammable materials	
Gases	See Section 105.5.9
Liquids	See Section 105.5.18
Solids	100 pounds
Highly toxic materials	
Gases	See Section 105.5.9
Liquids	Any Amount
Solids	Any Amount
Organic peroxides	
Liquids Class I Class IIA Class IIB Class III Class IV Class V	Any Amount Any Amount Any Amount 1 gallon 2 gallons No Permit Required

TYPE OF MATERIAL	AMOUNT
Solids Class I Class IIA Class IIB Class III Class IV Class V	Any Amount Any Amount Any Amount 10 pounds 20 pounds No Permit Required
Oxidizing materials	
Gases	See Section 105.5.9
Liquids Class 4 Class 3 Class 2 Class 1	Any Amount 1 gallon[a] 10 gallons 55 gallons
Solids Class 4 Class 3 Class 2 Class 1	Any Amount 10 pounds[b] 100 pounds 500 pounds
Pyrophoric materials	
Gases	Any Amount
Liquids	Any Amount
Solids	Any Amount
Toxic materials	
Gases	See Section 105.5.9
Liquids	10 gallons
Solids	100 pounds
Unstable (reactive) materials	
Liquids Class 4 Class 3 Class 2 Class 1	Any Amount Any Amount 5 gallons 10 gallons
Solids Class 4 Class 3 Class 2 Class 1	Any Amount Any Amount 50 pounds 100 pounds
Water-reactive materials	
Liquids Class 3 Class 2 Class 1	Any Amount 5 gallons 55 gallons
Solids Class 3 Class 2 Class 1	Any Amount 50 pounds 500 pounds

For SI: 1 gallon = 3.785 L, 1 pound = 0.454 kg.

a. 22 gallons where Table 5003.1.1(1) Note k applies and hazard identification signs in accordance with Section 5003.5 are provided for quantities of 22 gallons or less.

b. 220 pounds where Table 5003.1.1(1) Note k applies and hazard identification signs in accordance with Section 5003.5 are provided for quantities of 220 pounds or less.

203.6.3 High-hazard Group H-1. Buildings and structures containing materials that pose a *detonation* hazard shall be classified as Group

203.6.3 High-hazard Group H-1. Buildings and structures containing materials that pose a *detonation* hazard shall be classified as Group H-1. Such materials shall include, but not be limited to, the following:

Detonable *pyrophoric* materials

Explosives:

Division 1.1

Division 1.2

Division 1.3

Division 1.4

Division 1.5

Division 1.6

Organic peroxides, u~~nclassified detonable~~ detonable

Oxidizers, Class 4

Unstable (reactive) materials, Class 3 detonable and Class 4

203.6.5 High-hazard Group H-3. Buildings and structures containing materials that readily support combustion or that pose a*physical hazard* shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or *combustible liquids* that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103.4 kPa) or less

Combustible fibers, other than densely packed baled cotton, where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3 of the *International Building Code*

Consumer fireworks, 1.4G (Class C, Common)

Cryogenic fluids, oxidizing

Category 1B flammable gases having a burning velocity of 3.9 inches per second (99 mm/s) or less

Flammable solids

Organic peroxides, Class IIA, IIB and III

Oxidizers, Class 2

Oxidizers, Class 3, that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103 kPa) or less

Oxidizing gases

Unstable (reactive) materials, Class 2

Water-reactive materials, Class 2

TABLE 911.1 EXPLOSION CONTROL REQUIREMENTS[f]

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
Hazard Category			
Combustible dusts[a]	—	Not required	Required
Cryogenic fluids	Flammable	Not required	Required
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]
Flammable liquids	IA[b]	Not required	Required
	IB[c]	Not required	Required
Organic peroxides	~~Unclassified d~~Detonable	Required	Not permitted
	I	Required	Not permitted
Oxidizer liquids and solids	4	Required	Not permitted
Pyrophoric	Gases	Not required	Required
Unstable (reactive)	4	Required	Not permitted
	3 detonable	Required	Not permitted
	3 nondetonable	Not required	Required
Water-reactive liquids and solids	3	Not required	Required
	2[e]	Not required	Required
Special Uses			

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
Hazard Category			
Acetylene generator rooms	—	Not required	Required
Electrochemical energy storage systems[g]	—	Not required	Required
Energy storage systems[g]	—	Not required	Required
Grain processing	—	Not required	Required
Liquefied petroleum gas distribution facilities	—	Not required	Required
Where explosion hazards exist[d]	Detonation	Required	Not permitted
	Deflagration	Not required	Required

For SI: 1 inch per second = 25.4 mm/s.

a. Combustible dusts where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.2.2. See definition of “Combustible dust” in Chapter 2.

b. Storage or use.

c. In open use or dispensing.

d. Rooms containing dispensing and use of hazardous materials where an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.

e. A method of explosion control shall be provided where Class 2 water-reactive materials can form potentially explosive mixtures.

f. Explosion venting is not required for Group H-5 Fabrication Areas complying with Chapter 27 and the International Building Code.

g. Where explosion control is required in Section 1207.6.3.

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.

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

HAZARD CATEGORY	SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP per square foot)
Physical-Hazard Materials			
Combustible dust	Note b	Not Applicable	Not Applicable
Combustible fiberLooseBaled	Note b Notes b and c	Not Applicable	Not Applicable
Combustible liquidClass IIClass IIIAClass IIIBCombination Class I, II and IIIA	Not Applicable	0.02 0.04 Not Limited 0.08	Not Applicable
Cryogenic gasFlammableOxidizing	Not Applicable	Not Applicable	Note d 2.5
Explosives	Note b	Note b	Note b
Flammable gasGaseousLiquefied	Not Applicable	Not Applicable	Note d Note d
Flammable liquidClass IAClass IBClass ICCombination Class IA, IB and ICCombination Class I, II and IIIA	Not Applicable	0.005 0.05 0.05 0.05 0.08	Not Applicable
Flammable solid	0.002	Not Applicable	Not Applicable

HAZARD CATEGORY	SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP per square foot)
Organic peroxide			Not Applicable
~~Unclassified d~~Detonable	Note b	Note b	
Class I	Note b	Note b	
Class IIA	0.05	0.0025	
Class IIB	0.1	0.01	
Class III	0.2	0.02	
Class IV	Not Limited	Not Limited	
Class V	Not Limited	Not Limited	
Oxidizing gasGaseousLiquefiedCombination of gaseous and liquefied	Not Applicable	Not Applicable	 2.5 2.5 2.5
OxidizerClass 4Class 3Class 2Class 1Combination Class 1, 2, 3	 Note b 0.006 0.006 0.006 0.006	 Note b 0.06 0.06 0.06 0.06	Not Applicable
Pyrophoric materials	Note b	0.0025	Notes d and e
Unstable (reactive)Class 4Class 3Class 2Class 1	 Note b 0.05 0.2 Not Limited	 Note b 0.005 0.02 Not Limited	 Note b Note b Note b Not Limited
Water reactiveClass 3Class 2Class 1	 0.02 [f] 0.5 Not Limited	 0.0025 0.05 Not Limited	Not Applicable
Health-Hazard Materials			
Corrosives	Not Limited	Not Limited	Not Limited
Highly toxic	Not Limited	Not Limited	Note d
Toxics	Not Limited	Not Limited	Note d

For SI: 1 pound = 0.454 kg, 1 pound per square foot = 4.882 kg/m^2, 1 gallon per square foot = 40.7 L/m^2, 1 cubic foot @ NTP/square foot = 0.305 m^3 @ NTP/m^2, 1 cubic foot = 0.02832 m^3.

a. Hazardous materials within piping shall not be included in the calculated quantities.

b. Quantity of hazardous materials in a single fabrication area shall not exceed the maximum allowable quantities per control area in Tables 5003.1.1(1) and 5003.1.1(2).

c. Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.

d. The aggregate quantity of flammable, pyrophoric, toxic and highly toxic gases shall not exceed the greater of 0.2 cubic feet at NTP/square foot or 9,000 cubic feet at NTP.

e. The aggregate quantity of pyrophoric gases in the building shall not exceed the amounts set forth in Table 5003.8.2.

f. Quantity of Class 3 water-reactive solids in a single tool shall not exceed 1 pound.

TABLE 5003.1.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, i, l, m, o]

Portions of table not shown remain unchanged.

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note p	NA	NA	See Note p	NA	NA	See Note p	NA
Combustible fibers [p]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled		(1,000)			(1,000)			(200)	

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE			USE-CLOSED SYSTEMS			USE-OPEN SYSTEMS	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible liquid	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]
CryogenicFlammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
CryogenicInert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
CryogenicOxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]		1[g]	(1)[g]		1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]		50[g]	(50)[g]		NA	NA
	Division 1.4G	H-3	125[e, k]	NA		NA	NA		NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA		NA	NA		NA	NA
Flammable gas	Gaseous	H-2	NA	NA		NA	NA		NA	NA
	1A and 1B (High BV)[q]				1,000[d, e]			1,000[d, e]		
	1B (Low BV)[q]				162,500[d, e]			162,500[d, e]		
	Liquefied				NA			NA		
	1A and 1B (High BV)[q]			(150)[d, e]			(150)[d, e]			
	1B (Low BV)[q]			(10,000)[d, e]			(10,000)[d, e]			
Flammable liquid[n]	IA	H-2	NA	30[d, e]	NA	NA	30[d]	NA	NA	10d
	IB and IC	or H-3		120[d, e]			120[d]			30d
Flammable liquid, combination (IA, IB, IC)[n]	NA	H-2 or H-3	NA	120[d, e, h]	NA	NA	120[d, h]	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	125[d]	NA	NA	25[d]	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	~~UD~~ Detonable	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	I	H-2	16~~5~~[d, e]	(16~~5~~)[d, e]		16~~1~~[d]	(16~~1~~)[d]		8~~1~~[d]	(8~~1~~)[d]
	IIA	H-3	100~~50~~[d, e]	(100~~50~~)[d, e]		100~~50~~[d]	(100~~50~~)[d]		20~~10~~[d]	(20~~10~~)[d]
	IIB	H-3	200[d, e]	(200)[d, e]		200[d]	(200)[d]		50[d]	(50)[d]
	III	H-3	400~~125~~[d, e]	(400~~125~~)[d, e]		400~~125~~[d]	(400~~125~~)[d]		100~~25~~[d]	(100~~25~~)[d]
	IV	NA	NL	NL		NL	NL		NL	NL
	V	NA	NL	NL		NL	NL		NL	NL
Oxidizer	4	H-1	1[g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	3[j]	H-2 or H-3	10[d, e]	(10)[d, e]		2[d]	(2)[d]		2[d]	(2)[d]
	2	H-3	250[d, e]	(250)[d, e]		250[d]	(250)[d]		50[d]	(50)[d]
	1	NA	4,000[e, f]	(4,000)[e, f]		4,000[f]	(4,000)[f]		1,000[f]	(1,000)[f]
Oxidizing gas	Gaseous	H-3	NA	NA	1,500[d,e]	NA	NA	1,500[d, e]	NA	NA
	Liquefied			(150)[d, e]	NA		(150)[d, e]	NA		
Pyrophoric	NA	H-2	4[e, g]	(4)[e, g]	50[e, g]	1[g]	(1)[g]	10[e, g]	0	0
Unstable (reactive)	4	H-1	1[e, g]	(1)[e, g]	10[e, g]	0.25[g]	(0.25)[g]	2[e, g]	0.25[g]	(0.25)[g]
	3	H-1 or H-2	5[d, e]	(5)[d, e]	50[d, e]	1[d]	(1)[d]	10[d, e]	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]	750[d, e]	50[d]	(50)[d]	750[d, e]	10[d]	(10)[d]
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5[d, e]	(5)[d, e]	NA	5[d]	(5)[d]	NA	1[d]	(1)[d]
	2	H-3	50[d, e]	(50)[d, e]		50[d]	(50)[d]		10[d]	(10)[d]
	1	NA	NL	NL		NL	NL		NL	NL

For SI: 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NA = Not Applicable, NL = Not Limited~~, UD = Unclassified Detonable.~~

a. For use of control areas, see Section 5003.8.3.

b. The aggregate quantity in use and storage shall not exceed the maximum allowance quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of the *International Building Code* and Chapter 38.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent where stored in approved storage cabinets, day boxes, gas cabinets, gas rooms, exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10. Where Note d applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an approved automatic sprinkler system.

h. Containing not more than the maximum allowable quantity per control area of Class IA, Class IB or Class IC flammable liquids.

i. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

j. A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed where such materials are necessary for maintenance purposes, operation or sanitation of equipment where the storage containers and the manner of storage are approved.

k. Net weight of pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks including packaging shall be used.

l. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

m. For oxidizers, unstable (reactive) materials and water-reactive materials stored or displayed in Group M occupancies or storedin Group S occupancies, see Section 5003.11..

n. For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 5704.3.6.

o. Quantities in this table shall be modified in accordance with Table 5003.1.1(5).

p. Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.2.2.

q. "High BV" Category 1B flammable gas has a burning velocity greater than 3.9 in/s (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 in/s (10 cm/s) or less.

TABLE 5003.1.1(3) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD IN AN OUTDOOR CONTROL AREA[a, b, c, d]

MATERIAL	CLASS	STORAGE[b]			USE-CLOSED SYSTEMS[b]			USE-OPEN SYSTEMS[b]	
		Solid pounds (cubic feet)	Liquid gallons (pounds)[d]	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)[d]	Gas cubic feet at NTP	Solid pounds (cubic feet)	Liquid gallons (pounds)[d]
Flammable gas	Gaseous	Not Applicable	Not Applicable		Not Applicable	Not Applicable		Not Applicable	Not Applicable
	1A and 1B (High BV)[e]			3,000			1,500		
	1B (Low BV)[e]			195,000			97,500		
	Liquefied			Not Applicable			Not Applicable		
	1A and 1B (High BV)[e]		(300)			(150)			
	1B (Low BV)[e]		(20,000)			(10,000)			
Flammable solid	Not Applicable	500	Not Applicable	Not Applicable	250	Not Applicable	Not Applicable	50	Not Applicable
Inert Gas	Gaseous	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable
	Liquefied	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable
Cryogenic inert	Not Applicable	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable	Not Limited	Not Applicable	Not Applicable
Organic peroxide	~~Unclassified~~ Detonable	1	(1)	Not Applicable	0.25	(0.25)	Not Applicable	0.25	(0.25)

MATERIAL	CLASS	STORAGE Solid pounds (cubic feet)	STORAGE Liquid gallons (pounds)	STORAGE Gas cubic feet at NTP	USE-CLOSED SYSTEMS Solid pounds (cubic feet)	USE-CLOSED SYSTEMS Liquid gallons (pounds)	USE-CLOSED SYSTEMS Gas cubic feet at NTP	USE-OPEN SYSTEMS Solid pounds (cubic feet)	USE-OPEN SYSTEMS Liquid gallons (pounds)
Organic peroxide	I IIA IIB III IV V	20 200 400 840~~500~~ Not Limited Not Limited	(20) (200) (400) (840~~500~~) Not Limited Not Limited	Not Applicable	10 100 200 400~~250~~ Not Limited Not Limited	(10) (100) (200) (400~~250~~) Not Limited Not Limited	Not Applicable	8~~2~~ 50~~20~~ 100 200~~50~~ Not Limited Not Limited	(8~~2~~) (50~~20~~) (100) (200~~50~~) Not Limited Not Limited
Oxidizer	4	2	(2)	Not Applicable	1	(1)	Not Applicable	0.25	(0.25)
	3	40	(40)		20	(20)		4	(4)
	2	1,000	(1,000)		500	(500)		100	(100)
	1	Not Limited	Not Limited		Not Limited	Not Limited		Not Limited	Not Limited
Oxidizing gas	Gaseous	Not Applicable	Not Applicable	6,000	Not Applicable	Not Applicable	1,500	Not Applicable	Not Applicable
	Liquefied		(600)	Not Applicable		(300)	Not Applicable		
Pyrophoric materials	Not Applicable	8	(8)	100	4	(4)	10	0	0
Unstable (reactive)	4	2	(2)	20	1	(1)	2	0.25	(0.25)
	3	20	(20)	200	10	(10)	10	1	(1)
	2	200	(200)	1,000	100	(100)	250	10	(10)
	1	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited
Water reactive	3	20	(20)	Not Applicable	10	(10)	Not Applicable	1	(1)
	2	200	(200)		100	(100)		10	(10)
	1	Not Limited	Not Limited		Not Limited	Not Limited		Not Limited	Not Limited

For SI: 1 pound = 0.454 kg, 1 gallon = 3.785 L, 1 cubic foot = 0.02832 m^3.

a. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2.

b. The aggregate quantities in storage and use shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials allowed in outdoor storage per single property under the same ownership or control used for retail or wholesale sales is allowed to exceed the maximum allowable quantity per control area where such storage is in accordance with Section 5003.11.

d. Quantities in parentheses indicate quantity units in parentheses at the head of each column.

e. “High BV” Category 1B flammable gas has a burning velocity greater than 3.9 in/s (10 cm/s). “Low BV” Category 1B flammable gas has a burning velocity of 3.9 in/s (10 cm/s) or less.

TABLE 5003.8.2 DETACHED BUILDING REQUIRED

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
	Division 1.2	Maximum Allowable Quantity	
	Division 1.3	Maximum Allowable Quantity	
	Division 1.4[e]	Maximum Allowable Quantity	
	Division 1.4[c, e]	1	
	Division 1.5	Maximum Allowable Quantity	
	Division 1.6	Maximum Allowable Quantity	
Oxidizers	Class 4	Maximum Allowable Quantity	Maximum Allowable Quantity
Unstable (reactives) detonable	Class 3 or 4	Maximum Allowable Quantity	Maximum Allowable Quantity
Oxidizer, liquids and solids	Class 3	1,200	Not Applicable
	Class 2	2,000	

A DETACHED BUILDING IS REQUIRED WHERE THE QUANTITY OF MATERIAL EXCEEDS THAT LISTED HEREIN			
Material	**Class**	**Solids and liquids (tons)**	**Gases (cubic feet)**
Organic peroxides	Detonable	Maximum Allowable Quantity	Not Applicable
	Class I	Maximum Allowable Quantity	
	Class IIA	25[f]	
	Class IIB	40[f]	
	Class III	50[f]	
Unstable (reactives) nondetonable	Class 3 Class 2	125	2,000 10,000
Water reactives	Class 3 Class 2	125	Not Applicable
Pyrophoric gases[d]	Not Applicable	Not Applicable	2,000

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.02832 m^3, 1 ton = 2000 lb = 907.2 kg.

a. For materials that are detonable, the distance to other buildings or lot lines shall be in accordance with Section 415.6 of the International Building Code or Chapter 56 based on the trinitrotoluene (TNT) equivalence of the material, whichever is greater.

b. “Maximum Allowable Quantity” means the maximum allowable quantity per control area set forth in Table 5003.1.1(1).

c. Limited to Division 1.4 materials and articles, including articles packaged for shipment, that are not regulated as an explosive under Bureau of Alcohol, Tobacco, Firearms and Explosives regulations, or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles, providing the net explosive weight of individual articles does not exceed 1 pound.

d. Detached buildings are not required for gases in gas rooms that support H-5 fabrication facilities where the gas room is separated from other areas by a fire barrier with a fire-resistance rating of not less than 2 hours and the gas is located in a gas cabinet that is internally sprinklered, equipped with continuous leak detection, automatic shutdown, and is not manifolded upstream of pressure controls. The gas supply is limited to cylinders that do not exceed 125 pounds water capacity in accordance with DOTn 49 CFR 173.192 for Hazard Zone A toxic gases.

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

f. Where different classes of organic peroxides are stored in the same building, the aggregate sum of the ratios of the actual quantity divided by the allowed quantity for each class shall not exceed one.

TABLE 5004.2.2 REQUIRED SECONDARY CONTAINMENT—HAZARDOUS MATERIAL SOLIDS AND LIQUIDS STORAGE

MATERIAL		INDOOR STORAGE		OUTDOOR STORAGE	
		Solids	**Liquids**	**Solids**	**Liquids**
1. Physical-hazard materials					
Combustible liquids	Class II	Not Applicable	See Chapter 57	Not Applicable	See Chapter 57
	Class IIIA		See Chapter 57		See Chapter 57
	Class IIIB		See Chapter 57		See Chapter 57
Cryogenic fluids			See Chapter 55		See Chapter 55
Explosives		See Chapter 56		See Chapter 56	
Flammable liquids	Class IA	Not Applicable	See Chapter 57	Not Applicable	See Chapter 57
	Class IB		See Chapter 57		See Chapter 57
	Class IC		See Chapter 57		See Chapter 57
Flammable solids		Not Required	Not Applicable	Not Required	Not Applicable
Organic peroxides	~~Unclassified~~ Detonable	Required	Required	Not Required	Not Required
	Class I				
	Class IIA Class IIB				
	Class III				
	Class IV				

MATERIAL		INDOOR STORAGE		OUTDOOR STORAGE	
		Solids	Liquids	Solids	Liquids
	Class V	Not Required	Not Required	Not Required	Not Required
Oxidizers	Class 4	Required	Required	Not Required	Not Required
	Class 3				
	Class 2				
	Class 1	Not Required	Not Required	Not Required	Not Required
Pyrophorics		Not Required	Required	Not Required	Required
Unstable (reactives)	Class 4	Required	Required	Required	Required
	Class 3				
	Class 2				
	Class 1	Not Required	Not Required	Not Required	Not Required
Water reactives	Class 3	Required	Required	Required	Required
	Class 2				
	Class 1	Not Required	Not Required	Not Required	Not Required
2. Health-hazard materials					
Corrosives		Not Required	Required	Not Required	Required
Highly toxics		Required	Required	Required	Required
Toxics					

5004.7.1 Exempt applications. Standby or emergency power is not required for mechanical ventilation systems for any of the following:

1. Storage of Class IB and IC *flammable liquids* and Class II and III *combustible liquids* in closed containers not exceeding a capacity of 6 $^{1}/_{2}$ gallons (25 L).
2. Storage of Class 1 and 2 *oxidizers*.
3. Storage of Class IIA, IIB, III, IV and V *organic peroxides*.
4. Storage of asphyxiant, irritant and radioactive gases.

TABLE 5005.2.1.4 REQUIRED SECONDARY CONTAINMENT—HAZARDOUS MATERIAL LIQUIDS USE

MATERIAL	INDOOR LIQUIDS USE	OUTDOOR LIQUIDS USE	
1. Physical-hazard materials			
Combustible liquids	Class II	See Chapter 57	See Chapter 57
	Class IIIA	See Chapter 57	See Chapter 57
	Class IIIB	See Chapter 57	See Chapter 57
Cryogenic fluids		See Chapter 55	See Chapter 55
Explosives		See Chapter 56	See Chapter 56
Flammable liquids	Class IA	See Chapter 57	See Chapter 57
	Class IB	See Chapter 57	See Chapter 57
	Class IC	See Chapter 57	See Chapter 57
Flammable solids		Not Applicable	Not Applicable
Organic peroxides	~~Unclassified~~ Detonable	Required	Required
	Class I	Required	Required
	Class IIA Class IIB		
	Class III		
	Class IV		
	Class V	Not Required	Not Required
Oxidizers	Class 4	Required	Required
	Class 3		
	Class 2		
	Class 1		
Pyrophorics		Required	Required
Unstable (reactives)	Class 4	Required	Required
	Class 3		
	Class 2		
	Class 1	Not Required	Required
Water reactives	Class 3	Required	Required
	Class 2		
	Class 1	Not Required	Required
2. Health-hazard materials			
Corrosives		Required	Required
Highly toxics			
Toxics			

E102.1.8.1 Classification of organic peroxides ~~according to hazard~~.

~~**E102.1.8.1 Classification of organic peroxides according to hazard.**~~

~~Examples include:~~

~~Unclassified: Unclassified *organic peroxides* are capable of *detonation* and are regulated in accordance with Chapter 56.~~

~~Class I: acetyl cyclohexane sulfonyl 60-65 percent concentration by weight, fulfonyl peroxide, benzoyl peroxide over 98 percent concentration, t-butyl hydroperoxide 90 percent, t-butyl peroxyacetate 75 percent, t-butyl peroxyisopropylcarbonate 92 percent, diisopropyl peroxydicarbonate 100 percent, di-n-propyl peroxydicarbonate 98 percent, and di-n-propyl peroxydicarbonate 85 percent.~~

~~Class II: acetyl peroxide 25 percent, t-butyl hydroperoxide 70 percent (with DTBP and t-BuOH diluents), t-butyl peroxybenzoate 98 percent, t-butyl peroxy-2-ethylhexanoate 97 percent, t-butyl peroxyisobutyrate 75 percent, t-butyl peroxyisopropyl-carbonate 75 percent, t-butyl peroxypivalate 75 percent, dybenzoyl peroxydicarbonate 85 percent, di-sec-butyl peroxydicarbonate 98 percent, di-secbutyl peroxydicarbonate 75 percent, 1,1-di-(t-butylperoxy)-3,5,5-trimethyecyclohexane 95 percent, di-(2-ethythexyl) peroxydicarbonate 97 percent, 2,5-dymethyl-2-5 di (benzoylperoxy) hexane 92 percent, and peroxyacetic acid 43 percent.~~

~~Class III: acetyl cyclohexane sulfonal peroxide 29 percent, benzoyl peroxide 78 percent, benzoyl peroxide paste 55 percent, benzoyl peroxide paste 50 percent peroxide/50 percent butylbenzylphthalate diluent, cumene hydroperoxide 86 percent, di-(4-butylcyclohexyl) peroxydicarbonate 98 percent, t-butyl peroxy-2-ethylhexanoate 97 percent, t-butyl peroxyneodecanoate 75 percent, decanoyl peroxide 98.5 percent, di-t-butyl peroxide 99 percent, 1,1-di-(t-butylperoxy)3,5,5-trimethylcyclohexane 75 percent, 2,4-dichlorobenzoyl peroxide 50 percent, di-isopropyl peroxydicarbonate 30 percent, 2, 5-di-methyl-2,5-di-(2-ethylhexanolyperoxy)-hexane 90 percent, 2,5-dimethyl-2,5-di-(t-butylperoxy) hexane 90 percent and methyl ethyl ketone peroxide 9 percent active oxygen diluted in dimethyl phthalate.~~

~~Class IV: benzoyl peroxide 70 percent, benzoyl peroxide paste 50 percent peroxide/15 percent water/35 percent butylphthalate diluent, benzoyl peroxide slurry 40 percent, benzoyl peroxide powder 35 percent, t-butyl hydroperoxide 70 percent, (with water diluent), t-butyl peroxy-2-ethylhexanoate 50 percent, decumyl peroxide 98 percent, di-(2-ethylhexal) peroxydicarbonate 40 percent, laurel peroxide 98 percent, p-methane hydroperoxide 52.5 percent, methyl ethyl ketone peroxide 5.5 percent active oxygen and methyl ethyl ketone peroxide 9 percent active oxygen diluted in water and glycols.Class V: benzoyl peroxide 35 percent, 1,1-di-t-butyl peroxy 3,5,5-trimethylcyclohexane 40 percent, 2,5-di-(t-butyl peroxy) hexane 47 percent and 2,4-pentanedione peroxide 4 percent active oxygen.~~

Organic peroxide requirements in the IFC are based on the hazard classification, burning rate and transport type.

Add new text as follows:

E102.1.8.1.1 Hazard classification. Organic peroxide formulations are classified into seven hazard classifications (Detonable, I, IIA, IIB, III, IV and V). These classifications are used to determine the occupancy classifications and maximum allowable quantities. Detonable organic peroxides are explosive. As such, the storage requirements for detonable organic peroxides are found in Chapter 56, and Chapter 62 contains additional use, handling and transfer provisions.

E102.1.8.1.2 Transport types. Organic peroxides are also categorized based on the explosion hazard rating—referred to as the Transport Type. The transport type for organic peroxide formulations is determined in accordance with the UN RTDG. The explosion hazard levels are divided into "Types" (Type A-G) and a corresponding UN Number is identified based on whether the formulations are liquid or solid, and whether they require temperature control. Table E102.1.8.1.2 lists the transport types, UN Numbers, explosion hazard level and the maximum size container based on the transport type.

TABLE E102.1.8.1.2 TRANSPORT TYPES FOR ORGANIC PEROXIDES

Portions of table not shown remain unchanged.

TRANSPORT TYPE	EXPLOSIVE HAZARD RATING	MAXIMUM CONTAINER SIZE		UN NUMBER			
		Solid	Liquid	Ambient Temperature		Temperature Controlled	
		pounds (kg)	gallons (L)	Liquid	Solid	Liquid	Solid
A	Explosive	NP	NP	NA	NA	NA	NA
B	Very high	55 (25)	8 (30)	3101	3102	3111	3112
C	High	110 (50)	16 (60)	3103	3104	3113	3114
D	Medium	110 (50)	16 (60)	3105	3106	3115	3116
E	Low	882 (400)	60 (225)	3107	3108	3117	3118

F	Very low	IBC or Portable Tank	IBC or Portable Tank	3109	3110	3119	3120
G	None	NL	NL	NA	NA	NA	NA

NA – Not applicable; NL = Not Limited; NP = Not Permitted

E102.1.8.1.3 Burning rate. Organic peroxides are capable of high heat release and large quantities of smoke when they are involved in fire. The burning rate varies for each organic peroxide material and is determined in accordance with PGS 8. The burning rate is calculated from results of large-scale testing or small-scale testing detailed in PGS 8. Where the burning rate is not known, the highest classification for the organic peroxide shall be used.

TABLE E102.1.8.2 STORAGE CLASSIFICATION OF ORGANIC PEROXIDES

TRANSPORT TYPE	**BURNING RATE**					
	Large Scale Test (kg/minute)	**<10**	**≥10 and <60**	**≥60 and <140**	**≥140 and <300**	**≥300**
	OR					
	Small Scale Test [a] (kg/m²/minute)	**NA**	**<0.9**	**≥0.9 and <2.2**	**≥2.2 and <9.0**	≥9.0
B		I	I	I	I	I
C		IIB	IIB	IIB	IIA	I
D		III	III	IIB	IIA	I
E		IV	III	IIB	IIA	IIA
F		IV	III	III	III	III
G		V	V	V	V	V

a. Solid materials shall be tested using the large-scale test. Liquid materials can be tested using either the large-scale test or the small-scale test.

E102.1.8.2 Classification process. The classification process is based on the definitions of the various classes of organic peroxides. The classification for use in the IFC is based on the transport type and burning rate and is shown in Table E102.1.8.2. For example, a Transport Type C organic peroxide with a burning rate equal to or greater than 300 kilograms (662 pounds) per minute will be treated a Class I organic peroxide; and another Transport Type C organic peroxide with a burning rate less than 140 kilograms (309 pounds) per minute will be treated as a Class IIB organic peroxide.

E102.1.8.3 Organic peroxide classification. Organic peroxides and their corresponding classifications are listed in Table E102.1.8.3.

TABLE E102.1.8.3 ORGANIC PEROXIDE STORAGE CLASSIFICATIONS

Organic Peroxide Storage Class	**Organic Peroxide Name**	**CAS#**	**Concentration (mass%)**	**Diluent type A**	**Diluent type B**	**Inert solid**	**Water**	**UN Number (Generic entry)**	**Transport Type**	**Subsidiary risks and remarks**
III	Acetyl acetone peroxide	37187-22-7	≤42	≥48			≥8	3105	Type D	2
III	Acetyl acetone peroxide [as a paste]	37187-22-7	≤32					3106	Type D	20
I	Acetyl cyclohexanesulfonyl peroxide	3179-56-4	≤82				≥12	3112	Type B	3
III	Acetyl cyclohexanesulfonyl peroxide	3179-56-4	≤32		≥68			3115	Type D	
IIA	tert-Amyl hydroperoxide	3425-61-4	≤88	≥6			≥6	3107	Type E	

Organic Peroxide Storage Class	Organic Peroxide Name	CAS#	Concentration (mass%)	Diluent type A	Diluent type B	Inert solid	Water	UN Number (Generic entry)	Transport Type	Subsidiary risks and remarks
IIA	tert-Amyl peroxyacetate	690-83-5	≤62	≥38				3105	Type D	
IIA	tert-Amyl peroxybenzoate	4511-39-1	≤100					3103	Type C	
IIA	tert-Amyl peroxy-2-ethylhexanoate	686-31-7	≤100					3115	Type D	
IIB	tert-Amyl peroxy-2-ethylhexanoate	686-31-7	≤52	≥48				3115	Type D	
IIA	tert-Amyl peroxy-2-ethylhexyl carbonate	70833-40-8	≤100					3105	Type D	
I	tert-Amyl peroxy isopropyl carbonate	2372-22-7	≤77	≥23				3103	Type C	
IIA	tert-Amyl peroxyneodecanoate	68299-16-1	≤77	≥23				3115	Type D	
III	tert-Amyl peroxyneodecanoate	68299-16-1	≤47	≥53				3119	Type F	
IIA	tert-Amyl peroxypivalate	29240-17-3	≤77	≥23				3113	Type C	
IIA	tert-Amyl peroxy-3,5,5-trimethylhexanoate	68860-54-8	≤100					3105	Type D	
III	tert-Butyl cumyl peroxide	3457-61-2	>42-100					3109	Type F	
III	tert-Butyl cumyl peroxide	3457-61-2	≤52			≥48		3108	Type E	
IIA	n-Butyl-4,4-di-(tert-butylperoxy)valerate	995-33-5	>52-100					3103	Type C	
III	n-Butyl-4,4-di-(tert-butylperoxy)valerate	995-33-5	≤52			≥48		3108	Type E	
I	tert-Butyl hydroperoxide	75-91-2	>79-90				≥10	3103	Type C	13
IIA	tert-Butyl hydroperoxide	75-91-2	≤80	≥20				3105	Type D	4, 13
IIB	tert-Butyl hydroperoxide	75-91-2	≤79				>14	3107	Type E	13, 23
III	tert-Butyl hydroperoxide	75-91-2	≤72				≥28	3109	Type F	13, 32
I	tert-Butyl hydroperoxide [and] Di-tert-butylperoxide	75-91-2	<82+>9				≥7	3103	Type C	13
I	tert-Butyl monoperoxymaleate	1931-62-0	>52-100					3102	Type B	3
IIB	tert-Butyl monoperoxymaleate	1931-62-0	≤52	≥48				3103	Type C	
IIB	tert-Butyl monoperoxymaleate	1931-62-0	≤52			≥48		3108	Type E	
IIB	tert-Butyl monoperoxymaleate [as a paste]	1931-62-0	≤52					3108	Type E	
I	tert-Butyl peroxyacetate	107-71-1	>52-77	≥23				3101	Type B	3
IIA	tert-Butyl peroxyacetate	107-71-1	>32-52	≥48				3103	Type C	
III	tert-Butyl peroxyacetate	107-71-1	≤32	≥68				3109	Type F	
IIA	tert-Butyl peroxybenzoate	614-45-9	>77-100					3103	Type C	
IIA	tert-Butyl peroxybenzoate	614-45-9	>52-77	≥23				3105	Type D	
IIB	tert-Butyl peroxybenzoate	614-45-9	≤52			≥48		3106	Type D	
IIB	tert-Butyl peroxybutyl fumarate		≤52	≥48				3105	Type D	
IIA	tert-Butyl peroxycrotonate	23474-91-1	≤77	≥23				3105	Type D	
IIA	tert-Butyl peroxydiethylacetate	2550-33-6	≤100					3113	Type C	
IIA	tert-Butyl peroxy-2-ethylhexanoate	3006-82-4	>52–100					3113	Type C	
IIB	tert-Butyl peroxy-2-ethylhexanoate	3006-82-4	>32-52	≥48				3117	Type E	
IIB	tert-Butyl peroxy-2-ethylhexanoate	3006-82-4	≤52			≥48		3118	Type E	
III	tert-Butyl peroxy-2-ethylhexanoate	3006-82-4	≤32	≥68				3119	Type F	
III	tert-Butyl peroxy-2-ethylhexanoate [and] 2,2-di-(tert-Butylperoxy)butane	3006-82-4 & 2167-23-9	≤12+≤14	≥14		≥60		3106	Type D	
IIA	tert-Butyl peroxy-2-ethylhexanoate [and] 2,2-di-(tert-Butylperoxy)butane	3006-82-4 & 2167-23-9	≤31+≤36		≥33			3115	Type D	
IIA	tert-Butyl peroxy-2-ethylhexylcarbonate	34443-12-4	≤100					3105	Type D	
I	tert-Butyl peroxyisobutyrate	109-13-7	>52-77		≥23			3111	Type B	3
IIB	tert-Butyl peroxyisobutyrate	109-13-7	≤52		≥48			3115	Type D	
IIB	tert-Butylperoxy isopropylcarbonate	2372-21-6	≤77	≥23				3103	Type C	
IIA	1-(2-tert-Butylperoxy isopropyl)-3-isopropenylbenzene	96319-55-0	≤77	≥23				3105	Type D	
IIB	1-(2-tert-Butylperoxy isopropyl)-3-isopropenylbenzene	96319-55-0	≤42			≥58		3108	Type E	
I	tert-Butyl peroxy-2-methylbenzoate	22313-62-8	≤100					3103	Type C	
I	tert-Butyl peroxyneodecanoate	26748-41-4	>77-100					3115	Type D	

Organic Peroxide Storage Class	Organic Peroxide Name	CAS#	Concentration (mass%)	Diluent type A	Diluent type B	Inert solid	Water	UN Number (Generic entry)	Transport Type	Subsidiary risks and remarks
I	tert-Butyl peroxyneodecanoate	26748-41-4	≤77	≥23				3115	Type D	
IV	tert-Butyl peroxyneodecanoate [as a stable dispersion in water]	26748-41-4	≤52					3119	Type F	
IV	tert-Butyl peroxyneodecanoate [as a stable dispersion in water (frozen)]	26748-41-4	≤42					3118	Type E	
III	tert-Butyl peroxyneodecanoate	26748-41-4	≤32	≥68				3119	Type F	
I	tert-Butyl peroxyneoheptanoate	26748-38-9	≤77	≥23				3115	Type D	
IV	tert-Butyl peroxyneoheptanoate [as a stable dispersion in water]	26748-38-9	≤42					3117	Type E	
IIA	tert-Butyl peroxypivalate	927-07-1	>67-77	≥23				3113	Type C	
IIA	tert-Butyl peroxypivalate	927-07-1	>47-67	≥53				3115	Type D	
IIA	tert-Butyl peroxypivalate	927-07-1	>27-47	≥33				3115	Type D	
III	tert-Butyl peroxypivalate	927-07-1	≤27	≥73				3119	Type F	
IIA	tert-Butylperoxy stearylcarbonate	62476-60-6	≤100					3106	Type D	
IIA	tert-Butyl peroxy-3,5,5-trimethylhexanoate	13122-18-4	>37-100					3105	Type D	
IIA	tert-Butyl peroxy-3,5,5-trimethylhexanoate	13122-18-4	>37-77	≥23				3105	Type D	
III	tert-Butyl peroxy-3,5,5-trimethlyhexanoate	13122-18-4	≤42			≥58		3106	Type D	
III	tert-Butyl peroxy-3,5,5-trimethylhexanoate	13122-18-4	≤37	>63				3109	Type F	
I	3-Chloroperoxybenzoic acid	937-14-4	>57-86			≥14		3102	Type B	3
IIA	3-Chloroperoxybenzoic acid	937-14-4	≤57			≥3	≥40	3106	Type D	
IIA	3-Chloroperoxybenzoic acid	937-14-4	≤77			≥6	≥17	3106	Type D	
IIA	Cumyl hydroperoxide	80-15-9	>90-98	≤10				3107	Type E	13
III	Cumyl hydroperoxide	80-15-9	≤80	≥20				3109	Type F	13, 18
III	Cumyl hydroperoxide	80-15-9	≤90	≥10				3109	Type F	13, 18
I	Cumyl peroxyneodecanoate	26748-47-0	≤87	≥13				3115	Type D	
IIA	Cumyl peroxyneodecanoate	26748-47-0	≤77	≥23				3115	Type D	
III	Cumyl peroxyneodecanoate [as a stable dispersion in water]	26748-47-0	≤52					3119	Type F	
I	Cumyl peroxyneoheptanoate	104852-44-0	≤77	≥23				3115	Type D	
IIA	Cumyl peroxypivalate	23383-59-7	≤77		≥23			3115	Type D	
IIA	Cyclohexanone peroxide(s)	12262-58-7	≤91				≥9	3104	Type C	13
IIB	Cyclohexanone peroxide(s)	12262-58-7	≤72	≥28				3105	Type D	5
IIB	Cyclohexanone peroxide(s) [as a paste]	12262-58-7	≤72					3106	Type D	5, 20
V	Cyclohexanone peroxide(s)	12262-58-7	≤32			≥68		Exempt	Type G	29
IIA	([3R- (3R, 5aS, 6S, 8aS, 9R, 10R, 12S, 12aR**)]-Decahydro-10-methoxy-3, 6, 9-trimethyl-3, 12-epoxy-12H-pyrano [4, 3- j]-1, 2-benzodioxepin)	71963-77-4	<100					3106	Type D	
IIB	Diacetone alcohol peroxides	54693-46-8	≤57		≥26		≥8	3115	Type D	6
IIB	Diacetyl peroxide	110-22-5	≤27		≥73			3115	Type D	7, 13
IIB	Di-tert-amyl peroxide	10508-09-5	≤100					3107	Type E	
IIA	2,2-Di-(tert-amylperoxy)-butane	13653-62-8	≤57	≥43				3105	Type D	
IIA	1,1-Di-(tert-amylperoxy)cyclohexane	15667-10-4	≤82	≥18				3103	Type C	
I	Dibenzoyl peroxide	94-36-0	>52-100			≤48		3102	Type B	3
I	Dibenzoyl peroxide	94-36-0	>77-94				≥6	3102	Type B	3
IIB	Dibenzoyl peroxide	94-36-0	≤77				≥23	3104	Type C	
IIB	Dibenzoyl peroxide	94-36-0	≤62			≥28	≥10	3106	Type D	
IIB	Dibenzoyl peroxide [as a paste]	94-36-0	>52–62					3106	Type D	20
IIB	Dibenzoyl peroxide	94-36-0	>35-52			≥48		3106	Type D	
IIB	Dibenzoyl peroxide	94-36-0	>36-42	≥18			≤40	3107	Type E	
IIB	Dibenzoyl peroxide [as a paste]	94-36-0	≤56.5				≥15	3108	Type E	
IIB	Dibenzoyl peroxide [as a paste]	94-36-0	≤52					3108	Type E	20
III	Dibenzoyl peroxide [as a stable dispersion in water]	94-36-0	≤42					3109	Type F	
V	Dibenzoyl peroxide	94-36-0	≤35			≥65		Exempt	Type G	29

Organic Peroxide Storage Class	Organic Peroxide Name	CAS#	Concentration (mass%)	Diluent type A	Diluent type B	Inert solid	Water	UN Number (Generic entry)	Transport Type	Subsidiary risks and remarks
I	Di-(4-tert-butylcyclohexyl)peroxydicarbonate	15520-11-3	≤100					3114	Type C	
IIB	Di-(4-tert-butylcyclohexyl)peroxydicarbonate	15520-11-3	≤75				≥ 25	3114	Type C	
IV	Di-(4-tert-butylcyclohexyl)peroxydicarbonate [as a stable dispersion in water]	15520-11-3	≤42					3119	Type F	
IIA	Di-tert-butyl peroxide	110-05-4	>52-100					3107	Type E	
III	Di-tert-butyl peroxide	110-05-4	≤52	≥48				3109	Type F	25
IIB	Di-tert-butyl peroxyazelate	16580-06-6	≤52	≥48				3105	Type D	
IIB	2,2-Di-(tert-butylperoxy)butane	2167-23-9	≤52	≥48				3103	Type C	
I	1,6-Di-(tert-butylperoxycarbonyloxy)hexane		≤72	≥28				3103	Type C	
I	1,1-Di-(tert-butylperoxy)cyclohexane	3006-86-8	>80-100					3101	Type B	3
IIA	1,1-Di-(tert-butylperoxy)cyclohexane	3006-86-8	≤72	≥28				3103	Type C	30
IIA	1,1-Di-(tert-butylperoxy)cyclohexane	3006-86-8	>52-80	≥20				3103	Type C	
IIA	1,1-Di-(tert-butylperoxy)cyclohexane	3006-86-8	>42-52	≥48				3105	Type D	
III	1,1-Di-(tert-butylperoxy)cyclohexane	3006-86-8	≤42	≥13		≥45		3106	Type D	
III	1,1-Di-(tert-butylperoxy)cyclohexane	3006-86-8	≤42	≥58				3109	Type F	
III	1,1-Di-(tert-butylperoxy)cyclohexane	3006-86-8	≤27	≥25				3107	Type E	21
III	1,1-Di-(tert-Butylperoxy)cyclohexane	3006-86-8	≤13	≥13	≥74			3109	Type F	
IIA	1,1-Di-(tert-butylperoxy)cyclohexane [and] Tert-butyl peroxy-2-ethylhexanoate	3006-86-8 & 3006-82-4	≤43+≤16	≥41				3105	Type D	
IIB	Di-n-butyl peroxydicarbonate	16215-49-9	>27-52		≥48			3115	Type D	
IV	Di-n-butyl peroxydicarbonate [as a stable dispersion in water (frozen)]	16215-49-9	≤42					3118	Type E	
III	Di-n-butyl peroxydicarbonate	16215-49-9	≤27		≥73			3117	Type E	
I	Di-sec-butyl peroxydicarbonate	19910-65-7	>62-100					3113	Type C	
I	Di-sec-butyl peroxydicarbonate	19910-65-7	>52-62	≥38				3113	Type C	
I	Di-sec-butyl peroxydicarbonate	19910-65-7	≤52		≥48			3115	Type D	
IIB	Di-(tert-butylperoxyisopropyl) benzene(s)	25155-25-3	>42-100			≤57		3106	Type D	
V	Di-(tert-butylperoxyisopropyl) benzene(s)	25155-25-3	≤42			≥58		Exempt	Type G	29
IIB	Di-(tert-butylperoxy)phthalate	15042-77-0	>42-52	≥48				3105	Type D	
IIB	Di-(tert-butylperoxy)phthalate [as a paste]	15042-77-0	≤52					3106	Type D	20
IIB	Di-(tert-butylperoxy)phthalate	15042-77-0	≤42	≥58				3107	Type E	
IIB	2,2-Di-(tert-butylperoxy)propane	2167-23-9	≤52	≥48				3105	Type D	
III	2,2-Di-(tert-butylperoxy)propane	2167-23-9	≤42	≥13		≥45		3106	Type D	
I	1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	>90-100					3101	Type B	3
IIA	1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	≤90	≥10				3103	Type C	30
IIA	1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	>57-90	≥10				3103	Type C	
IIA	1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	≤77	≥23				3103	Type C	
III	1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	≤57			≥43		3110	Type F	
IIA	1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	≤57	≥43				3107	Type E	
IIB	1,1-Di-(tert-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	≤32	≥26	≥42			3107	Type E	
III	Dicetyl peroxydicarbonate	26322-14-5	≤100					3120	Type F	
IV	Dicetyl peroxydicarbonate [as a stable dispersion in water]	26322-14-5	≤42					3119	Type F	
I	Di-4-chlorobenzoyl peroxide	94-17-7	≤77				≥23	3102	Type B	3
IIB	Di-4-chlorobenzoyl peroxide [as a paste]	94-17-7	≤52					3106	Type D	20
V	Di-4-chlorobenzoyl peroxide	94-17-7	≤32			≥68		Exempt	Type G	29
III	Dicumyl peroxide	80-43-3	>52-100					3110	Type F	12
V	Dicumyl peroxide	80-43-3	≤52			≥48		Exempt	Type G	29
I	Dicyclohexyl peroxydicarbonate	1561-49-5	>91-100					3112	Type B	3
IIA	Dicyclohexyl peroxydicarbonate	1561-49-5	≤91				≥9	3114	Type C	
IV	Dicyclohexyl peroxydicarbonate [as a stable dispersion in water]	1561-49-5	≤42					3119	Type F	

Organic Peroxide Storage Class	Organic Peroxide Name	CAS#	Concentration (mass%)	Diluent type A	Diluent type B	Inert solid	Water	UN Number (Generic entry)	Transport Type	Subsidiary risks and remarks
IIB	Didecanoyl peroxide	762-12-9	≤100					3114	Type C	
III	2,2-Di-(4,4-di(tert-butylperoxy)cyclohexyl)propane	1705-60-8	≤42			≥58		3106	Type D	
III	2,2-Di-(4,4-di(tert-butylperoxy)cyclohexyl)propane	1705-60-8	≤22		≥78			3107	Type E	
I	Di-2,4-dichlorobenzoyl peroxide	133-14-2	≤77				≥23	3102	Type B	3
IIB	Di-2,4-dichlorobenzoyl peroxide [as a paste]	133-14-2	≤52					3118	Type E	
IIB	Di-2,4-dichlorobenzoyl peroxide [as a paste with silicone oil]	133-14-2	≤52					3106	Type D	
I	Di-(2-ethoxyethyl) peroxydicarbonate		≤52		≥48			3115	Type D	
IIA	Di-(2-ethylhexyl) peroxydicarbonate	16111-62-9	>77-100					3113	Type C	
IIA	Di-(2-ethylhexyl) peroxydicarbonate	16111-62-9	≤77	≥23				3115	Type D	
III	Di-(2-ethylhexyl) peroxydicarbonate [as a stable dispersion in water]	16111-62-9	≤62					3119	Type F	
IV	Di-(2-ethylhexyl) peroxydicarbonate [as a stable dispersion in water (frozen)]	16111-62-9	≤52					3120	Type F	
I	2,2-Dihydroperoxypropane	2614-76-8	≤27			≥73		3102	Type B	3
IIB	Di-(1-hydroxycyclohexyl)peroxide	2407-94-5	≤100					3106	Type D	
I	Diisobutyryl peroxide	3437-84-1	>32-52	≥48				3111	Type B	3
IIB	Diisobutyryl peroxide	3437-84-1	≤32	≥68				3115	Type D	
IIB	Diisopropylbenzene dihydroperoxide		≤82	≥5			≥5	3106	Type D	24
I	Diisopropyl peroxydicarbonate	105-64-6	>52-100					3112	Type B	3
IIB	Diisopropyl peroxydicarbonate	105-64-6	≤52		≥48			3115	Type D	
IIB	Diisopropyl peroxydicarbonate	105-64-6	≤32	≥68				3115	Type D	
IIB	Dilauroyl peroxide	105-74-8	≤100					3106	Type D	
IV	Dilauroyl peroxide [as a stable dispersion in water]	105-74-8	≤42					3109	Type F	
I	Di-(3-methoxybutyl) peroxydicarbonate	52238-68-3	≤52		≥48			3115	Type D	
I	Di-(2-methylbenzoyl)peroxide	22313-62-8	≤87				≥13	3112	Type B	3
IIA	Di-(3-methylbenzoyl) peroxide + Benzoyl (3-methylbenzoyl) peroxide + Dibenzoyl peroxide		≤20+≤18+≤4		≥58			3115	Type D	
IIB	Di-(4-methylbenzoyl)peroxide [as a paste with silicone oil]	895-85-2	≤52					3106	Type D	
I	2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane	2618-77-1	>82-100					3102	Type B	3
IIA	2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane	2618-77-1	≤82			≥18		3106	Type D	
IIB	2,5-Dimethyl-2,5-di-(benzoylperoxy)hexane	2618-77-1	≤82				≥18	3104	Type C	
IIB	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	78-63-7	>90-100					3103	Type C	
IIB	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	78-63-7	>52-90	≥10				3105	Type D	
IIB	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	78-63-7	≤77			≥23		3108	Type E	
III	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane	78-63-7	≤52	≥48				3109	Type F	
IIB	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexane [as a paste]	78-63-7	≤47					3108	Type E	
I	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	1068-27-5	>86-100					3101	Type B	3
IIA	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	1068-27-5	>77-86	≥14				3103	Type C	26
IIA	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	1068-27-5	>52-77	≥23				3103	Type C	26
III	2,5-Dimethyl-2,5-di-(tert-butylperoxy)hexyne-3	1068-27-5	≤52			≥48		3106	Type D	
IIA	2,5-Dimethyl-2,5-di-(2-ethylhexanoylperoxy)hexane	13052-09-0	≤100					3113	Type C	
IIA	2,5-Dimethyl-2,5-dihydroperoxyhexane	3025-88-5	≤82				≥18	3104	Type C	
IIA	2,5-Dimethyl-2,5-di-(3,5,5-trimethylhexanoylperoxy)hexane		≤77	≥23				3105	Type D	
IIB	1,1-Dimethyl-3-hydroxybutylperoxyneoheptanoate	110972-57-1	≤52	≥48				3117	Type E	
III	Dimyristyl peroxydicarbonate	53220-22-7	≤100					3116	Type D	
IV	Dimyristyl peroxydicarbonate [as a stable dispersion in water]	53220-22-7	≤42					3119	Type F	
IIB	Di-(2-neodecanoylperoxyisopropyl)benzene	117663-11-3	≤52	≥48				3115	Type D	
IIA	Di-n-nonanoyl peroxide	762-13-0	≤100					3116	Type D	
IIA	Di-n-octanoyl peroxide	762-16-3	≤100					3114	Type C	

Organic Peroxide Storage Class	Organic Peroxide Name	CAS#	Concentration (mass%)	Diluent type A	Diluent type B	Inert solid	Water	UN Number (Generic entry)	Transport Type	Subsidiary risks and remarks
I	Di-(2-phenoxyethyl)peroxydicarbonate	41935-39-1	>85-100					3102	Type B	3
IIA	Di-(2-phenoxyethyl)peroxydicarbonate	41935-39-1	≤85				≥15	3106	Type D	
III	Dipropionyl peroxide	3248-28-0	≤27		≥73			3117	Type E	
I	Di-n-propyl peroxydicarbonate	16066-38-9	≤100					3113	Type C	
I	Di-n-propyl peroxydicarbonate	16066-38-9	≤77		≥23			3113	Type C	
I	Disuccinic acid peroxide	123-23-9	>72-100					3102	Type B	3, 17
IIB	Disuccinic acid peroxide	123-23-9	≤72				≥28	3116	Type D	
IIA	Di-(3,5,5-trimethylhexanoyl) peroxide	3851-87-4	>62-82	≥18				3115	Type D	
IIB	Di-(3,5,5-trimethylhexanoyl) peroxide	3851-87-4	>52-62	≥38				3115	Type D	
III	Di-(3,5,5-trimethylhexanoyl) peroxide	3851-87-4	>38-52	≥48				3115	Type D	
III	Di-(3,5,5-trimethylhexanoyl)peroxide [as a stable dispersion in water]	3851-87-4	≤52					3119	Type F	
III	Di-(3,5,5-trimethylhexanoyl)peroxide	3851-87-4	≤38	≥62				3119	Type F	
IIA	Ethyl 3,3-di-(tert-amylperoxy)butyrate	67567-23-1	≤67	≥33				3105	Type D	
IIA	Ethyl 3,3-di-(tert-butylperoxy)butyrate	55794-20-2	>77-100					3103	Type C	
IIA	Ethyl 3,3-di-(tert-butylperoxy)butyrate	55794-20-2	≤77	≥23				3105	Type D	
III	Ethyl 3,3-di-(tert-butylperoxy)butyrate	55794-20-2	≤52			≥48		3106	Type D	
IIA	1-(2-ethylhexanoylperoxy)-1,3-Dimethylbutyl peroxypivalate	228415-62-1	≤52	≥45	≥10			3115	Type D	
IIA	tert-Hexyl peroxyneodecanoate	62178-88-5	≤71	≥29				3115	Type D	
IIA	tert-Hexyl peroxypivalate	51938-28-4	≤72		≥28			3115	Type D	
IIA	3-Hydroxy-1,1-dimethylbutyl peroxyneodecanoate	95718-78-8	≤77	≥23				3115	Type D	
IIA	3-Hydroxy-1,1-dimethylbutyl peroxyneodecanoate [as a stable dispersion in water]	95718-78-8	≤52	≥48				3117	Type E	
IV	3-Hydroxy-1,1-dimethylbutyl peroxyneodecanoate	95718-78-8	≤52					3119	Type F	
I	Isopropyl sec-butyl peroxydicarbonat +Di-sec-butyl peroxydicarbonate+Di-isopropyl peroxydicarbonate		≤32+≤15-18+≤12-15	≥38				3115	Type D	
I	Isopropyl sec-butyl peroxydicarbonat +Di-sec-butyl peroxydicarbonate+Di-isopropyl peroxydicarbonate		≤52+≤28+≤22					3111	Type B	3
III	Isopropylcumyl hydroperoxide	26762-93-6	≤72	≥28				3109	Type F	13
IIA	p-Menthyl hydroperoxide	26762-92-5	>72-100					3105	Type D	13
III	p-Menthyl hydroperoxide	26762-92-5	≤72	≥28				3109	Type F	27
IIA	Methylcyclohexanone peroxide(s)		≤67		≥33			3115	Type D	
I	Methyl ethyl ketone peroxide(s)	1338-23-4	See Remark 8	≥48				3101	Type B	3, 8, 13
IIA/IIB - Consult Manufacturer	Methyl ethyl ketone peroxide(s)	1338-23-4	See Remark 9	≥55				3105	Type D	9
III	Methyl ethyl ketone peroxide(s)	1338-23-4	See Remark 10	≥60				3107	Type E	10
IIA	Methyl isobutyl ketone peroxide(s)	37206-20-5	≤62	≥19				3105	Type D	22
III	Methyl isopropyl ketone peroxide(s)	33373-82-7	See Remark 31	≥70				3109	Type F	31
IIA	Organic peroxide, Liquid, Sample							3103	Type C	11
IIA	Organic peroxide, Liquid, Sample, Temperature Controlled							3113	Type C	11
IIA	Organic Peroxide, Solid, Sample							3104	Type C	11
IIA	Organic Peroxide, Solid, Sample, Temperature Controlled							3114	Type C	11
IIA	3,3,5,7,7-Pentamethyl-1,2,4-Trioxepane	215877-64-8	≤100					3107	Type E	
IIA	Peroxyacetic acid, type D, stabilized	79-21-0	≤43					3105	Type D	13, 14, 19
III	Peroxyacetic acid, type E, stabilized	79-21-0	≤43					3107	Type E	13, 15, 19
IV	Peroxyacetic acid, type F, stabilized	79-21-0	≤43					3109	Type F	13, 16, 19
IIA	Peroxylauric acid	2388-12-7	≤100					3118	Type E	
IIA	Pinanyl hydroperoxide	28324-52-9	>56-100					3105	Type D	13
III	Pinanyl hydroperoxide	28324-52-9	≤56	≥44				3109	Type F	
IIA	Polyether poly-tert-butylperoxycarbonate	Proprietary	≤52		≥48			3107	Type E	
IIA	1,1,3,3-Tetramethylbutyl hydroperoxide	5809-08-5	≤100					3105	Type D	

Organic Peroxide Storage Class	Organic Peroxide Name	CAS#	Concentration (mass%)	Diluent type A	Diluent type B	Inert solid	Water	UN Number (Generic entry)	Transport Type	Subsidiary risks and remarks
IIA	1,1,3,3-Tetramethylbutyl peroxy-2-ethylhexanoate	22288-43-3	≤100					3115	Type D	
IIA	1,1,3,3-Tetramethylbutyl peroxyneodecanoate	51240-95-0	≤72		≥28			3115	Type D	
III	1,1,3,3-Tetramethylbutyl peroxyneodecanoate [as a stable dispersion in water]	51240-95-0	≤52					3119	Type F	
I	1,1,3,3-tetramethylbutyl peroxypivalate	22288-41-1	≤77	≥23				3115	Type D	
IIA	3,6 9-Triethyl-3,6,9-trimethyl-1,4,7-triperoxonane	24748-23-0	≤42	≥58				3105	Type D	28
IV	3,6,9-Triethyl-3,6,9-trimethyl-1,4,7-triperoxonane	24748-23-0	≤17	≥18		>65		3110	Type F	

1. Diluent type B may always be replaced by Diluent type A. The boiling point of Diluent type B should be at least 60°C higher than the SADT of the organic peroxide formulation.
2. Available (or Active) oxygen less than 4.7 percent.
3. “EXPLOSIVE” subsidiary risk label required.
4. Diluent may be replaced by di-tert-butyl peroxide.
5. Available (or Active) oxygen not greater than 4.7 percent.
6. Hydrogen peroxide not greater than 9 percent, and available (or active) oxygen not greater than 10 percent.
7. Only non-metallic packaging allowed.
8. Available (or Active) oxygen greater than 10 percent but not greater than 10.7 percent, with or without water.
9. Available (or Active) oxygen not greater than 10 percent with or without water.
10. Available (or Active) oxygen not greater than 8.2 percent with or without water.
11. See 2.5.3.2.5.1 of UN RTDG.
12. Up to 2000 kg per receptacle assigned to ORGANIC PEROXIDE TYPE F on the basis of large scale trials.
13. "CORROSIVE" subsidiary risk label required.
14. Peroxyacetic acid formulations which fulfill the criteria of 2.5.3.3.2 (d) of UN RTDG.
15. Peroxyacetic acid formulations which fulfill the criteria of 2.5.3.3.2 (e) of UN RTDG.
16. Peroxyacetic acid formulations which fulfill the criteria of 2.5.3.3.2 (f) of UN RTDG.
17. Addition of water to this organic peroxide will decrease its thermal stability.
18. No "CORROSIVE" subsidiary risk label required for concentrations not greater than 80 percent.
19. Mixtures with hydrogen peroxide, water and acid(s).
20. With Diluent type A with or without water.
21. Diluent type A 25 percent or greater by mass, and in addition to ethylbenzene.
22. Diluent type A 19 percent or greater by mass, and in addition to methyl isobutyl ketone.
23. di-tert-butyl peroxide not greater than 6 percent.
24. 1-isopropylhydroperoxy-4-isopropylhydroxybenzene not greater than 8 percent.

25. Diluent type B with a boiling point greater than 230°F (110°C).

26. Hydroperoxides content not greater than 0.5 percent.

27. Concentrations greater than 56 percent require a "CORROSIVE" subsidiary risk label.

28. Available (or Active) oxygen not greater than 7.6 percent and Diluent type A with a 95-percent boil-off point between 392°F and 500°F (200°C and 260°C).

29. Not subject to the requirements of these Model Regulations for Division 5.2 per the UN RTDG.

30. Diluent type B with boiling point greater than 266°F (130°C).

31. Available (or active) oxygen not greater than 6.7 percent.

32. Tert-Butyl hydroperoxide can be transported and stored in bulk provided that polyethylene saddles are used—DOTn 49 CFR Part 173.225(g) and (h).

Revise as follows:

TABLE E105.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
CGA P-20—2009	*Standard for Classification of Toxic Mixtures*	E103.1.3.1
CGA P-23—2008	*Standard for Categorizing Gas Mixtures Containing Flammable and Nonflammable Components*	E102.1.2
DOL 29 CFR Part 1910—2023	*Occupational Safety and Health Standards*	E104.1
DOL 29 CFR Part 1910.1200—2012	*Hazard Communication*	E102.1.7.2, E104.1, E104.2
DOTn 49 CFR—2023	*Transportation*	E104.1
DOTn 49 CFR Part 173.127—2005	*Class 5, Division 5.1—Definition and Assignment of Packing Groups*	E102.1.7.2
DOTn 49 CFR Part 173.225 - 2023	Title 49 Code of Federal Regulations; Part 173.225, *Packaging Requirements and Other Provisions for Organic Peroxides*	Table E102.1.8.3
PGS 8—21	*Organic peroxides: Storage – Guideline for the labour-safe, environment-safe and fire-safe storage of organic peroxides*	E102.1.8.1.3
UN ST/SG/AC.10/11 (Rev. 7)—2019	*Manual of Tests and Criteria*	Table E104.2
UN ST/SG/AC.10/1 (Rev 21)—2019	*Recommendations on the Transport of Dangerous Goods*	E102.1.8.1.2, Table E102.1.8.3, Table E104.2
UN ST/SG/AC.10/30 (Rev.7)—2017	*Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Part 2: Physical Hazards*	E102.1.7.2, E104.1, E104.2, Table E104.2

TABLE F101.2 FIREFIGHTER WARNING PLACARD DESIGNATIONS BASED ON HAZARD CLASSIFICATION CATEGORIES

HAZARD CATEGORY	DESIGNATION
Combustible liquid II	F2
Combustible liquid IIIA	F2
Combustible liquid IIIB	F1
Combustible dust	F3 or F2[a]
Combustible fiber	F3
Cryogenic flammable	F4, H3
Cryogenic oxidizing	OX, H3
Explosive	R4
Flammable solid	F2
Flammable gas (gaseous)	F4
Flammable gas (liquefied)	F4
Flammable liquid IA	F4
Flammable liquid IB	F3
Flammable liquid IC	F3

HAZARD CATEGORY	DESIGNATION
Organic peroxide, ~~UD~~Detonable	R4
Organic peroxide I	F4, R3
Organic peroxide IIA	F3, R3
Organic peroxide IIB	F3, R3
Organic peroxide III	F2, R2
Organic peroxide IV	F1, R1
Organic peroxide V	None
Oxidizing gas (gaseous)	OX
Oxidizing gas (liquefied)	OX
Oxidizer 4	OX4
Oxidizer 3	OX3
Oxidizer 2	OX2
Oxidizer 1	OX1
Pyrophoric gases	F4
Pyrophoric solids, liquids	F3
Unstable reactive 4D	R4
Unstable reactive 3D	R4
Unstable reactive 3N	R2
Unstable reactive 2	R2
Unstable reactive 1	None
Water reactive 3	W3
Water reactive 2	W2
Corrosive	H3, COR
Toxic	H3
Highly toxic	H4

a. F3 = Finely divided solids, typically less than 75 micrometers (µm) (200 mesh), that pose an elevated risk of forming an ignitable dust cloud, such as finely divided sulfur, *National Electric Code* Group E dusts (for example, aluminum, zirconium and titanium) and bisphenol A. F2 = Finely divided solids less than 420 µm (40 mesh) that pose an ordinary risk of forming an ignitable dust cloud.

F—Flammable category.

R—Reactive category.

H—Health category.

W—Special hazard: water reactive.

OX—Special hazard: oxidizing properties.

COR—Corrosive.

~~UD—Unclassified detonable material.~~

4D—Class 4 detonable material.

3D—Class 3 detonable material.

3N—Class 3 nondetonable material.

TABLE H102.1 SECTION II—HAZARDOUS MATERIALS INVENTORY STATEMENT (HMIS) SUMMARY REPORT[a] (Storage[b] Conditions)[c]

IBC/IFC HAZARD CLASS	HAZARD CLASS	INVENTORY AMOUNT			IBC/IFC MAXIMUM ALLOWABLE QUANTITY[d]		
	(Abbrev)	Solid (lb)	Liquid (gal)	Gas (cu ft, gal, lb)	Solid (lb)	Liquid (gal)	Gas (cu ft, gal, lb)
Combustible Liquid	C2		5			120	
	C3A					330	
	C3B		6			13,200	
Combustible Fiber	Loose/Baled						
Cryogenics, Flammable	Cryo-Flam					45	
Cryogenic, Oxidizing	Cryo-OX					45	
Flammable Gas	FLG						
(Gaseous)				150			1,000
(Liquefied)						30	
Flammable Liquid	F1A					30	
	F1B & F1C		5			120	
Combination (1A, 1B, 1C)			5			120	
Flammable Solid	FLS				125		
Organic Peroxide	~~OPU~~OPD				~~0~~1		

IBC/IFC HAZARD CLASS	HAZARD CLASS	INVENTORY AMOUNT			IBC/IFC MAXIMUM ALLOWABLE QUANTITY		
	(Abbrev)	Solid (lb)	Liquid (gal)	Gas (cu ft, gal, lb)	Solid (lb)	Liquid (gal)	Gas (cu ft, gal, lb)
	OP1				~~5~~16		
	OP2A				~~50~~100		
	OP2B				400		
	OP3				~~125~~840		
	OP4				NL		
	OP5				NL		
Oxidizer	OX4				0		
	OX3				10		
	OX2				250		
	OX1				4,000		

a. Complete a summary report for each *control area* and Group H occupancy.

b. Storage = storage + use-closed + use-open systems.

c. Separate reports are required for use-closed and use-open systems.

d. Include increases for sprinklers or storage in cabinets, if applicable.

(This is an example; add additional hazard classes as needed.)

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Revise as follows:

[F] ORGANIC PEROXIDE. An organic compound that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. ~~Organic peroxides can pose an *explosion* hazard (*detonation* or *deflagration*) or they can be shock sensitive. They can also decompose into various unstable compounds over an extended period of time.~~Organic peroxide formulation is a pure or technically pure organic peroxide or a mixture of organic peroxides with an active oxygen (aO) concentration greater than 1 percent alone or in combination with one or more materials. Organic peroxide storage classification is based on the organic peroxide transportation type and burning rate. The transport type for organic peroxide formulations is determined by the UN Manual of Tests and Criteria, Part II. The methods used to determine the burning rate of organic peroxide formulations are spelled out in the Storage of Organic Peroxides in The Netherlands (also known as PGS 8). Terms such as accelerator, catalyst, initiator, and curing agent are sometimes used to describe organic peroxide formulations and are misleading because they can also refer to materials that are not or do not contain organic peroxides, some of which might present increased hazard when mixed with organic peroxides.

~~Unclassified detonable~~ Detonable. *Organic peroxides* that are capable of *detonation*. These peroxides pose an extremely high *explosion* hazard through rapid *explosive* decomposition.

Class IIB. Describes those formulations that burn rapidly and that pose a moderate reactivity hazard. This class comprises of organic peroxide formulations with transport classification Type C with a large-scale burning rate lower than 140 kg/min, those with transport classification Type D and Type E with a large-scale burning rate equal to or higher than 60 kg/min but lower than 140 kg/min, those with transport classification Type C if the small-scale burning rate is lower than 2.2 kg/min × m^2, and those with transport classification Type D and Type E if the small-scale burning rate is equal to or higher than 0.9 kg/min × m^2 but lower than 2.2 kg/min × m^2.

Class I. Those formulations that are capable of *deflagration* but not *detonation*.This class comprises of organic peroxide formulations with transport classification Type B, those with transport classification Type C and Type D with large-scale burning rate equal to or higher than 300 kg/min, and those with transport classification Type C and Type D with small-scale burning rate equal to or higher than 9.0 kg/min × m^2 unless the large-scale burning rate is lower than 300 kg/min.

Class IIA. Those formulations that burn very rapidly and that pose a moderate reactivity hazard.This class comprises of organic peroxide formulations with transport classification Type C and Type D with a large-scale burning rate equal to or higher than 140 kg/min but lower than 300 kg/min and those with transport classification Type E with a large-scale burning rate equal to or higher than 140 kg/min, those with Type C and Type D if the small-scale burning rate is equal to or higher than 2.2 kg/min × m^2 but lower than 9.0 kg/min × m^2, and Type E if the small-scale burning rate is equal to or higher than 2.2 kg/min × m^2.

Class III. Those formulations that burn rapidly and that pose a moderate reactivity hazard.This class comprises of organic peroxide formulations with transport classification Type D with a large-scale burning rate lower than 60 kg/min, those with transport classification Type E with a large-scale burning rate equal to or higher than 10 kg/min but lower than 60 kg/min, those with transport classification Type F with a large-scale burning rate equal to or higher than 10 kg/min, and those with transport classification Type D and Type E if the small-scale burning rate is lower than 0.9 kg/min × m^2, and those with transport classification Type F irrespective of the small scale burning rate.

Class IV. Those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.This class comprises of organic peroxide formulations of transport classification Type E or Type F with a large-scale burning rate lower than 10 kg/min.

Class V. Those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard. This class comprises of organic peroxide formulations of transport classification Type G without additional subsidiary risks.

[F] TABLE 307.1(1) MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIALS POSING A PHYSICAL HAZARD[a, c, i, l, m]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE[b] Solid pounds (cubic feet)	STORAGE[b] Liquid gallons (pounds)	STORAGE[b] Gas (cubic feet at NTP)	USE-CLOSED SYSTEMS[b] Solid pounds (cubic feet)	USE-CLOSED SYSTEMS[b] Liquid gallons (pounds)	USE-CLOSED SYSTEMS[b] Gas (cubic feet at NTP)	USE-OPEN SYSTEMS[b] Solid pounds (cubic feet)	USE-OPEN SYSTEMS[b] Liquid gallons (pounds)
Combustible dust	NA	H-2	See Note o	NA	NA	See Note o	NA	NA	See Note o	NA
Combustible fiber[o]	Loose	H-3	(100)	NA	NA	(100)	NA	NA	(20)	NA
	Baled		(1,000)			(1,000)			(200)	
Combustible liquid[n]	II	H-2 or H-3	NA	120[d, e]	NA	NA	120[d]	NA	NA	30[d]
	IIIA	H-2 or H-3		330[d, e]			330[d]			80[d]
	IIIB	NA		13,200[e, f]			13,200[f]			3,300[f]
Cryogenic flammable	NA	H-2	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Cryogenic inert	NA	NA	NA	NA	NL	NA	NA	NL	NA	NA
Cryogenic oxidizing	NA	H-3	NA	45[d]	NA	NA	45[d]	NA	NA	10[d]
Explosives	Division 1.1	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	Division 1.2	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.3	H-1 or H-2	5[e, g]	(5)[e, g]		1[g]	(1)[g]		1[g]	(1)[g]
	Division 1.4	H-3	50[e, g]	(50)[e, g]		50[g]	(50)[g]		NA	NA
	Division 1.4G	H-3	125[e, k]	NA		NA	NA		NA	NA
	Division 1.5	H-1	1[e, g]	(1)[e, g]		0.25[g]	(0.25)[g]		0.25[g]	(0.25)[g]
	Division 1.6	H-1	1[e, g]	NA		NA	NA		NA	NA
Flammable gas	Gaseous	H-2	NA	NA		NA	NA		NA	NA
	1A and 1B (High BV)[p]				1,000[d, e]			1,000[d, e]		
	1B (Low BV)[p]				162,500[d, e]			162,500[d, e]		
	Liquefied				NA			NA		
	1A and 1B (High BV)[p]			(150)[d, e]			(150)[d, e]			
	1B (Low BV)[p]			(10,000)[d, e]			(10,000)[d, e]			
Flammable liquid[n]	IA	H-2 or H-3	NA	30[d, e]	NA	NA	30[d]	NA	NA	10[d]
	IB and IC			120[d, e]			120[d]			30[d]
Flammable liquid, combination (IA, IB, IC)[n]	NA	H-2 or H-3	NA	120[d, e, h]	NA	NA	120[d, h]	NA	NA	30[d, h]
Flammable solid	NA	H-3	125[d, e]	NA	NA	125[d]	NA	NA	25[d]	NA
Inert gas	Gaseous	NA	NA	NA	NL	NA	NA	NL	NA	NA
	Liquefied	NA	NA	NA	NL	NA	NA	NL	NA	NA
Organic peroxide	~~UD~~ Detonable	H-1	1[e, g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	I	H-2	16 ~~5~~[d, e]	(16 ~~5~~)[d, e]		16 ~~1~~[d]	(16 ~~1~~)[d]		8 ~~1~~[d]	(8 ~~1~~)[d]
	IIA	H-3	100 ~~50~~[d, e]	(100 ~~50~~)[d, e]		100 50[d]	(100 ~~50~~)[d]		20 ~~10~~[d]	(20 ~~10~~)[d]
	IIB	H-3	200[d, e]	(200)[d, e]		200[d]	(200)[d]		50[d]	(50)[d]
	III	H-3	400 ~~125~~[d, e]	(400 ~~125~~)[d, e]		400 ~~125~~[d]	(400 ~~125~~)[d]		100 ~~25~~[d]	(100 ~~25~~)[d]
	IV	NA	NL	NL		NL	NL		NL	NL
	V	NA	NL	NL		NL	NL		NL	NL
Oxidizer	4	H-1	1[g]	(1)[e, g]	NA	0.25[g]	(0.25)[g]	NA	0.25[g]	(0.25)[g]
	3[j]	H-2 or H-3	10[d, e]	(10)[d, e]		2[d]	(2)[d]		2[d]	(2)[d]
	2	H-3	250[d, e]	(250)[d, e]		250[d]	(250)[d]		50[d]	(50)[d]
	1	NA	4,000[e, f]	(4,000)[e, f]		4,000[f]	(4,000)[f]		1,000[f]	(1,000)[f]
Oxidizing gas	Gaseous	H-3	NA	NA	1,500[d, e]	NA	NA	1,500[d,e]	NA	NA
	Liquefied			(150)[d, e]	NA		(150)[d,e]	NA		
Pyrophoric	NA	H-2	4[e, g]	(4)[e, g]	50[e, g]	1[g]	(1)[g]	10[e, g]	0	0
Unstable (reactive)	4	H-1	1[e, g]	(1)[e, g]	10[e, g]	0.25[g]	(0.25)[g]	2[e, g]	0.25[g]	(0.25)[g]

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE			USE-CLOSED SYSTEMS			USE-OPEN SYSTEMS	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
	3	H-1 or H-2	$5^{d, e}$	$(5)^{d, e}$	$50^{d, e}$	1^{d}	$(1)^{d}$	$10^{d, e}$	1^{d}	$(1)^{d}$
	2	H-3	$50^{d, e}$	$(50)^{d, e}$	$750^{d, e}$	50^{d}	$(50)^{d}$	$750^{d, e}$	10^{d}	$(10)^{d}$
	1	NA	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	$5^{d, e}$	$(5)^{d, e}$	NA	5^{d}	$(5)^{d}$	NA	1^{d}	$(1)^{d}$
	2	H-3	$50^{d, e}$	$(50)^{d, e}$		50^{d}	$(50)^{d}$		10^{d}	$(10)^{d}$
	1	NA	NL	NL		NL	NL		NL	NL

For SI: 1 cubic foot = 0.028 m^3, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

NL = Not Limited; NA = Not Applicable; ~~UD = Unclassified Detonable.~~

a. For use of control areas, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the maximum allowable quantity for storage, including applicable increases.

c. For hazardous materials in Group B higher education laboratory occupancies, see Section 428 of this code and Chapter 38 of the *International Fire Code*.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day boxes, gas cabinets, gas rooms or exhausted enclosures or in listed safety cans in accordance with Section 5003.9.10 of the International Fire Code. Where Note d also applies, the increase for both notes shall be applied accumulatively.

f. Quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

g. Allowed only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.

h. Containing not more than the maximum allowable quantity per control area of Class IA, IB or IC flammable liquids.

i . Quantities in parentheses indicate quantity units in parentheses at the head of each column.

j . A maximum quantity of 220 pounds of solid or 22 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment when the storage containers and the manner of storage are approved.

k . Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.

l . For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 5003.1.2 of the International Fire Code.

m . For oxidizers, unstable (reactive) materials, and water-reactive materials stored or displayed in Group M occupancies or stored in Group S occupancies, see Section 414.2.5.1.

n . For flammable and combustible liquid storage in Group M occupancy wholesale and retail sales uses, see Section 414.2.5.2.

o . Where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 414.1.3.

p. “High BV” Category 1B flammable gas has a burning velocity greater than 3.9 inches per second (10 cm/s). "Low BV" Category 1B flammable gas has a burning velocity of 3.9 inches per second (10 cm/s) or less.

[F] 307.3 High-hazard Group H-1.

Buildings and *structures* containing materials that pose a *detonation* hazard shall be classified as Group H-1. Such materials shall include, but not be limited to, the following:

Detonable *pyrophoric* materials

Explosives:

Division 1.1

Division 1.2

Division 1.3

Division 1.4

Division 1.5

Division 1.6

Organic peroxides, ~~unclassified detonable~~ detonable

Oxidizers, Class 4

Unstable (reactive) materials, Class 3 detonable and Class 4

[F] 307.5 High-hazard Group H-3.

Buildings and *structures* containing materials that readily support combustion or that pose a *physical hazard* shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA *flammable or combustible liquids* that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103.4 kPa) or less

Combustible fibers, other than *densely packed baled cotton*, where manufactured, generated or used in such a manner that the concentration and conditions create a fire or *explosion* hazard based on information prepared in accordance with Section 414.1.3

Consumer *fireworks*, 1.4G (Class C, Common)

Cryogenic fluids, oxidizing

Category 1B flammable gases having a burning velocity of 3.9 inches per second (10 cm/s) or less

Flammable solids

Organic peroxides, Class IIA, IIB and III

Oxidizers, Class 2

Oxidizers, Class 3, that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103 kPa) or less

Oxidizing gases

Unstable (reactive) materials, Class 2

Water-reactive materials, Class 2

[F] TABLE 414.5.1 EXPLOSION CONTROL REQUIREMENTS[a, h]

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems[b]
HAZARD CATEGORY			
Combustible dusts[c]	—	Not Required	Required
Cryogenic flammables	—	Not Required	Required
Explosives	Division 1.1	Required	Not Required
	Division 1.2	Required	Not Required
	Division 1.3	Not Required	Required
	Division 1.4[j]	Not Required	Required
	Division 1.5	Required	Not Required
	Division 1.6	Required	Not Required
Flammable gas	Gaseous	Not Required	Required[k]
	Liquefied	Not Required	Required[k]
Flammable liquid	IA[d]	Not Required	Required
	IB[e]	Not Required	Required
Organic peroxides	~~U~~Detonable	Required	Not Permitted
	I	Required	Not Permitted
Oxidizer liquids and solids	4	Required	Not Permitted
Pyrophoric gas	—	Not Required	Required
Unstable (reactive)	4	Required	Not Permitted
	3 Detonable	Required	Not Permitted
	3 Nondetonable	Not Required	Required
Water-reactive liquids and solids	3	Not Required	Required
	2[g]	Not Required	Required

MATERIAL	CLASS	EXPLOSION CONTROL METHODS	
		Barricade construction	Explosion (deflagration) venting or explosion (deflagration) prevention systems
SPECIAL USES			
Acetylene generator rooms	—	Not Required	Required
Electrochemical energy storage system[i]	—	Not Required	Required
Energy storage system[i]	—	Not Required	Required
Grain processing	—	Not Required	Required
Liquefied petroleum gas-distribution facilities	—	Not Required	Required
Where explosion hazards exist[f]	Detonation	Required	Not Permitted
	Deflagration	Not Required	Required

a. See Section 414.1.3.

b. See the International Fire Code.

c. Combustible dusts where manufactured, generated or used in such a manner that the concentration and conditions create a fire or explosion hazard based on information prepared in accordance with Section 104.2.2 of the *International Fire Code*. See definition of "Combustible dust" in Chapter 2.

d. Storage or use.

e. In open use or dispensing.

f. Rooms containing dispensing and use of hazardous materials where an explosive environment can occur because of the characteristics or nature of the hazardous materials or as a result of the dispensing or use process.

g. A method of explosion control shall be provided where Class 2 water-reactive materials can form potentially explosive mixtures.

h. Explosion venting is not required for Group H-5 fabrication areas complying with Section 415.11.1 and the International Fire Code.

i. Where explosion control is required in Section 1207 of the *International Fire Code*.

j. Does not apply to consumer fireworks, Division 1.4G.

k. Not required for Category 1B Flammable Gases having a burning velocity not exceeding 3.9 inches per second (10 cm/s).

[F] TABLE 415.6.5 DETACHED BUILDING REQUIRED

A DETACHED BUILDING IS REQUIRED WHERE THE QUANTITY OF MATERIAL EXCEEDS THAT SPECIFIED HEREIN			
Material	**Class**	**Solids and Liquids (tons)[a, b]**	**Gases (cubic feet)[a, b]**
Explosives	Division 1.1	Maximum Allowable Quantity	Not Applicable
	Division 1.2	Maximum Allowable Quantity	
	Division 1.3	Maximum Allowable Quantity	
	Division 1.4 [e]	Maximum Allowable Quantity	
	Division 1.4[c, e]	1	
	Division 1.5	Maximum Allowable Quantity	
	Division 1.6	Maximum Allowable Quantity	
Oxidizers	Class 4	Maximum Allowable Quantity	Maximum Allowable Quantity
Unstable (reactives) detonable	Class 3 or 4	Maximum Allowable Quantity	Maximum Allowable Quantity
Oxidizer, liquids and solids	Class 3	1,200	Not Applicable
	Class 2	2,000	Not Applicable
Organic peroxides	Detonable	Maximum Allowable Quantity	Not Applicable
	Class I	Maximum Allowable Quantity	Not Applicable
	Class IIA	25[f]	Not Applicable
	Class IIB	40[f]	
	Class III	50[f]	Not Applicable
Unstable (reactives) nondetonable	Class 3	1	2,000
	Class 2	25	10,000
Water reactives	Class 3	1	Not Applicable
	Class 2	25	Not Applicable
Pyrophoric gases[d]	Not Applicable	Not Applicable	2,000

For SI: 1 ton = 906 kg, 1 cubic foot = 0.02832 m^3, 1 pound = 0.454 kg.

a. For materials that are detonable, the distance to other buildings or lot lines shall be in accordance with Section 415.6 of this code or Chapter 56 of the International Fire Code based on trinitrotoluene (TNT) equivalence of the material, whichever is greater.

b. “Maximum Allowable Quantity” means the maximum allowable quantity per control area set forth in Table 307.1(1).

c. Limited to Division 1.4 materials and articles, including articles packaged for shipment, that are not regulated as an explosive under Bureau of Alcohol, Tobacco, Firearms and Explosives (BATF) regulations or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles, provided that the net explosive weight of individual articles does not exceed 1 pound.

d. Detached buildings are not required, for gases in gas rooms that support H-5 fabrication facilities where the gas room is separated from other areas by a fire barrier with a fire-resistance rating of not less than 2 hours and the gas is located in a gas cabinet that is internally sprinklered, equipped with continuous leak detection, automatic shutdown and is not manifolded upstream of pressure controls. Additionally, the gas supply is limited to cylinders that do not exceed 125 pounds (57 kg) water capacity in accordance with 49 CFR 173.192 for Hazard Zone A toxic gases.

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

f. Where different classes of organic peroxides are stored in the same building, the aggregate sum of the ratios of the actual quantity divided by the allowed quantity for each class shall not exceed one.

[F]TABLE 415.11.1.1 QUANTITY LIMITS FOR HAZARDOUS MATERIALS IN A SINGLE FABRICATION AREA IN GROUP H-5[a]

HAZARD CATEGORY		SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP/square foot)
PHYSICAL-HAZARD MATERIALS				
Combustible dust		Note b	Not Applicable	Not Applicable
Combustible fiber	Loose	Note b	Not Applicable	Not Applicable
	Baled	Notes b and c		
Combustible liquid	II	Not Applicable	0.02	Not Applicable
	IIIA		0.04	
	IIIB		Not Limited	
Combination Class	I, II and IIIA		0.08	
Cryogenic gas	Flammable	Not Applicable	Not Applicable	Note d
	Oxidizing			2.5
Explosives		Note b	Note b	Note b
Flammable gas	Gaseous	Not Applicable	Not Applicable	Note d
	Liquefied			Note d
Flammable liquid	IA	Not Applicable	0.005	Not Applicable
	IB		0.05	
	IC		0.05	
Combination Class	IA, IB and IC		0.05	
Combination Class	I, II and IIIA		0.08	
Flammable solid		0.002	Not Applicable	Not Applicable
Organic peroxide	~~Unclassified detonable~~ Detonable	Note b	Note b	Not Applicable
	Class I	Note b	Note b	

HAZARD CATEGORY		SOLIDS (pounds per square foot)	LIQUIDS (gallons per square foot)	GAS (cubic feet @ NTP/square foot)
	Class IIA	0.05	0.0025	
	Class IIB	0.1	0.01	
	Class III	0.2	0.02	
	Class IV	Not Limited	Not Limited	
	Class V	Not Limited	Not Limited	
Oxidizing gas	Gaseous	Not Applicable	Not Applicable	2.5
	Liquefied			2.5
Combination of gaseous and liquefied				2.5
Oxidizer	Class 4	Note b	Note b	Not Applicable
	Class 3	0.006	0.06	
	Class 2	0.006	0.06	
	Class 1	0.006	0.06	
Combination Class	1, 2, 3	0.006	0.06	
Pyrophoric materials		Note b	0.0025	Notes d and e
Unstable (reactive)	Class 4	Note b	Note b	Note b
	Class 3	0.05	0.005	Note b
	Class 2	0.2	0.02	Note b
	Class 1	Not Limited	Not Limited	Not Limited
Water reactive	Class 3	0.02 [f]	0.0025	Not Applicable
	Class 2	0.5	0.05	
	Class 1	Not Limited	Not Limited	
HEALTH-HAZARD MATERIALS				
Corrosives		Not Limited	Not Limited	Not Limited
Highly toxic		Not Limited	Not Limited	Note d
Toxics		Not Limited	Not Limited	Note d

For SI: 1 pound = 0.454 kg, 1 pound per square foot = 4.882 kg/m^2, 1 gallon per square foot = 40.7 L/m^2, 1 cubic foot @ *NTP*/square foot = 0.305 m^3 @ *NTP*/m^2, 1 cubic foot = 0.02832 m^3.

a. Hazardous materials within piping shall not be included in the calculated quantities.

b. Quantity of hazardous materials in a single fabrication shall not exceed the maximum allowable quantities per control area in Tables 307.1(1) and 307.1(2).

c. Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.

d. The aggregate quantity of flammable, pyrophoric, toxic and highly toxic gases shall not exceed the greater of 0.2 cubic feet at *NTP*/square foot or 9,000 cubic feet at *NTP*.

e. The aggregate quantity of pyrophoric gases in the building shall not exceed the amounts set forth in Table 415.6.5.

f. Quantity of Class 3 water-reactive solids in a single tool shall not exceed 1 pound.

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Organic Peroxides: Storage – Guideline for the labour-safe, environment-safe and fire-safe storage of organic peroxides (PGS 8-2021)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: Organic peroxides are hazardous materials with key hazard characteristics of thermal instability, explosivity and flammability with high burning rates. Organic peroxides can undergo self-accelerating decomposition and may result in fire and/or explosion when exposed to heat or when they come in contact with incompatible materials. The decomposition process is further accelerated when the containers are confined. The explosion hazard rating for organic peroxides is determined by the transport type testing in accordance with the UN Recommendations on the Transport of Dangerous Goods, Manual of tests and criteria, and is divided into Type A through G. The transport type testing addresses the explosivity hazard of the organic peroxide and the package size but not the flammability or the burning rate. The flammability aspect of organic peroxide is determined by the burning rate test methods listed in PGS8 Storage Code. Organic peroxides burn vigorously once ignited and the burning rates may be significantly high when compared to that of ordinary flammables. Organic peroxide fires may be characterized by large fire heights, high heat release, high flame temperatures and large amounts of smoke. Given the importance of both the explosivity and high flammability characteristics of organic peroxides, it is very important the storage classification takes into consideration both the transport type and burning rate test results, especially as organic peroxides in storage are stored for long term unlike in transport. An organic peroxide fire can significantly impact the inventory in the storage area, the storage building itself, personnel, nearby property, local community and the environment. The proposed storage classification of organic peroxides is based on both the transport type and the burning rate as shown in the below table (included in Appendix E) and the organic peroxide class definitions are defined accordingly. With the proposed changes, the organic peroxides storage class definitions are defined quantitively as against current qualitative definitions. The proposed storage class definitions harmonize with the definitions in NPFA 400 code and the European organic peroxides codes.

Appendix E is revised as part of this code change proposal, which provides the code official and the code user with the details of organic peroxide classification types, basis for classification, test method references, classification details and classification list of all organic peroxides with composition information included. This information provides the code official and code user the storage classification to be used for a given organic peroxide formulation and how this is determined.

STORAGE CLASSIFICATION OF ORGANIC PEROXIDES

TRANSPORT TYPE	BURNING RATE					
	Large Scale Test (kg/minute)	<10	≥10 and <60	≥60 and <140	≥140 and <300	≥300
	OR					
	Small Scale Test [a] (kg/m^2/minute)	NA	<0.9	≥0.9 and <2.2	≥2.2 and <9.0	≥9.0
B		I	I	I	I	I
C		IIB	IIB	IIB	IIA	I
D		III	III	IIB	IIA	I
E		IV	III	IIB	IIA	IIA
F		IV	III	III	III	III
G		V	V	V	V	V

a. Solid materials shall be tested using the large-scale test. Liquid materials can be tested using either the large-scale te or the small-scale test.

This code change proposal also revises Unclassified Detonable classification name to Detonable. Organic peroxides are classified by transport type A to transport type G. There is no such class called Unclassified Detonable. If an organic peroxide is detonable, then it is classified as transport type A per the UN and DOT organic peroxides definitions. As such, Detonable is an appropriate word to denote such class. This change from Unclassified Detonable to Detonable is made throughout Chapter 62, other chapters and appendices.

This code change proposal also proposes organic peroxide classification Class II is split into two classes: Class IIA and Class IIB, since the range of burn rate for Class II is broad - lower limit is 60 kg/min and upper limit is 300 kg/min. By subdividing the range into Class IIA (burn rates of 140 kg/min to 300 kg/min) and Class IIB (60 kg/min to 140 kg/min) we have two classes with materials similarly classed for transportation (Type C, D, or E) by explosion hazard but are distinguished by their burning rate in the storage class definition. This additional distinction of the storage classification system allows better definition of separation distances versus quantity and other features that reflect the burning behavior of the materials, beyond the explosion hazard concerns identified in the transport type designation. This change is made throughout Chapter 62 and other chapters. Maximum quantities are defined for Class IIA and IIB where required. Footnote is added under the maximum quantities table in Chapter 62 which states that when multiple classes of organic peroxides are stored, the sum of the ratios is used to determine the maximum quantity allowed. So even though the proposal is adding Class IIB quantities, the aggregate of all organic peroxide materials must be considered based on the footnote which is more restrictive than the current code.

The IFC Organic Peroxides Task Group is aware of IFC's intention to align storage classification definitions with GHS classifications in this code cycle as the GHS classification is listed on a safety data sheet of each material and a fire code official can then easily determine the storage classification of that material. In the case of organic peroxides, however, the GHS classification aligns with transport type definitions. The transport type testing, as explained above, addresses only the explosivity hazard of the organic peroxide and not the flammability or the burning rate. This proposal requests that the storage classifications for organic peroxides be as proposed in this code change proposal which is based on both the transport type and the burning rate, and an exception be made for organic peroxides to not align with GHS classifications. The storage classification for all organic peroxides is easily available for a code official as this is now listed in the Appendix E.

If the organic peroxide storage classification definitions are aligned with GHS definitions:

1. 20 organic peroxide formulations which are classified as Class I based on transport type and burning rate will be classified in a less severe hazard class of Class II organic peroxides based on GHS definition.
2. 24 organic peroxide formulations which are classified as Class II (IIA or IIB) based on transport type and burning rate will be classified in a less severe hazard class of Class III organic peroxides based on GHS definition.
3. 27 organic peroxide formulations which are classified as Class III based on transport type and burning rate will be classified in a less severe hazard class of Class IV organic peroxides based on GHS definition.
4. a total of 71 organic peroxide formulations will be classified in a less severe hazard class despite the presence of high burning rate hazard. Classifying the organic peroxide formulation into a less severe hazard class means a code user would be allowed to store increased quantities and/or at a shorter separation distance which will put the code user's storage area, personnel, nearby property, local community and the environment at increased risk in case of a fire.
5. 15 organic peroxide formulations which are classified as Class IV based on transport type and burning rate will be classified in a more severe hazard class of Class III organic peroxides based on GHS definition. These Class IV formulations are those that do not burn at all, or their burning rate is significantly low due to the presence of decompositions products like carbon dioxide, and these will be reclassified to a higher hazard storage class despite their lower hazard.

Therefore, it is strongly requested that an exception be made for organic peroxides to not align with GHS classifications and classify as proposed based on both the burning rate and explosivity hazard.

Bibliography: Safety and Handling of Organic Peroxides - American Chemistry Council

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is to define and update storage classification of organic peroxides based on both the explosivity and flammability hazards. This code change proposal also revises Unclassified Detonable classification name change to Detonable and split Class II into two classes: Class IIA and Class IIB for the reasons stated in reason statement. These changes are made throughout Chapter 62, other chapters and appendices. Appendix E is revised as part of this code change proposal, which provides the code official and the code user with the details of organic peroxide classification types, basis for classification, test method references, classification details and classification list of all organic peroxides with composition information included. The information provided in this proposal helps both the code official and the code user to effectively implement the code. The proposal does not impact the cost of construction.

F270-24

F271-24

IFC: 6306.2, 6306.5 (New), 6306.5, 6306.6, 6306.6.1, 6306.6.2, 6306.7

Proponents: Robert Marshall, San Mateo Consolidated Fire Department, International Association of Fire Chiefs- Fire and Life Safety Section (rmarshall@smcfire.org)

2024 International Fire Code

Revise as follows:

6306.2 Information and instructions to be provided.
The seller of liquid oxygen shall provide the user with information in written form that includes, but is not limited to, the following topics:

1. Manufacturer's instructions and labeling for safe storage and use of the containers.
2. Locating containers away from ignition sources, *exits*, electrical hazards, cooking equipment and other high-temperature devices in accordance with Section 6306.3.3.
3. Restraint of containers to prevent falling in accordance with Section 6306.3.4.
4. Requirements for handling containers in accordance with Section 6306.3.5.
5. Safeguards for refilling containers in accordance with Section 6306.3.6.
6. Signage requirements in accordance with Section ~~6306.6~~ 6306.7.
7. The dangers of smoking while on oxygen
8. The use of thermal fuses provided in accordance with 6306.5

Add new text as follows:

6306.5 Thermal Fuses. Liquid oxygen concentrators and containers used in Group R occupancies shall be provided with a thermal fuse device. Such devices shall be provided by the oxygen seller at the time of installation and any time containers are refilled.

Revise as follows:

~~6306.5~~ 6306.6 Smoking prohibited. Smoking shall be prohibited in rooms or areas where liquid oxygen is in use.

~~6306.6~~ 6306.7 Signs.
Warning signs for occupancies using home health care liquid oxygen shall be in accordance with Sections 6306.6.1 and 6306.6.2.

~~6306.6.1~~ 6306.7.1 No smoking sign. A sign stating "OXYGEN— NO SMOKING" shall be posted in each room or area where liquid oxygen containers are stored, used or filled.

~~6306.6.2~~ 6306.7.2 Premises signage. Where required by the *fire code official*, each *dwelling unit* or *sleeping unit* shall have an *approved* sign indicating that the unit contains liquid oxygen home care containers.

~~6306.7~~ 6306.8 Fire department notification. ~~Where required by the *fire code official*, the liquid~~ Liquid oxygen ~~seller~~ sellers shall notify the fire department of the locations of liquid oxygen home care containers when a new installation is placed, and when the system is removed from a home.

Exception: When explicitly exempted by the fire department.

Reason: NFPA released the report *Fire and Burns Involving Home Medical Oxygen* in which they cite the Consumer Product Safety Commission (CPSC) data listing 1,041 thermal burns, 228 home fires, and 96 fire deaths per year related to home oxygen therapy use, (Hall, 2023). Because not all fire departments report to the National Fire Incident Reporting System (NFIRS), the data suggests this problem to be much more significant and under reported. According to NFPA, emergency room visits involving oxygen related burns were caused by cigarettes 59% of the time compared to the next highest cause of cooking while on oxygen at 18%. In fact, a civilian is killed at one of every three home fires in which oxygen administration equipment is used. Data suggest our home oxygen therapy fire deaths could be as high as 350 people or 12% of the US fire fatalities annually.And the fatalities are not limited to the person on home oxygen, as injuries and fatalities occur with others in the same structure who are not on oxygen.Fires involving home oxygen are a significant risk to the safety of firefighters. Two firefighters die each year fighting home oxygen therapy fires and many more are injured. “The enrichment of normal room air with oxygen increases the energy, heat release and severity of any fire. What can normally be a fairly nonflammable substance can, in the presence of oxygen, burn with vigor and produce noxious fumes very rapidly” (BPR Medical). Five firefighters in Tacoma were injured in a June 2023 fast-moving apartment fire that was later determined to be caused by smoking and home oxygen use.

This problem is not an isolated or rare anomaly. “Around 16 million people have been diagnosed with Chronic Obstructive Lung Disease (COPD) in the US (1 in 8 over the age of 45), with millions more undiagnosed. Of these, an estimated 1.5 million require home oxygen therapy” (American Thoracic Society, 2018). Research shows 1.5 million people are prescribed home oxygen. Of that number, it is estimated 52% still smoke due to the addictive nature of nicotine.

According to CDC WISQARS, in 2020 there were 281,801 fire/burn injuries in the U.S. These injuries cost $3.9 billion ($3,862,650,000) in medical costs, and $41.6 billion ($41,599,370,000) in combined medical/work/life loss costs, (National Center for Injury Prevention and Control, CDC WISQARS accessed on 8/4/2023). It costs $97,971 per day to treat an intubated patient with severe burns at a Trauma and Burn Center. The thermal fuse is a bi-directional valve, meaning it completely shuts off the flow of oxygen – whichever way it is fitted - when exposed to fire. From 2013 – 2018 after mandated implementation in the United Kingdom, only one home fatality has been recorded associated with home oxygen use. The current cost of a thermal fuse is approximately $4.45 per unit and manufacturers recommend a thermal fuse at the oxygen concentrator and at the connection point of the nasal cannula. The thermal fuse is an FDA listed medical device manufactured in the UK with two independent medical supply wholesale companies both competitively listing the device for sale within the US. It is not required to be listed according to UL representatives due to its FDA approval. There currently does not exist another engineering solution to reduce home oxygen therapy fires.

This proposal would:

1. Require thermal fuse devices be provided to a user on the oxygen tubing of all home oxygen installations.

2. Require additional educational information on the dangers of oxygen in homes.3. Clarify that notification of the fire department is required whenever oxygen is being used in a home, rather than making it only if the AHJ requires it. The exception still exists, however, it is now an exception. The current language leads to oxygen providers not checking with the department, and the new language will at least prompt the conversation.The requirements for a thermal fuse device are not intended to be required in an institutional occupancy because of the supervised nature of oxygen use in such occupancies. The educational material requirements would still be required for all occupancies.

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Weighted to reflect population differences: BPR Medical (2019), The prevalence and impact of home oxygen fires in the US, available at: http://www.firebreaks.info/wp-content/uploads/2019/09/BPR-WhitePaper-2019-v6.1.pdf

Cost Impact: Increase

Estimated Immediate Cost Impact:

This is not a construction provision, so there is no cost impact to construction. The device itself costs between $5 and $15 USD.

Estimated Immediate Cost Impact Justification (methodology and variables):

The device itself is going to remain a fixed cost. There may be a labor charge for installation. Currently, these devices are mandated and paid for by the US Veterans Affairs, but not covered by Medicare. Many insurance companies will pay for this device.

F271-24

F272-24

IFC: CHAPTER 63, SECTION 6306, 6306.1, 6306.2, 6306.3, 6306.3.1, 6306.3.2, 6306.3.3, 6306.3.4, 6306.3.5, 6306.3.6, 6306.3.6.1, 6306.3.6.2, 6306.3.6.3, 6306.4, 6306.5, 6306.6, 6306.6.1, 6306.6.2, 6306.7

Proponents: Robert Marshall, San Mateo Consolidated Fire Department, International Association of Fire Chiefs- Fire and Life Safety Section (rmarshall@smcfire.org)

2024 International Fire Code

Revise as follows:

CHAPTER 63 OXIDIZERS, OXIDIZING GASES AND OXIDIZING CRYOGENIC FLUIDS AND RESIDENTIAL OXYGEN USE

SECTION 6306
~~LIQUID~~ RESIDENTIAL OXYGEN USE ~~IN HOME HEALTH CARE~~

6306.1 General.
The storage and use of ~~liquid~~ oxygen ~~(LOX)~~ in residential occupancies and facilities located in Group I-1, I-4 and R occupancies shall comply with Sections 6306.2 through 6306.6, or shall be stored and used in accordance with Chapter 50.

6306.2 Information and instructions to be provided.
The seller of ~~liquid~~ oxygen shall provide the user and facility with information in written form that includes, but is not limited to, the following:

1. Manufacturer's instructions and labeling for safe storage and use of oxygen and the associated containers.
2. Locating containers away from ignition sources, *exits*, electrical hazards, cooking appliances and high-temperature devices in accordance with Section 6306.3.3.
3. Restraint of containers to prevent falling in accordance with Section 6306.3.4.
4. Requirements for handling containers in accordance with Section 6306.3.5.
5. Safeguards for refilling containers in accordance with Section 6306.3.6.
6. Signage requirements in accordance with Section 6306.6.

6306.3 ~~Liquid oxygen~~ Oxygen ~~home care~~ containers.
Compressed Gas Containers and Cryogenic Containers containing oxygen used in home health care settings shall be in accordance with Sections 6306.3.1 through 6306.3.6.3.

6306.3.1 Maximum individual container capacity.
~~Liquid oxygen~~ Oxygen ~~home care~~ containers shall not exceed an individual capacity of 15.8 gallons (60 L) in Group I-1, I-4 and R occupancies. ~~Liquid oxygen~~ Oxygen ~~ambulatory~~ containers intended for ambulatory use are allowed in Group I-1, I-4 and R occupancies. ~~Containers of liquid oxygen in home health care shall also be stored, used and filled in accordance with Section 6306 and Sections 5503.1 and 5503.2.~~

6306.3.2 Manufacturer's instructions and labeling. Compressed gas containers and cryogenic containers shall be stored, used and operated in accordance with the manufacturer's instructions and labeling.

6306.3.3 Locating containers. Compressed gas containers and cryogenic containers shall not be located in areas where any of the following conditions exist:

1. They can be overturned due to operation of a door.
2. They are in the direct path of egress.

3. They are subject to falling objects.
4. They can become part of an electrical circuit.
5. Open flames and high-temperature devices can cause a hazard.

6306.3.4 Restraining containers. ~~Liquid oxygen home care~~Compressed gas containers and cryogenic containers containing oxygen shall be restrained while in storage or use to prevent falling caused by contact, vibration or seismic activity. Containers shall be restrained by one of the following methods:

1. Restraining containers to a fixed object with one or more restraints.
2. Restraining containers within a framework, stand or assembly designed to secure the container.
3. ~~Restraining containers by locating a container against two points of contact such as the walls of a corner of a room or a wall and a secure furnishing or object such as a desk.~~
3. Nesting of compressed gas containers or cryogenic containers where, if dislodged, do not obstruct the required means of egress.

6306.3.5 Container handling. Containers shall be handled by use of a cart or hand truck designed for such use.

Exceptions:

1. ~~Liquid oxygen home care containers~~ Containers equipped with a roller base.
2. ~~Liquid oxygen ambulatory containers~~ Containers for ambulatory use are allowed to be hand carried.

6306.3.6 Filling of containers.

The filling of oxygen containers shall be in accordance with Sections 6306.3.6.1 through 6306.3.6.3.

6306.3.6.1 Filling location. ~~Liquid oxygen~~ Oxygen ~~home care~~ containers ~~and ambulatory containers~~ shall be filled outdoors.

Exception: ~~Liquid oxygen ambulatory containers~~ Containers are allowed to be filled indoors where the supply container is specifically designed for filling such containers and written instructions are provided by the container manufacturer.

6306.3.6.2 Incompatible surfaces. A drip pan compatible with liquid oxygen shall be provided under ~~home care~~ container fill and vent connections during the filling process in order to protect against ~~liquid oxygen~~ spillage from coming into contact with combustible surfaces, including asphalt.

6306.3.6.3 Open flames and high-temperature devices.

The use of open flames and high-temperature devices during filling shall ~~be in accordance~~ comply with Section 5003.7.2.

6306.4 Maximum aggregate quantity.

The maximum aggregate quantity ~~of liquid~~ oxygen allowed in storage and in use in each *dwelling unit* shall be ~~31.6 gallons (120 L).~~ as follows:

1. 31.6 gallons (120 L) liquid oxygen.
2. 3650 CF (103.35 m3) oxygen gas.
3. Where 1-hour fire barriers and horizontal assemblies installed in accordance with the *International Building Code* separate individual sleeping rooms within a dwelling unit, the quantities in items 1 or 2 shall be permitted to be applied per sleeping room.

Exception~~s~~:

~~1.~~ The maximum aggregate quantity of liquid oxygen allowed in Group I-4 occupancies shall be limited by the maximum allowable quantity set forth in Table 5003.1.1(1).

2. ~~Where individual sleeping rooms are separated from the remainder of the *dwelling unit* by *fire barriers* constructed in accordance with Section 707 of the International Building Code, and *horizontal assemblies* constructed in accordance with Section 711 of the International Building Code, or both, having a minimum *fire-resistance rating* of 1 hour, the maximum aggregate quantity per *dwelling unit* shall be increased to allow not more than 31.6 gallons (120 L) of liquid oxygen per sleeping room.~~

6306.5 Smoking prohibited. Smoking shall be prohibited in rooms or areas where ~~liquid~~ oxygen is in use.

6306.6 Signs.
Warning signs for occupancies using ~~home health care liquid~~ oxygen shall be in accordance with Sections 6306.6.1 and 6306.6.2.

6306.6.1 No smoking sign. A sign stating "OXYGEN— NO SMOKING" shall be posted in each room or area where ~~liquid~~ oxygen containers are stored, used or filled.

6306.6.2 Premises signage. Where required by the *fire code official*, each *dwelling unit* or *sleeping unit* shall have an *approved* sign indicating that the unit contains ~~liquid~~ oxygen ~~home care~~ containers.

6306.7 Fire department notification. Where required by the *fire code official*, the ~~liquid~~ oxygen seller shall notify the fire department of the locations of ~~liquid~~ oxygen ~~home care~~ containers.

Reason: NFPA released the report *Fire and Burns Involving Home Medical Oxygen* in which they cite the Consumer Product Safety Commission (CPSC) data listing 1,041 thermal burns, 228 home fires, and 96 fire deaths per year related to home oxygen therapy use, (Hall, 2023). Because not all fire departments report to the National Fire Incident Reporting System (NFIRS), the data suggests this problem to be much more significant and under reported. According to NFPA, emergency room visits involving oxygen related burns were caused by cigarettes 59% of the time compared to the next highest cause of cooking while on oxygen at 18%. In fact, a civilian is killed at one of every three home fires in which oxygen administration equipment is used. Data suggests our home oxygen therapy fire deaths could be as high as 350 people or 12% of the US fire fatalities annually.

Fires involving home oxygen are a significant risk to the safety of firefighters. A fire in June of 2023 injured 2 residents and 5 firefighters in Tacoma, Washington after a resident on home oxygen lit a cigarette. (The News Tribune). Unfortunately, incidents such as this are not rare. Talk to almost any firefighter, and they will tell you a story in which a fire or burn injury occurred as the result of home oxygen use.

The NFPA report and NFIRS data does not differentiate between liquid oxygen and gaseous oxygen, yet the fire code only addresses liquid oxygen use. In practice, both liquid oxygen and gaseous oxygen is prescribed for use in patients needing supplemental oxygen therapy.

This proposal seeks to remove all references to liquid oxygen, clarifying that the safety requirements for use of oxygen in residential occupancies apply no matter what kind of oxygen a patient in a residential setting may be on.

6306.4 added a quantity for gaseous oxygen. The quantity for liquid oxygen is in the existing language, and the quantity for the gaseous oxygen matches the quantity of liquid oxygen in a gas form. The proposal purposely does not restrict the quantity to one or the other since a patient will only be on one form at any given time, and the oxygen tubing attached to the patient is usually the cause of ignition of the fire.

Bibliography: Hall, Shelby, 2023. Fires and Burns Involving Home Medical Oxygen. Accessed 1/8/24 at https://www.nfpa.org/education-and-research/research/nfpa-research/fire-statistical-reports/fires-and-burns-involving-home-medical-oxygen

The News Tribune- https://www.thenewstribune.com/news/local/article276149236.html

Cost Impact: Increase

Estimated Immediate Cost Impact:

This is not a construction issue. That said, clarifying that the regulation extends to all use of home oxygen regardless of whether the oxygen is in a liquid or gas form. While many oxygen providers comply with these requirements, the increased printing costs of the safety materials would be the only cost, as the safety regulations are largely adhered to by providers already. This could result in a price increase of around $1.00.

Estimated Immediate Cost Impact Justification (methodology and variables):

None

F272-24

F273-24

IFC: B103.2.1 (New), B103.2.2 (New), B103.2.3 (New)

Proponents: Robert Neale, Integra Code Consultants, Self (rneale1951@outlook.com)

2024 International Fire Code

Add new text as follows:

B103.2.1 Increases based on occupancy.. The required fire flow for any building with a Group M, F-1, H or S-1 fire area shall be increased by not less than 500 gpm (1893 L/m) above the value derived from Table B105.2.

B103.2.2 Increases based on fire separation distance.. The required fire flow for any building having one or more exterior walls within a fire separation distance of less than 30 feet (9144 mm) shall increase the fire flow not less than 250 gpm (948 L/m) above the value derived from Table B105.2 for each wall within the fire separation distance of less than 30 feet (9144 mm).

B103.2.3 Aggregated Values.. The values derived from Sections B103.2.1 and B103.2.2 shall be aggregated.

Reason: The fire flow values in IFC Table B105.1(2) do not include values for two important fire protection considerations: contents' combustibility and exposure protection.

For example, using Table B105.1(2) for a sample one-story Type IIB non-sprinklered building measuring 38,000 sq. ft. requires a fire flow value of 4,250 gpm for four hours. By installing an approved fire sprinkler system, that value can be reduced to 1,062.5 gpm for two hours. There is no consideration for building contents or exposures.

In this scenario, the proposed building would be assess the same fire flow value whether it stored steel or concrete pipe products or combustible wood, paper or plastic products. The proposed 500 gpm increase for any building having a Group M, F-1, H or S-1 fire area acknowledges these occupancies are "moderate" or "high" hazard occupancies that may require more water application for suppression than a light hazard occupancy. The language is written to allow the code official to increase the fire flow for these fire areas whether the building has only one or multiple fire areas of those occupancy classifications.

Similarly, the proposed increase based on fire separation distances recognizes the need for exposure protection in the event the subject building threatens one or more adjacent properties. The fire separation distance standard is selected to align with the Building Code distances.

Finally, the proposed Section B103.2.3 "Aggregated values" is to clarify for the code official that content combustibility and exposure protection both must be considered.

Cost Impact: Increase

Estimated Immediate Cost Impact:

This proposal may increase the cost of construction where existing infrastructure (fire protection water storage and distribution) is inadequate to support the adjusted Table B103.5(2) values. Water mains may have to be upsized to accommodate increased volumes.

The following table compares estimated* retail prices for the two most commonly used water main products: PVC C-900 and ductile iron.

Size (in)	C-900	DI
4	$ 1.88	$ 9.00
6	$ 3.00	$14.74
8	$ 6.30	$18.38
10	$ 9.59	$ 23.75
12	$ 13.51	$ 30.43
14	$ 17.51	$ 40.30

Size (in)	C-900	DI
16	$ 24.06	$ 50.17

Avg. price comparisons (linear foot) C-900 vs. ductile iron based on pipe size.

Estimated Immediate Cost Impact Justification (methodology and variables):

A web search of 27 retail outlets in 14 states using the search term "C-900 v. DI unit price" provided the price per linear foot data. The data do not include sunk costs of excavation, installation and testing that would be required regardless of pipe size.

F273-24

F274-24

IFC: D105.1

Proponents: Edward Lisinski, American Wood Council (elisinski@awc.org)

2024 International Fire Code

Revise as follows:

D105.1 Where required.
Where the vertical distance between the *grade plane* and the highest roof surface exceeds 30 feet (9144 mm), *approved* aerial fire apparatus access roads shall be provided. For purposes of this section, the highest roof surface shall be determined by measurement to the eave of a pitched roof, the intersection of the roof to the *exterior wall*, or the top of parapet walls, whichever is greater.

> **Exception:** Where *approved* by the *fire code official*, buildings of Type IA, Type IB, ~~or~~ Type IIA, Type IV-A, or Type IV-B construction equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and having firefighter access through an enclosed *stairway* with a Class I standpipe from the lowest level of fire department vehicle access to all roof surfaces.

Reason: This exception to Section D105.1 was added in the 2021 IFC by proposal F324-18. Per that reason statement, Fire Department Aerial Apparatus Access is rarely needed in these taller buildings which are equipped with an automatic sprinkler system in accordance with NFPA 13 and has fire department access through an enclosed stair with a Type I standpipe system from the lowest level of fire department access to all roof surfaces. Firefighting operations, including ventilation, can be achieved through the interior of these buildings using the enclosed stairs as a means of egress from the hazard area. The requirement for a Class I standpipe is for fire suppression and firefighter protection when operating hose lines at the roof or at a lower floor level.

These same principles and techniques to fight a fire in a taller Type I or II building could also be applied to a taller Type IV building. Because the exception of Section D105.1 was new in the 2021 IFC, it was not addressed by the ICC Ad Hoc Committee on Tall Wood Buildings in their code package for the 2021 IFC. Use of this exception requires the approval of the fire code official.

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00 minimally but there could be a cost decrease for some buildings.

Estimated Immediate Cost Impact Justification (methodology and variables):

This proposal creates an exception for the use of narrower streets with taller Type IV buildings. This means that an existing narrow street would not have to be widened if a Type IV building is being constructed on it. Providing additional construction type options could lower the cost of construction.

F274-24

F275-24

IFC: TABLE E104.2

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org); Lynne Kilpatrick, HMEx Assistant LLC, self (lynne.kilpatrick@hmexassistant.com)

2024 International Fire Code

Revise as follows:

TABLE E104.2 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	
Aerosol	—	A combination of a container, a propellant and a material that is dispensed. Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated Level 1, Level 2 or Level 3.	Any nonrefillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state.	
Aerosol	Level 1	Those with a total chemical heat of combustion that is less than or equal to 8,600 Btu/lb (20 kJ/g).	H223, Category 3; ~~Pressurized container: May burst if heated.~~ 1. Any aerosol that contains ≤ 1% flammable components (by mass) and that has a heat of combustion < 20 kJ/g. 2. Any aerosol that contains > 1% (by mass) flammable components or which has a heat of combustion of ≥ 20 kJ/g but which, based on the results of the ignition distance test, the enclosed space ignition test or the aerosol foam flammability test, does not meet the criteria for Category 1 or Category 2. and H229; Pressurized container: May burst if heated	

Aerosol	Level 2	Those with a total chemical heat of combustion that is less than or equal to 8,600 Btu/lb (20 kJ/g).	H223, Category 2; Flammable aerosol~~. Pressurized container: May burst if heated~~: 1. Any aerosol that dispenses a spray that, based on the results of the ignition distance test, does not meet the criteria for Category 1, and which has: a. A heat of combustion of ≥ 20 kJ/g. b. A heat of combustion of < 20 kJ/g along with an ignition distance of ≥ 15 cm; or c. A heat of combustion of < 20 kJ/g and an ignition distance of < 15 cm along with either, in the enclosed space ignition test a time: i. A time equivalent of ≤ 300 s/m^3; or ii. A deflagration density of ≤ 300 g/m^3; or 2. Any aerosol that dispenses a foam that, based on the results of the aerosol foam flammability test, does not meet the criteria for Category 1, and which has a flame height of ≥ 4 cm and a flame duration of ≥ 2 s. and H229; Pressurized container: May burst if heated	

Aerosol	Level 3	Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb (30 kJ/g).	H222, Category 1; Extremely flammable aerosol~~. Pressurized container: May burst if heated~~: 1. Any aerosol that contains ≥ 85% flammable components (by mass) and has a heat of combustion of ≥ 30 kJ/g. 2. Any aerosol that dispenses a spray that, in the ignition distance test, has an ignition distance of ≥ 75 cm. 3. Any aerosol that dispenses a foam that, in the foam flammability test, has: a. A flame height of ≥ 20 cm and a flame duration of ≥ 2 s. b. A flame height of ≥ 4 cm and a flame duration of ≥ 7 s. and H229; Pressurized container: May burst if heated	
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	
Combustible liquid	IIIA	Liquids having a closed cup flash point at or above 140°F (60°C) and below 200°F (93°C).	H227, Category 4; Combustible liquid: Flash point > 60°C and ≤ 93°C	
Combustible liquid	IIIB	Liquids having closed cup flash points at or above 200°F (93°C).	N/A	
Compressed gas	—	A material or mixture of materials that: 1. Is a gas at 68°F (20°C) or less at 14.7 psia (101 kPa) of pressure, and 2. Has a boiling point of 68°F (20°C) or less at 14.7 psia (101 kPa) which is either liquefied, nonliquefied or in solution, except those gases that have no other health- or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68°F (20°C). States of compressed gases: 1. Nonliquefied compressed gases are gases, other than those in solution, that are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C). 2. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C). 3. Compressed gases in solution are nonliquefied gases that are dissolved in a solvent. 4. Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.	Gases under pressure are gases which are contained in a receptacle at a pressure of 200 kPa (gauge) or more at 20°C, or which are liquefied, or liquefied and refrigerated. H280, Compressed gas; Contains gas under pressure: May explode if heated. A gas which when under pressure is entirely gaseous at -50°C (-58°F), including all gases with a critical temperature ≤ -50°C (-58°F). H280, Liquefied gas; Contains gas under pressure: May explode if heated. A gas which when under pressure is partially liquid at temperatures above -50°C (-58°F). H280, Dissolved gas; Contains gas under pressure: May explode if heated. A gas which when under pressure is dissolved in a liquid phase solvent.	
Corrosive	—	A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method described in DOTn 49 CFR 173.137, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.	H314, Category 1 (1A, 1B, 1C); Causes severe skin burns and eye damage. Skin corrosion refers to the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis occurring after exposure to a substance or mixture, or H318, Category 1; Causes serious eye damage: Serious eye damage refers to the production of tissue damage in the eye, or serious physical decay of vision, which is not fully reversible, occurring after exposure of the yed to the substance or mixture.	
Cryogenic fluid	—	A fluid having a boiling point lower than -130°F (-89.9°C) at 14.7 pounds per square inch atmosphere (psia) (an absolute pressure of 101.3 kPa).	H281, Refrigerated liquefied gas; Contains refrigerated gas: May cause cryogenic burns or injury. A gas which is made partially liquid because of its low temperature.	

Cryogenic fluid, flammable	—	A cryogenic fluid that is flammable in its vapor state.	H220, Category 1A; Extremely flammable gas. Gases, which at 20° C and a standard pressure of 101.3 kPa: 1. Are ignitable when in a mixture of 13% or less by volume in air; or 2. Have a flammable range with air of at least 12 percentage points, regardless of the lower flammability limit unless data show they meet the criteria for Category 1B. Category 1A includes pyrophoric gases and chemically unstable gases~~.~~, or H221, Category 1B; Flammable gas: Gases which meet the flammability criteria for Category 1A, but which are not pyrophoric, nor chemically unstable, and which have at least either: a lower flammability limit of more than 6% by volume in air; or (b) a fundamental burning velocity of less than 10 cm/s and H281, refrigerated liquefied gas~~, would also apply.~~	
Cryogenic fluid,~~—~~Inert	—	A cryogenic fluid that is inert.	H281, Refrigerated liquefied gas. Contains refrigerated gas: May cause cryogenic burns or injury. A gas which is made partially liquid because of its low temperature.	
Cryogenic fluid, Oxidizing	—	An oxidizing gas in the cryogenic state.	H270, Category 1: May cause or intensify fire; oxidizer. Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. and H281, refrigerated liquefied gas~~, would also apply.~~	
Explosives	—	A chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord and igniters. The term “Explosive” includes any material determined to be within the scope of USC Title 18: Ch. 40 and also includes any material classified as an explosive other than consumer fireworks, Division 1.4G Explosives, by the hazardous materials regulations of DOTn 49 CFR Parts 100–185.	An explosive substance (or mixture) is a solid or liquid substance (or mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases.	
Explosives	Unstable explosives		H200; Unstable explosive. Unstable explosives are those which are thermally unstable and/or too sensitive for normal handling, transport and use. Special precautions are necessary.	
Explosives	Division 1.1	Explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.	H201; Explosive; mass explosion hazard. Substances, mixtures and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire quantity present virtually instantaneously).	
Explosives	Division 1.2	Explosives that have a projection hazard but not a mass explosion hazard.	H202; Explosive; severe projection hazard. Substances, mixtures and articles which have a projection hazard but not a mass explosion hazard.	
Explosives	Division 1.3	Explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.	H203; Explosive; fire, blast or projection hazard. Substances, mixtures and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard: 1. Combustion of which gives rise to considerable radiant heat; or 2. Which burn one after another, producing minor blast or projection effects or both.	
Explosives	Division 1.4	Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.	H204; Fire or projection hazard: Substances, mixtures and articles which present no significant hazard; substances, mixtures and articles which present only a small hazard in the event of ignition or initiation. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package.	
Explosives	Division 1.4G	Small fireworks devices containing restricted amounts of pyrotechnic composition designed primarily to produce visual or audible effects by combustion or deflagration that complies with the construction, chemical composition and labeling regulations of the DOTn for fireworks, UN No. 0336 and the US Consumer Product Safety Commission as set forth in CPSC 16 CFR Parts 1500 and 1507.	N/A	

Explosives	Division 1.5	Very insensitive explosives. This division is comprised of substances that have a mass explosion hazard but which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.	H205; May mass explode in fire. Very insensitive substances or mixtures which have a mass explosion hazard: substances and mixtures which have a mass explosion hazard but are so insensitive that there is very little probability or initiation or of transition from burning to detonation under normal conditions.	
Explosives	Division 1.6	Extremely insensitive articles that do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substances and that demonstrate a negligible probability of accidental initiation or propagation.	Extremely insensitive articles which do not have a mass explosion hazard: articles which predominantly contain extremely insensitive substances or mixtures and which demonstrate a negligible probability of accidental initiation or propagation.	
Flammable gas	Gaseous or Liquefied	A material that is a gas at 68°F (20°C) or less at 14.7 psia (101 kPa) of pressure [a material that has a boiling point of 68°F (20°C) or less at 14.7 psia (101 kPa)] ~~which:~~subdivided as follows: 1. Category 1A. a. A gas which ~~i~~s ignitable at 14.7 psia (101 kPa) when in a mixture of 13% or less by volume with air; or ~~2~~ b. ~~Has~~ A gas with a flammable range at 14.7 psia (101 kPa) 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: a. A lower flammability limit of more than 6% by volume of air; or b. A fundamental burning velocity of less than 3.9 in/s (10 cm/s). The limits specified shall be determined at 14.7 psia (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E681. Where not otherwise specified, the term "flammable gas" includes both Category 1A and 1B.	A flammable gas is a gas having a flammable range with air at 20°C and a standard pressure of 101.3 kPa. H220, Category 1A; Extremely flammable gas. Gases, which at 20°C and a standard pressure of 101.3 kPa: 1. Are ignitable when in a mixture of 13% or less by volume in air; or 2. Have a flammable range with air of at least 12 percentage points regardless of the lower flammability limit unless data show they meet the criteria for Category 1B. Category 1A includes pyrophoric gases and chemically unstable gases. H22~~0~~1, Category 1B; Flammable gas. Gases which meet the flammability criteria for Category 1A, but which are not pyrophoric nor chemically unstable, and which have at least either: 1. A lower flammability limit of more than 6% by volume in air; or 2. A fundamental burning velocity of less than 10 cm/s. and H280 or H281~~, compressed gas, would also apply.~~	
Flammable liquid	—	A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:	A liquid having a flash point of not more than 93°C. A flammable liquid is classified in one of the four categories for this class.	
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	

Flammable solid	—	A solid, other than a blasting agent or explosive, that is capable of causing fire through friction, absorption of moisture, spontaneous chemical change or retaining heat from manufacturing or processing, or which has an ignition temperature below 212°F (100°C) or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid, as determined in accordance with the test method of CPSC 16 CFR Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than 0.0866 inch (2.2 mm) per second along its major axis.	A flammable solid is a solid which is readily combustible, or may cause or contribute to fire through friction. A flammable solid is classified in one of the two categories for this class using method N.1 as described in Part III, subsection 33.2.1 of the Manual of Tests and Criteria, according to: H228, Category 1; Flammable solid: Burning rate test: Substances or mixtures other than metal powders: 1. Wetted zone does not stop fire; and 2. Burning time < 45 s or burning rate > 2.2 mm/s. Metal powders: burning time ≤ 5 min H228, Category 2; Flammable solid: Burning rate test: Substances or mixtures other than metal powders: 1. Wetted zone stops the fire for at least 4 min; and 2. Burning time < 45 s or burning rate > 2.2 mm/s. Metal powders: burning time > 5 min and ≤ 10 min	
Highly toxic	—	A material that produces a lethal dose or lethal concentration that falls within any of the following categories: 1. A chemical that has a median lethal dose (LD50) of 50 mg or less per kg of body weight when administered orally to albino rats weighing between 200 and 300 g each. 2. A chemical that has a medial lethal dose (LD50) of 200 mg or less per kg of body weight when administered by continuous contact for 24 hr (or less if death occurs within 24 hr) with the bare skin of albino rabbits weighing between 2 and 3 kg each. 3. A chemical that has a median lethal concentration (LC50) in air of 200 ppm by volume or less of gas or vapor, or 2 mg/l or less of mist, fume or dust, when administered by continuous inhalation for 1 hr (or less if death occurs within 1 hr) to albino rats weighing between 200 and 300 g.	Acute toxicity refers to serious adverse health effects (i.e., lethality) occurring after a single or short-term oral, dermal or inhalation exposure to a substance or mixture. Oral H300, Category 1; Fatal if swallowed: LD50 ≤ 5 mg/kg bodyweight H300, Category 2; Fatal if swallowed: LD50 > 5 ≤ 50 mg/kg bodyweight Dermal H310, Category 1; Fatal in contact with skin: LD50 ≤ 50 mg/kg bodyweight H310, Category 2; Fatal in contact with skin: LD50 > 50 ≤ 200 mg/kg bodyweight Inhalation H330, Category 1; Fatal if inhaled. Gases: LC50 ≤ 100 ppm (4 hr) ≈ 200 ppm (1 hr) Vapors: LC50 ≤ 0.5 mg/l (4 hr) ≈ 2 mg/l (1 hr) Dust/mist: LC50 ≤ 0.05 mg/l (4 hr) ≈ 0.2 mg/l (1 hr) H330, Category 2; Fatal if inhaled: Dust/mist: LC50 > 0.05 mg/l (4 hr) ≈ 0.2 mg/l (1 hr) ≤ 0.5 mg/l (4 hr) ≈ 2 mg/l (1 hr)	
Inert gas	—	A gas that is capable of reacting with other materials only under abnormal conditions such as high temperatures, pressures and similar extrinsic physical forces. Within the context of the code, inert gases do not exhibit either physical or health hazard properties as defined (other than acting as a simple asphyxiant) or hazard properties other than those of a compressed gas. Some of the more common inert gases include argon, helium, krypton, neon, nitrogen and xenon.	Gases under pressure are gases which are contained in receptacles at a pressure of 200 kPa (gauge) or more at 20°C or which are liquefied or liquefied and refrigerated. They comprise compressed gases, liquefied gases, dissolved gases and refrigerated liquefied gases. See the description of “Compressed gas.”	
Organic peroxide	—	An organic compound that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. Organic peroxides can present an explosion hazard (detonation or deflagration) or they can be shock sensitive. They can also decompose into various unstable compounds over an extended period of time.	Organic peroxides are liquid or solid organic substances which contain the bivalent -O-O- structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. The term also includes organic peroxide formulations (mixtures). Organic peroxides are thermally unstable substances or mixtures, which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties: 1. Be liable to explosive decomposition. 2. Burn rapidly. 3. Be sensitive to impact or friction. 4. React dangerously with other substances.	

Organic peroxide	UD	Organic peroxides that are capable of detonation. These peroxides pose an extremely high-explosion hazard through rapid explosive decomposition.	H240, Organic peroxide, Type A; Heating may cause an explosion. Any organic peroxide which, as packaged, can detonate or deflagrate rapidly will be defined as organic peroxide Type A.	
Organic peroxide	I	Describes those formulations that are capable of deflagration but not detonation.	H241, Organic peroxide, Type B; Heating may cause a fire or explosion. Any organic peroxide possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly but is liable to undergo a thermal explosion in that package will be defined as organic peroxide Type B.	
Organic peroxide	II	Describes those formulations that burn very rapidly and that pose a moderate reactivity hazard.	H242, Organic peroxide, Type C; Heating may cause a fire. Any organic peroxide possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion will be defined as organic peroxide Type C. H242, Organic peroxide, Type D; Heating may cause a fire. Any organic peroxide which in laboratory testing: Detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or Does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or Does not detonate or deflagrate at all and shows a medium effect when heated under confinement; will be defined as organic peroxide Type D.	
Organic peroxide	III	Describes those formulations that burn rapidly and that pose a moderate reactivity hazard.	H242, Organic peroxide, Type E; Heating may cause a fire. Any organic peroxide which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement will be defined as organic peroxide Type E.	
Organic peroxide	IV	Describes those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.	H242, Organic peroxide, Type F; Heating may cause a fire. Any organic peroxide which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power will be defined as organic peroxide Type F.	
Organic peroxide	V	Describes those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.	Organic peroxide, Type G. Any organic peroxide which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60°C or higher for a 50 kg package), and for liquid mixtures, a diluent having a boiling point of not less than 150°C and used for desensitization will be defined as organic peroxide Type G. If the organic peroxide is not thermally stable or is a diluent having a boiling point less than 150°C and is used for desensitization, it shall be defined as organic peroxide Type F.	
Oxidizer	—	A material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials and, if heated or contaminated, can result in vigorous self-sustained decomposition.	An oxidizing solid is a solid which, while in itself is not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material. An oxidizing liquid is a liquid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.	
Oxidizer	4	An oxidizer that can undergo an explosive reaction due to contamination or exposure to a thermal or physical shock that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.	H271, Category 1; May cause fire or explosion; strong oxidizer. Criteria for solids (based on Test O.1 or O.3 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Test O.1—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture (by mass) of potassium bromate and cellulose. Test O.3—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate greater than the mean burning rate of a 3:1 mixture (by mass) of calcium peroxide and cellulose. Criteria for liquids (based on Test O.2 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Any substance or mixture which, in the 1:1 mixture (by mass) of substance (or mixture) and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture (by mass) of substance and cellulose is less than that of a 1:1 mixture (by mass) of 50% perchloric acid and cellulose.	

Oxidizer	3	An oxidizer that causes a severe increase in the burning rate of combustible materials with which it comes in contact.	H271, Category 1; May cause fire or explosion; strong oxidizer. Criteria for solids (based on Test O.1 or O.3 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Test O.1—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture (by mass) of potassium bromate and cellulose. Test O.3—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate greater than the mean burning rate of a 3:1 mixture (by mass) of calcium peroxide and cellulose. Criteria for liquids (based on Test O.2 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Any substance or mixture which, in the 1:1 mixture (by mass) of substance (or mixture) and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture (by mass) of substance and cellulose is less than that of a 1:1 mixture (by mass) of 50% perchloric acid and cellulose.	
Oxidizer	2	An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.	H272, Category 2; May intensify fire; oxidizer. Criteria for solids (based on Test O.1 or O.3 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Test O.1—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for Category 1 are not met. Test O.3—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:1 mixture (by mass) of calcium peroxide and cellulose and the criteria for Category 1 are not met. Criteria for liquids (based on Test O.2 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Any substance or mixture which, in the 1:1 mixture (by mass) of substance (or mixture) and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture (by mass) of a 40% aqueous sodium chlorate solution and cellulose and the criteria for Category 1 are not met.	
Oxidizer	1	An oxidizer that does not moderately increase the burning rate of combustible materials.	H272, Category 3; May intensify fire; oxidizer: Criteria for solids (based on Test O.1 or O.3 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Test O.1—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for Categories 1 and 2 are not met. Test O.3—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose and the criteria for Categories 1 and 2 are not met. Criteria for liquids (based on Test O.2 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Any substance or mixture which, in the 1:1 mixture (by mass) of substance (or mixture) and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture (by mass) of a 65% aqueous nitric acid solution and cellulose and the criteria for Categories 1 and 2 are not met.	
Oxidizing gas	Gaseous <u>or</u> <u>Liquefied</u>	A gas that can support and accelerate combustion of other materials more than air does.	Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. H270, Category 1; May cause or intensify fire; oxidizer: Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. <u>and</u> H280 or H281~~, compressed gas would also apply.~~	
~~Oxidizing gas~~	~~Liquified~~	~~An oxidizing gas that is liquefied [liquefied gases are gases that, in a packaging under the charged pressure, are partially liquid at 68°F (20°C)].~~	~~Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does.~~ ~~H270, Category 1; May cause or intensify fire; oxidizer. Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. H280, liquefied gas, would also apply.~~	

Pyrophoric	—	A chemical with an autoignition temperature in air, at or below a temperature of 130°F (54°C).	Separate definitions based on physical state; see each category of pyrophoric:	
Pyrophoric	Solid	A solid with an autoignition temperature in air, at or below a temperature of 130°F (54°C).	H250, Category 1; Pyrophoric solid; Catches fire spontaneously if exposed to air. A pyrophoric solid is a solid which, even in small quantities, is liable to ignite within 5 minutes after coming into contact with air. Classification criteria: The solid ignites within 5 minutes of coming into contact with air.	
Pyrophoric	Liquid	A liquid with an autoignition temperature in air, at or below a temperature of 130°F (54°C).	H250, Category 1; Pyrophoric liquid; Catches fire spontaneously if exposed to air: A pyrophoric liquid is a liquid which, even in small quantities, is liable to ignite within 5 minutes after coming into contact with air. Classification criteria: The liquid ignites within 5 minutes when added to an inert carrier and exposed to air, or it ignites or chars a filter paper on contact with air within 5 minutes. Testing is performed at 25 ±2°C and 50 ±5% relative humidity.	
Pyrophoric	Gas	A gas with an autoignition temperature in air, at or below a temperature of 130°F (54°C).	H220, Category 1A; Extremely flammable gas. May ignite spontaneously if exposed to air: A pyrophoric gas is a flammable gas that is liable to ignite spontaneously in air at a temperature of 54°C or below. and H280 or H281~~, compressed (or liquefied) gas, would also apply.~~	
Toxic	—	A chemical falling within any of the following categories: 1. A chemical that has a median lethal dose (LD50) of more than 50 mg per kg, but not more than 500 mg per kg of body weight when administered orally to albino rats weighing between 200 and 300 g each. 2. A chemical that has a medial lethal dose (LD50) of more than 200 mg per kg but not more than 1,000 mg per kg of body weight when administered by continuous contact for 24 hr (or less if death occurs within 24 hr) with the bare skin of albino rabbits weighing between 2 and 3 kg each. 3. A chemical that has a median lethal concentration (LC50) in air of more than 200 ppm but not more than 2,000 ppm by volume or less of gas or vapor, or more than 2 mg/l but not more than 20 mg/l of mist, fume or dust, when administered by continuous inhalation for 1 hr (or less if death occurs within 1 hr) to albino rats weighing between 200 and 300 g	Acute toxicity refers to serious adverse health effects (i.e., lethality) occurring after a single or short-term oral, dermal or inhalation exposure to a substance or mixture. Oral H301, Category 3; Toxic if swallowed: LD50 > 50 ≤ 300 mg/kg bodyweight H302, Category 4; Harmful if swallowed: LD50 > 300 ≤ 2,000 mg/kg bodyweight Dermal H311, Category 3, Toxic in contact with skin: LD50 > 200 ≤ 1,000 mg/kg bodyweight Inhalation H330, Category 2; Fatal if inhaled: Gases: LC50 > 100 ppm (4 hr) ≈ 200 ppm (1 hr) ≤ 500 ppm (4 hr) ≈ 1,000 ppm (1 hr) Vapours: LC50 > 0.5 mg/l (4 hr) ≈ 2 mg/l (1 hr) ≤ 2 mg/l (4 hr) ≈ 8 mg/l (1 hr) Dust/mist: LC50 > 0.05 mg/l (4 hr) ≈ 0.2 mg/l (1 hr) ≤ 0.5 mg/l (4 hr) ≈ 2 mg/l (1 hr) H331, Category 3; Toxic if inhaled: Gases: LC50 > 500 ppm (4 hr) ≈ 1,000 ppm (1 hr) ≤ 2,500 ppm (4 hr) ≈ 5,000 ppm (1 hr) Vapours: LC50 > 2 mg/l (4 hr) ≈ 8 mg/l (1 hr) ≤ 10 mg/l (4 hr) ≈ 40 mg/l (1 hr) Dust/mist: LC50 > 0.5 mg/l (4 hr) ≈ 2 mg/l (1 hr) ≤ 1 mg/l (4 hr) ≈ 4 mg/l (1 hr) H332, Category 4; Harmful if inhaled: Dust/mist: LC50 > 1 mg/l (4 hr) ≈ 4 mg/l (1 hr) ≤ 5 mg/l (4 hr) ≈ 20 mg/l (1 hr)	
Unstable (reactive)	—	A material, other than an explosive, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor, or in the presence of contaminants, or in contact with incompatible materials. Unstable (reactive) materials are subdivided as follows:	Self-reactive substances or mixtures are thermally unstable liquids or solid substances or mixtures liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This definition excludes substances and mixtures classified under the GHS as explosives, organic peroxides or as oxidizing. A self-reactive substance or mixture is regarded as possessing explosive properties when in laboratory testing the formulation is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement.	
Unstable (reactive)	4	Materials that in themselves are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. This class includes materials that are sensitive to mechanical or localized thermal shock at normal temperatures and pressures.	H240, Type A; Heating may cause an explosion. Any self-reactive substance or mixture which can detonate or deflagrate rapidly, as packaged, will be defined as self-reactive substance Type A.	
Unstable (reactive)	3	Materials that in themselves are capable of detonation or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at the elevated temperatures and pressures.	H241, Type B; Heating may cause a fire or explosion. Any self-reactive substance or mixture possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package will be defined as self-reactive substance Type B.	

Unstable (reactive)	2	Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at normal temperatures and pressures, and that can undergo violent chemical change at elevated temperatures and pressures.	H242, Type C; Heating may cause a fire. Any self-reactive substance or mixture possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion will be defined as self-reactive substance Type C. H242, Type D; Heating may cause a fire. Any self-reactive substance or mixture which in laboratory testing: Detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or Does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or Does not detonate or deflagrate at all and shows a medium effect when heated under confinement; will be defined as self-reactive substance Type D; Will be defined as self-reactive substance Type D.	
Unstable (reactive)	1	Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressures.	H242, Type E; Heating may cause a fire. Any self-reactive substance or mixture which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement will be defined as self-reactive substance Type E. H242, Type F; Heating may cause a fire. Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power will be defined as self-reactive substance Type F. Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60°C to 75°C for a 50 kg package), and for liquid mixtures, a diluent having a boiling point greater than or equal to 150°C and used for desensitization will be defined as self-reactive substance Type G. If the mixture is not thermally stable or is a diluent having a boiling point less than 150°C and is used for desensitization, the mixture shall be defined as self-reactive substance Type F.	
Unstable (reactive) gas	Gaseous <u>or</u> <u>Liquefied</u>		A chemically unstable gas is a flammable gas that is able to react explosively even in the absence of air or oxygen. H220, Category 1A, Category A; Extremely flammable gas; May react explosively even in the absence of air. Flammable gases which are chemically unstable at 20°C and a standard pressure of 101.3 kPa. H220, Category 1A, Category B; Extremely flammable gas; May react explosively even in the absence of air at elevated pressure and/or temperature. Flammable gases which are chemically unstable at a temperature greater than 20°C and/or a standard pressure greater than 101.3 kPa. <u>and</u> H280 or H281~~, compressed gas, would also apply.~~	
Water reactive	3	Materials that react explosively with water without requiring heat or confinement.	H260, Category 1; Contact with water releases flammable gases which may ignite spontaneously. Any substance or mixture which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 liters per kilogram of substance over any 1 minute. (UN/DOT test methods: Test N.5, Part III, subsection 33.4.1.4)	
Water reactive	2	Materials that react violently with water or have the ability to boil water. Materials that produce flammable, toxic or other hazardous gases, or evolve enough heat to cause autoignition of combustibles upon exposure to water or moisture.	H261, Category 2; Contact with water releases flammable gas. Any substance or mixture which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 20 liters per kilogram of substance per hour, and which does not meet the criteria for Category 1.	
Water reactive	1	Materials that react with water with some release of energy, but not violently.	H261, Category 3; Contact with water releases flammable gas. Any substance or mixture which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 1 liter per kilogram of substance per hour, and which does not meet the criteria for Categories 1 and 2.	

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a. The table illustrates that there is not perfect alignment between the IFC and GHS definitions and provides information on similarities and difference between the two classification systems.

Reason:

Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners which continues to be a challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This comparison will make compliance more straightforward. In some cases, utilizing GHS definitions may more heavily regulate additional materials for new buildings; conversely, in other cases GHS definitions will result in reduced classification of materials. However, any differences are balanced out by the coordination and ease of enforcement that comes with being aligned with GHS and OSHA. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

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IFC: TABLE E104.2, E104.2, E104.1

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2024 International Fire Code

Revise as follows:

TABLE E104.2 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	
Aerosol	—	A combination of a container, a propellant and a material that is dispensed. Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated Level ~~1, Level 2 or Level~~ 3, Level 2, or Level 1.	Any nonrefillable receptacles made of metal, glass or plastics and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder or in a liquid state or in a gaseous state.	
~~Aerosol~~	~~Level 1~~	~~Those with a total chemical heat of combustion that is less than or equal to 8,600 Btu/lb (20 kJ/g).~~	~~H223, Category 3; Pressurized container: May burst if heated.~~ ~~1.~~ ~~Any aerosol that contains ≤ 1% flammable components (by mass) and that has a heat of combustion < 20 kJ/g.~~ ~~2.~~ ~~Any aerosol that contains > 1% (by mass) flammable components or which has a heat of combustion of ≥ 20 kJ/g but which, based on the results of the ignition distance test, the enclosed space ignition test or the aerosol foam flammability test, does not meet the criteria for Category 1 or Category 2.~~	
~~Aerosol~~	~~Level 2~~	~~Those with a total chemical heat of combustion that is less than or equal to 8,600 Btu/lb (20 kJ/g).~~	~~H223, Category 2; Flammable aerosol. Pressurized container: May burst if heated.~~ ~~1.~~ ~~Any aerosol that dispenses a spray that, based on the results of the ignition distance test, does not meet the criteria for Category 1, and which has:~~ ~~a.~~ ~~A heat of combustion of ≥ 20 kJ/g.~~ ~~b.~~ ~~A heat of combustion of < 20 kJ/g along with an ignition distance of ≥ 15 cm; or~~ ~~c.~~ ~~A heat of combustion of < 20 kJ/g and an ignition distance of < 15 cm along with either, in the enclosed space ignition test a time:~~ ~~i.~~ ~~A time equivalent of ≤ 300 s/m^3; or~~ ~~ii.~~ ~~A deflagration density of ≤ 300 g/m^3; or~~ ~~2.~~ ~~Any aerosol that dispenses a foam that, based on the results of the aerosol foam flammability test, does not meet the criteria for Category 1, and which has a flame height of ≥ 4 cm and a flame duration of ≥ 2 s.~~	

Aerosol	Level 3	An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: Those with a total chemical heat of combustion that is greater than 13,000 Btu/lb (30 kJ/g).	H222, Category 1; Extremely flammable aerosol. Pressurized container: May burst if heated: 1. Any aerosol that contains ≥ 85% flammable components (by mass) and has a heat of combustion of ≥ 30 kJ/g. 2. Any aerosol that dispenses a spray that, in the ignition distance test, has an ignition distance of ≥ 75 cm. 3. Any aerosol that dispenses a foam that, in the foam flammability test, has: a. A flame height of ≥ 20 cm and a flame duration of ≥ 2 s. b. A flame height of ≥ 4 cm and a flame duration of ≥ 7 s.	

Aerosol	Level 2	An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes: Those with a total chemical heat of combustion that is less than or equal to 8,600 Btu/lb (20 kJ/g).	H223, Category 2; Flammable aerosol: 1. Any aerosol that dispenses a spray that, based on the results of the ignition distance test, does not meet the criteria for Category 1, and which has: a. A heat of combustion of ≥ 20 kJ/g. b. A heat of combustion of < 20 kJ/g along with an ignition distance of ≥ 15 cm; or c. A heat of combustion of < 20 kJ/g and an ignition distance of < 15 cm along with either, in the enclosed space ignition test a time: i. A time equivalent of ≤ 300 s/m^3; or ii. A deflagration density of ≤ 300 g/m^3; or 2. Any aerosol that dispenses a foam that, based on the results of the aerosol foam flammability test, does not meet the criteria for Category 1, and which has a flame height of ≥ 4 cm and a flame duration of ≥ 2 s. and H229; Pressurized container: May burst if heated	

Aerosol	Level 1	An aerosol product that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Aerosol (Category 3). Where the GHS category is not known, the following is acceptable for classification purposes: Those with a total chemical heat of combustion that is less than or equal to 8,600 Btu/lb (20 kJ/g).	H223, Category 3: 1. Any aerosol that contains ≤ 1% flammable components (by mass) and that has a heat of combustion < 20 kJ/g. 2. Any aerosol that contains > 1% (by mass) flammable components or which has a heat of combustion of ≥ 20 kJ/g but which, based on the results of the ignition distance test, the enclosed space ignition test or the aerosol foam flammability test, does not meet the criteria for Category 1 or Category 2. and H229; Pressurized container: May burst if heated	
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	A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 3) and having a flashpoint at or above 100°F (38°C). Where the GHS category is not known, the following is acceptable for classification purposes: 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	
Combustible liquid	IIIA	A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 4). Where the GHS category is not known, the following is acceptable for classification purposes: Liquids having a closed cup flash point at or above 140°F (60°C) and below 200°F (93°C).	H227, Category 4; Combustible liquid: Flash point > 60°C and ≤ 93°C	
Combustible liquid	IIIB	Liquids having closed cup flash points at or above 200°F (93°C).	N/A	

<table>
<tr><td>Compressed gas</td><td>—</td><td>A material or mixture of materials that:
1. Is a gas at 68°F (20°C) or less at 14.7 psia (101 kPa) of pressure, and
2. Has a boiling point of 68°F (20°C) or less at 14.7 psia (101 kPa) which is either liquefied, nonliquefied (gaseous) or in solution (dissolved), except those gases that have no other health- or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68°F (20°C).

COMPRESSED GAS, DISSOLVED. Dissolved compressed gases, or gases in solution, are non-liquefied gases that are dissolved in a solvent. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Dissolved Gas.

COMPRESSED GAS, GASEOUS. Gaseous compressed gases are non-liquefied gases, other than those in solution (dissolved), which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C). Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Compressed Gas.

COMPRESSED GAS, LIQUEFIED. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C). Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these gases are categorized as Gases Under Pressure – Liquefied Gas.

~~States of compressed gases:~~
~~1. Nonliquefied compressed gases are gases, other than those in solution, that are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C).~~
~~2. Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C).~~
~~3. Compressed gases in solution are nonliquefied gases that are dissolved in a solvent.~~
~~4. Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.~~</td><td>Gases under pressure are gases which are contained in a receptacle at a pressure of 200 kPa (gauge) or more at 20°C, or which are liquefied, or liquefied and refrigerated.

H280, Compressed gas; Contains gas under pressure: May explode if heated. A gas which when under pressure is entirely gaseous at -50°C (-58°F), including all gases with a critical temperature ≤ -50°C (-58°F).

H280, Liquefied gas; Contains gas under pressure: May explode if heated. A gas which when under pressure is partially liquid at temperatures above -50°C (-58°F).

H280, Dissolved gas; Contains gas under pressure: May explode if heated. A gas which when under pressure is dissolved in a liquid phase solvent.</td><td></td></tr>
<tr><td>Corrosive</td><td>—</td><td>A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Skin Corrosion (Category 1A, 1B, or 1C), or Serious Eye Damage (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method described in DOTn 49 CFR 173.137, such chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.</td><td>H314, Category 1 (1A, 1B, 1C); Causes severe skin burns and eye damage. Skin corrosion refers to the production of irreversible damage to the skin; namely, visible necrosis through the epidermis and into the dermis occurring after exposure to a substance or mixture.</td><td></td></tr>
<tr><td>Cryogenic fluid</td><td>—</td><td>A fluid having a boiling point lower than -130°F (-89.9°C) at 14.7 pounds per square inch atmosphere (psia) (an absolute pressure of 101.3 kPa). Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Cryogenic Fluids are categorized as a Gas Under Pressure – Refrigerated Liquefied Gas. However, not all GHS Refrigerated Liquefied Gases are Cryogenic Fluids.</td><td>H281, Refrigerated liquefied gas; Contains refrigerated gas: May cause cryogenic burns or injury. A gas which is made partially liquid because of its low temperature.</td><td></td></tr>
<tr><td>Cryogenic fluid,~~-~~ flammable</td><td>—</td><td>A cryogenic fluid that is a *flammable gas* in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Flammable Gas, Category 1A or Category 1B and Gases Under Pressure - Refrigerated Liquefied Gas. ~~A cryogenic fluid that is flammable in its vapor state.~~</td><td>H220, Category 1A; Extremely flammable gas. Gases, which at 20°C and a standard pressure of 101.3 kPa:
1. Are ignitable when in a mixture of 13% or less by volume in air; or
2. Have a flammable range with air of at least 12 percentage points, regardless of the lower flammability limit unless data show they meet the criteria for Category 1B.

Category 1A includes pyrophoric gases and chemically unstable gases~~.~~

H281, refrigerated liquefied gas, would also apply</td><td></td></tr>
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Cryogenic fluid, ~~—~~Inert	—	A cryogenic fluid that is an *inert* gas in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Gases Under Pressure - Refrigerated Liquefied Gas.	H281, Refrigerated liquefied gas. Contains refrigerated gas: May cause cryogenic burns or injury. A gas which is made partially liquid because of its low temperature.	
Cryogenic fluid, ~~—~~ Oxidizing	—	~~An oxidizing gas in the cryogenic state.~~A cryogenic fluid that is an *oxidizing gas* in its vapor state. These fluids are categorized under the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) as Oxidizing Gas, Category 1 and Gases Under Pressure - Refrigerated Liquefied Gas.	H270, Category 1: May cause or intensify fire; oxidizer. Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. H281, refrigerated liquefied gas, would also apply.	
Explosives	—	A chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord and igniters. The term "Explosive" includes any material determined to be within the scope of USC Title 18: Ch. 40 and also includes any material classified as an explosive other than consumer fireworks, Division 1.4G Explosives, by the hazardous materials regulations of DOTn 49 CFR Parts 100–185.	An explosive substance (or mixture) is a solid or liquid substance (or mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings. Pyrotechnic substances are included even when they do not evolve gases.	
Explosives	Unstable explosives		H200; Unstable explosive. Unstable explosives are those which are thermally unstable and/or too sensitive for normal handling, transport and use. Special precautions are necessary.	
Explosives	Division 1.1	A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.1). Where the GHS category is not known, the following is acceptable for classification purposes: Explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.	H201; Explosive; mass explosion hazard. Substances, mixtures and articles which have a mass explosion hazard (a mass explosion is one which affects almost the entire quantity present virtually instantaneously).	
Explosives	Division 1.2	A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.2). Where the GHS category is not known, the following is acceptable for classification purposes: Explosives that have a projection hazard but not a mass explosion hazard.	H202; Explosive; severe projection hazard. Substances, mixtures and articles which have a projection hazard but not a mass explosion hazard.	
Explosives	Division 1.3	A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.3). Where the GHS category is not known, the following is acceptable for classification purposes: Explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.	H203; Explosive; fire, blast or projection hazard. Substances, mixtures and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard: 1. Combustion of which gives rise to considerable radiant heat; or 2. Which burn one after another, producing minor blast or projection effects or both.	
Explosives	Division 1.4	A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.4). Where the GHS category is not known, the following is acceptable for classification purposes: Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.	H204; Fire or projection hazard: Substances, mixtures and articles which present no significant hazard; substances, mixtures and articles which present only a small hazard in the event of ignition or initiation. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package.	
Explosives	Division 1.4G	Small fireworks devices containing restricted amounts of pyrotechnic composition designed primarily to produce visual or audible effects by combustion or deflagration that complies with the construction, chemical composition and labeling regulations of the DOTn for fireworks, UN No. 0336 and the US Consumer Product Safety Commission as set forth in CPSC 16 CFR Parts 1500 and 1507.	N/A	
Explosives	Division 1.5	A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.5). Where the GHS category is not known, the following is acceptable for classification purposes: Very insensitive explosives. This division is comprised of substances that have a mass explosion hazard but which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.	H205; May mass explode in fire. Very insensitive substances or mixtures which have a mass explosion hazard: substances and mixtures which have a mass explosion hazard but are so insensitive that there is very little probability or initiation or of transition from burning to detonation under normal conditions.	
Explosives	Division 1.6	A chemical or item that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Explosive (Division 1.6). Where the GHS category is not known, the following is acceptable for classification purposes: Extremely insensitive articles that do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substances and that demonstrate a negligible probability of accidental initiation or propagation.	Extremely insensitive articles which do not have a mass explosion hazard: articles which predominantly contain extremely insensitive substances or mixtures and which demonstrate a negligible probability of accidental initiation or propagation.	

Flammable gas	Gaseous or Liquefied	A material that is a gas at 68°F (20°C) or less at 14.7 psia (101 kPa) of pressure [a material that has a boiling point of 68°F (20°C) or less at 14.7 psia (101 kPa)] subdivided as follows: ~~which:~~ 1. Category 1A. a gas that meets either of the following: 1.1 ~~A gas that is~~ Ignitable at 14.7 psia (101 kPa) when in a mixture of 13% or less by volume with air; or ~~2.~~ 1.2 ~~Has a~~A flammable range at 14.7 psia (101 kPa) with air of not less than 12%, regardless of the lower limit, unless data shows compliance with Category 1B. 2. Category 1B. A gas that 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 percent by volume of air. 2.2. A fundamental burning velocity of less than 3.9 inches/second (99 mm/s). The limits specified shall be determined at 14.7 psia (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E681.Where not otherwise specified, the term “flammable gas” includes both Categories 1A and 1B. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Flammable Gases are categorized as a Flammable Gas (Category 1A or 1B).	A flammable gas is a gas having a flammable range with air at 20°C and a standard pressure of 101.3 kPa. H220, Category 1A; Extremely flammable gas. Gases, which at 20°C and a standard pressure of 101.3 kPa: 1. Are ignitable when in a mixture of 13% or less by volume in air; or 2. Have a flammable range with air of at least 12 percentage points regardless of the lower flammability limit unless data show they meet the criteria for Category 1B. Category 1A includes pyrophoric gases and chemically unstable gases. H220, Category 1B; Flammable gas. Gases which meet the flammability criteria for Category 1A, but which are not pyrophoric nor chemically unstable, and which have at least either: 1. A lower flammability limit of more than 6% by volume in air; or 2. A fundamental burning velocity of less than 10 cm/s. ~~H280, compressed gas, would also apply.~~	
Flammable liquid	—	A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:	A liquid having a flash point of not more than 93°C. A flammable liquid is classified in one of the four categories for this class.	
Flammable liquid	IA	A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: 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	A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes: 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	A liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Liquid (Category 3) and having a flashpoint below 100°F (38°C). Where the GHS category is not known, the following is acceptable for classification purposes: 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	
Flammable solid	—	A solid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as a Flammable Solid (Category 1 or 2). Where the GHS category is not known, the following is acceptable for classification purposes: A solid, other than a blasting agent or explosive, that is capable of causing fire through friction, absorption of moisture, spontaneous chemical change or retaining heat from manufacturing or processing, or which has an ignition temperature below 212°F (100°C) or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid, as determined in accordance with the test method of CPSC 16 CFR Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than 0.0866 inch (2.2 mm) per second along its major axis.	A flammable solid is a solid which is readily combustible, or may cause or contribute to fire through friction. A flammable solid is classified in one of the two categories for this class using method N.1 as described in Part III, subsection 33.2.1 of the Manual of Tests and Criteria, according to: H228, Category 1; Flammable solid: Burning rate test: Substances or mixtures other than metal powders: 1. Wetted zone does not stop fire; and 2. Burning time < 45 s or burning rate > 2.2 mm/s. Metal powders: burning time ≤ 5 min H228, Category 2; Flammable solid: Burning rate test: Substances or mixtures other than metal powders: 1. Wetted zone stops the fire for at least 4 min; and 2. Burning time < 45 s or burning rate > 2.2 mm/s. Metal powders: burning time > 5 min and ≤ 10 min	

Highly toxic	—	A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Acute Toxicity Oral Category 1 or 2, Dermal Category 1 or 2, Inhalation Gases Category 1, Inhalation Vapors Category 1, or Inhalation Dusts and Mists Category 1 or 2. Where the GHS category is not known, one of the following is acceptable for classification purposes: ~~A material that produces a lethal dose or lethal concentration that falls within any of the following categories:~~ 1. A chemical that has a median lethal dose (LD50) of 50 mg or less per kg of body weight when administered orally to albino rats weighing between 200 and 300 g each. 2. A chemical that has a medial lethal dose (LD50) of 200 mg or less per kg of body weight when administered by continuous contact for 24 hr (or less if death occurs within 24 hr) with the bare skin of albino rabbits weighing between 2 and 3 kg each. 3. A chemical that has a median lethal concentration (LC50) in air of 200 ppm by volume or less of gas or vapor, or 2 mg/l or less of mist~~, fume~~ or dust, when administered by continuous inhalation for 1 hr (or less if death occurs within 1 hr) to albino rats weighing between 200 and 300 g.	Acute toxicity refers to serious adverse health effects (i.e., lethality) occurring after a single or short-term oral, dermal or inhalation exposure to a substance or mixture. Oral H300, Category 1; Fatal if swallowed: LD50 ≤ 5 mg/kg bodyweight H300, Category 2; Fatal if swallowed: LD50 > 5 ≤ 50 mg/kg bodyweight Dermal H310, Category 1; Fatal in contact with skin: LD50 ≤ 50 mg/kg bodyweight H310, Category 2; Fatal in contact with skin: LD50 > 50 ≤ 200 mg/kg bodyweight Inhalation H330, Category 1; Fatal if inhaled. Gases: LC50 ≤ 100 ppm (4 hr) ≈ 200 ppm (1 hr) Vapors: LC50 ≤ 0.5 mg/l (4 hr) ≈ ~~2~~1 mg/l (1 hr) Dust/mist: LC50 ≤ 0.05 mg/l (4 hr) ≈ 0.2 mg/l (1 hr)	
Inert compressed gas	—	A compressed gas that is capable of reacting with other materials only under abnormal conditions such as high temperatures, pressures and similar extrinsic physical forces. Within the context of the code, inert compressed gases do not exhibit either physical or health hazard properties as defined (other than acting as a simple asphyxiant) or hazard properties other than those of a compressed gas. Some of the more common inert compressed gases include argon, helium, krypton, neon, nitrogen and xenon.	Gases under pressure are gases which are contained in receptacles at a pressure of 200 kPa (gauge) or more at 20° C or which are liquefied or liquefied and refrigerated. They comprise compressed gases, liquefied gases, dissolved gases and refrigerated liquefied gases. See the description of "Compressed gas."	
Organic peroxide	—	Liquid or solid ~~An~~ organic substances ~~compound~~ that contains the bivalent -O-O- structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by ~~an~~ organic radicals. The term also includes organic peroxide formulations (mixtures). Organic peroxides ~~can present an explosion hazard (detonation or deflagration) or they can be shock sensitive. They can also decompose into various unstable compounds over an extended period of time.~~ are thermally unstable substances or mixtures, which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties: a. be liable to explosive decomposition; b. burn rapidly; c. be sensitive to impact or friction; d. react dangerously with other substances.	Organic peroxides are liquid or solid organic substances which contain the bivalent -O-O- structure and may be considered derivatives of hydrogen peroxide, where one or both of the hydrogen atoms have been replaced by organic radicals. The term also includes organic peroxide formulations (mixtures). Organic peroxides are thermally unstable substances or mixtures, which may undergo exothermic self-accelerating decomposition. In addition, they may have one or more of the following properties: 1. Be liable to explosive decomposition. 2. Burn rapidly. 3. Be sensitive to impact or friction. 4. React dangerously with other substances.	
Organic peroxide	UD	Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type A). Type A Organic Peroxides are forbidden in transportation. Where the GHS Category is not known, the following is acceptable for classification purposes: Organic peroxides that are capable of *detonation*. These peroxides pose an extremely high-explosion hazard through rapid explosive decomposition.	H240, Organic peroxide, Type A; Heating may cause an explosion. Any organic peroxide which, as packaged, can detonate or deflagrate rapidly will be defined as organic peroxide Type A.	
Organic peroxide	I	Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type B). Where the GHS Category is not known, the following is acceptable for classification purposes: ~~Describes t~~Those formulations that are capable of *deflagration* but not *detonation*.	H241, Organic peroxide, Type B; Heating may cause a fire or explosion. Any organic peroxide possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly but is liable to undergo a thermal explosion in that package will be defined as organic peroxide Type B.	

Organic peroxide	II	Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type C) or (Type D). Where the GHS Category is not known, the following is acceptable for classification purposes: ~~Describes t~~Those formulations that burn very rapidly and that pose a moderate reactivity hazard.	H242, Organic peroxide, Type C; Heating may cause a fire. Any organic peroxide possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion will be defined as organic peroxide Type C. H242, Organic peroxide, Type D; Heating may cause a fire. Any organic peroxide which in laboratory testing: Detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or Does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or Does not detonate or deflagrate at all and shows a medium effect when heated under confinement; will be defined as organic peroxide Type D.	
Organic peroxide	III	Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type E). Where the GHS Category is not known, the following is acceptable for classification purposes: ~~Describes t~~Those formulations that burn rapidly and that pose a moderate reactivity hazard.	H242, Organic peroxide, Type E; Heating may cause a fire. Any organic peroxide which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement will be defined as organic peroxide Type E.	
Organic peroxide	IV	Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type F). Where the GHS Category is not known, the following is acceptable for classification purposes: ~~Describes t~~Those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.	H242, Organic peroxide, Type F; Heating may cause a fire. Any organic peroxide which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power will be defined as organic peroxide Type F.	
Organic peroxide	V	Any organic peroxide which, as packaged, is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Organic Peroxide (Type G). Where the GHS Category is not known, the following is acceptable for classification purposes: ~~Describes t~~Those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.	Organic peroxide, Type G. Any organic peroxide which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60°C or higher for a 50 kg package), and for liquid mixtures, a diluent having a boiling point of not less than 150°C and used for desensitization will be defined as organic peroxide Type G. If the organic peroxide is not thermally stable or is a diluent having a boiling point less than 150°C and is used for desensitization, it shall be defined as organic peroxide Type F.	
Oxidizer	—	A material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials and, if heated or contaminated, can result in vigorous self-sustained decomposition.	An oxidizing solid is a solid which, while in itself is not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material. An oxidizing liquid is a liquid which, while in itself not necessarily combustible, may, generally by yielding oxygen, cause, or contribute to, the combustion of other material.	
Oxidizer	4	A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 1) or Oxidizing Liquids (Category 1) and which have evidence of explosive properties or are packaged for transport in Packing Group I. Where the GHS category is not known, the following is acceptable for classification purposes: An oxidizer that can undergo an explosive reaction due to contamination or exposure to a thermal or physical shock that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.	H271, Category 1; May cause fire or explosion; strong oxidizer. Criteria for solids (based on Test O.1 or O.3 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Test O.1—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture (by mass) of potassium bromate and cellulose. Test O.3—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate greater than the mean burning rate of a 3:1 mixture (by mass) of calcium peroxide and cellulose. Criteria for liquids (based on Test O.2 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Any substance or mixture which, in the 1:1 mixture (by mass) of substance (or mixture) and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture (by mass) of substance and cellulose is less than that of a 1:1 mixture (by mass) of 50% perchloric acid and cellulose.	

Oxidizer	3	A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 1) or Oxidizing Liquids (Category 1) and is not otherwise classified as Class 4. Where the GHS category is not known, the following is acceptable for classification purposes: An oxidizer that causes a severe increase in the burning rate of combustible materials with which it comes in contact.	H271, Category 1; May cause fire or explosion; strong oxidizer. Criteria for solids (based on Test O.1 or O.3 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Test O.1—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time less than the mean burning time of a 3:2 mixture (by mass) of potassium bromate and cellulose. Test O.3—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate greater than the mean burning rate of a 3:1 mixture (by mass) of calcium peroxide and cellulose. Criteria for liquids (based on Test O.2 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Any substance or mixture which, in the 1:1 mixture (by mass) of substance (or mixture) and cellulose tested, spontaneously ignites; or the mean pressure rise time of a 1:1 mixture (by mass) of substance and cellulose is less than that of a 1:1 mixture (by mass) of 50% perchloric acid and cellulose.	
Oxidizer	2	A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 2) or Oxidizing Liquids (Category 2). Where the GHS category is not known, the following is acceptable for classification purposes: An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.	H272, Category 2; May intensify fire; oxidizer. Criteria for solids (based on Test O.1 or O.3 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Test O.1—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 2:3 mixture (by mass) of potassium bromate and cellulose and the criteria for Category 1 are not met. Test O.3—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:1 mixture (by mass) of calcium peroxide and cellulose and the criteria for Category 1 are not met. Criteria for liquids (based on Test O.2 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Any substance or mixture which, in the 1:1 mixture (by mass) of substance (or mixture) and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture (by mass) of a 40% aqueous sodium chlorate solution and cellulose and the criteria for Category 1 are not met.	
Oxidizer	1	A solid or liquid that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as either Oxidizing Solids (Category 3) or Oxidizing Liquids (Category 3). Where the GHS category is not known, the following is acceptable for classification purposes: An oxidizer that does not moderately increase the burning rate of combustible materials.	H272, Category 3; May intensify fire; oxidizer: Criteria for solids (based on Test O.1 or O.3 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Test O.1—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning time equal to or less than the mean burning time of a 3:7 mixture (by mass) of potassium bromate and cellulose and the criteria for Categories 1 and 2 are not met. Test O.3—Any substance or mixture which, in the 4:1 or 1:1 sample-to-cellulose ratio (by mass) tested, exhibits a mean burning rate equal to or greater than the mean burning rate of a 1:2 mixture (by mass) of calcium peroxide and cellulose and the criteria for Categories 1 and 2 are not met. Criteria for liquids (based on Test O.2 in Part III of UN ST/SG/AC.10/11, *Manual of Tests and Criteria*): Any substance or mixture which, in the 1:1 mixture (by mass) of substance (or mixture) and cellulose tested, exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 1:1 mixture (by mass) of a 65% aqueous nitric acid solution and cellulose and the criteria for Categories 1 and 2 are not met.	
Oxidizing gas	Gaseous or Liquefied	A compressed gas that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as an Oxidizing Gas, Category 1. Where the GHS category is not known, the following is acceptable for classification purposes: A gas that can support and accelerate combustion of other materials more than air does.	Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. H270, Category 1; May cause or intensify fire; oxidizer: Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. ~~H280, compressed gas would also apply.~~	

Oxidizing gas	Liquified	An oxidizing gas that is liquefied [liquefied gases are gases that, in a packaging under the charged pressure, are partially liquid at 68°F (20°C)].	Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. H270, Category 1; May cause or intensify fire; oxidizer. Any gas which may, generally by providing oxygen, cause or contribute to the combustion of other material more than air does. H280, liquefied gas, would also apply.	
Pyrophoric	—	A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Pyrophoric Gas, Pyrophoric Solid (Category 1), or Pyrophoric Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: A chemical with an autoignition temperature in air, at or below a temperature of 130°F (54°C).	Separate definitions based on physical state; see each category of pyrophoric:	
Pyrophoric	Solid	A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Pyrophoric Gas, Pyrophoric Solid (Category 1), or Pyrophoric Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: A solid with an autoignition temperature in air, at or below a temperature of 130°F (54°C).	H250, Category 1; Pyrophoric solid; Catches fire spontaneously if exposed to air. A pyrophoric solid is a solid which, even in small quantities, is liable to ignite within 5 minutes after coming into contact with air. Classification criteria: The solid ignites within 5 minutes of coming into contact with air.	
Pyrophoric	Liquid	A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Pyrophoric Gas, Pyrophoric Solid (Category 1), or Pyrophoric Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: A liquid with an autoignition temperature in air, at or below a temperature of 130°F (54°C).	H250, Category 1; Pyrophoric liquid; Catches fire spontaneously if exposed to air: A pyrophoric liquid is a liquid which, even in small quantities, is liable to ignite within 5 minutes after coming into contact with air. Classification criteria: The liquid ignites within 5 minutes when added to an inert carrier and exposed to air, or it ignites or chars a filter paper on contact with air within 5 minutes. Testing is performed at 25 ±2°C and 50 ±5% relative humidity.	
Pyrophoric	Gas	A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Pyrophoric Gas, Pyrophoric Solid (Category 1), or Pyrophoric Liquid (Category 1). Where the GHS category is not known, the following is acceptable for classification purposes: A gas with an autoignition temperature in air, at or below a temperature of 130°F (54°C).	H220, Category 1A~~; Extremely flammable~~, Pyrophoric gas. ~~May ignite spontaneously if exposed to air:~~ A pyrophoric gas is a flammable gas that is liable to ignite spontaneously in air at a temperature of 54°C or below. and H232; May ignite spontaneously if exposed to air ~~H280, compressed (or liquefied) gas, would also apply.~~	
Toxic	—	A substance or mixture that is categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Acute Toxicity Oral Category 3 or 4, Dermal Category 3, Inhalation Gases Category 2 or 3, Inhalation Vapors Category 2 or 3, or Inhalation Dusts and Mists Category 3 or 4. Where the GHS category is not known, one of the following is acceptable for classification purposes: ~~A chemical falling within any of the following categories:~~ 1. A chemical that has a median lethal dose (LD50) of more than 50 mg per kg, but not more than 500 mg per kg of body weight when administered orally to albino rats weighing between 200 and 300 g each. 2. A chemical that has a medial lethal dose (LD50) of more than 200 mg per kg but not more than 1,000 mg per kg of body weight when administered by continuous contact for 24 hr (or less if death occurs within 24 hr) with the bare skin of albino rabbits weighing between 2 and 3 kg each. 3. A chemical that has a median lethal concentration (LC50) in air of more than 200 ppm but not more than 2,000 ppm by volume or less of gas or vapor, or more than 2 mg/l but not more than 20 mg/l of mist~~, fume~~ or dust, when administered by continuous inhalation for 1 hr (or less if death occurs within 1 hr) to albino rats weighing between 200 and 300 g	Acute toxicity refers to serious adverse health effects (i.e., lethality) occurring after a single or short-term oral, dermal or inhalation exposure to a substance or mixture. Oral H301, Category 3; Toxic if swallowed: LD50 > 50 ≤ 300 mg/kg bodyweight H302, Category 4; Harmful if swallowed: LD50 > 300 ≤ 2,000 mg/kg bodyweight Dermal H311, Category 3, Toxic in contact with skin: LD50 > 200 ≤ 1,000 mg/kg bodyweight Inhalation H330, Category 2; Fatal if inhaled: Gases: LC50 > 100 ppm (4 hr) ≈ 200 ppm (1 hr) ≤ 500 ppm (4 hr) ≈ 1,000 ppm (1 hr) Vapours: LC50 > 0.5 mg/l (4 hr) ≈ ~~2~~1 mg/l (1 hr) ≤ 2 mg/l (4 hr) ≈ ~~8~~4 mg/l (1 hr) Dust/mist: LC50 > 0.05 mg/l (4 hr) ≈ 0.2 mg/l (1 hr) ≤ 0.5 mg/l (4 hr) ≈ 2 mg/l (1 hr) H331, Category 3; Toxic if inhaled: Gases: LC50 > 500 ppm (4 hr) ≈ 1,000 ppm (1 hr) ≤ 2,500 ppm (4 hr) ≈ 5,000 ppm (1 hr) Vapours: LC50 > 2 mg/l (4 hr) ≈ ~~8~~4 mg/l (1 hr) ≤ 10 mg/l (4 hr) ≈ ~~4~~20 mg/l (1 hr) Dust/mist: LC50 > 0.5 mg/l (4 hr) ≈ 2 mg/l (1 hr) ≤ 1 mg/l (4 hr) ≈ 4 mg/l (1 hr)	

Unstable (reactive)	—	A material, other than an explosive, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor~~, or in the presence of contaminants, or in contact with incompatible materials.~~ Unstable (reactive) materials are subdivided as follows:	Self-reactive substances or mixtures are thermally unstable liquids or solid substances or mixtures liable to undergo a strongly exothermic decomposition even without participation of oxygen (air). This definition excludes substances and mixtures classified under the GHS as explosives, organic peroxides or as oxidizing. A self-reactive substance or mixture is regarded as possessing explosive properties when in laboratory testing the formulation is liable to detonate, to deflagrate rapidly or to show a violent effect when heated under confinement.	
Unstable (reactive)	4	Materials that in themselves are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. This class includes materials that are sensitive to mechanical or localized thermal shock at normal temperatures and pressures. <u>This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category A) and can include compressed gases categorized as Chemically Unstable (Type A).</u>	H240, Type A; Heating may cause an explosion. Any self-reactive substance or mixture which can detonate or deflagrate rapidly, as packaged, will be defined as self-reactive substance Type A.	
Unstable (reactive)	3	Materials that in themselves are capable of detonation or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at the elevated temperatures and pressures. <u>This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category B) and can include compressed gases categorized as Chemically Unstable (Type B).</u>	H241, Type B; Heating may cause a fire or explosion. Any self-reactive substance or mixture possessing explosive properties and which, as packaged, neither detonates nor deflagrates rapidly, but is liable to undergo a thermal explosion in that package will be defined as self-reactive substance Type B.	
Unstable (reactive)	2	Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at normal temperatures and pressures, and that can undergo violent chemical change at elevated temperatures and pressures. <u>This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category C or D).</u>	H242, Type C; Heating may cause a fire. Any self-reactive substance or mixture possessing explosive properties when the substance or mixture as packaged cannot detonate or deflagrate rapidly or undergo a thermal explosion will be defined as self-reactive substance Type C. H242, Type D; Heating may cause a fire. Any self-reactive substance or mixture which in laboratory testing: Detonates partially, does not deflagrate rapidly and shows no violent effect when heated under confinement; or Does not detonate at all, deflagrates slowly and shows no violent effect when heated under confinement; or Does not detonate or deflagrate at all and shows a medium effect when heated under confinement; will be defined as self-reactive substance Type D; Will be defined as self-reactive substance Type D.	
Unstable (reactive)	1	Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressures. <u>This Class includes liquid or solid materials that are categorized under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) as Self-Reactive (Category E or F).</u>	H242, Type E; Heating may cause a fire. Any self-reactive substance or mixture which, in laboratory testing, neither detonates nor deflagrates at all and shows low or no effect when heated under confinement will be defined as self-reactive substance Type E. H242, Type F; Heating may cause a fire. Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows only a low or no effect when heated under confinement as well as low or no explosive power will be defined as self-reactive substance Type F. Any self-reactive substance or mixture which, in laboratory testing, neither detonates in the cavitated state nor deflagrates at all and shows no effect when heated under confinement nor any explosive power, provided that it is thermally stable (self-accelerating decomposition temperature is 60° C to 75° C for a 50 kg package), and for liquid mixtures, a diluent having a boiling point greater than or equal to 150° C and used for desensitization will be defined as self-reactive substance Type G. If the mixture is not thermally stable or is a diluent having a boiling point less than 150° C and is used for desensitization, the mixture shall be defined as self-reactive substance Type F.	

Unstable (reactive) gas	Gaseous		A chemically unstable gas is a flammable gas that is able to react explosively even in the absence of air or oxygen. H220, Category 1A, Chemically Unstable, Category A; Extremely flammable gas~~; May react explosively even in the absence of air.~~: Flammable gases which are chemically unstable at 20° C and a standard pressure of 101.3 kPa. and H230: May react explosively even in the absence of air or H220, Category 1A, Chemically Unstable, Category B; Extremely flammable gas~~; May react explosively even in the absence of air at elevated pressure and/or temperature.~~: Flammable gases which are chemically unstable at a temperature greater than 20° C and/or a standard pressure greater than 101.3 kPa. and H231: May react explosively even in the absence of air at elevated pressure and/or temperature ~~H280, compressed gas, would also apply.~~	
Water reactive	3	Materials that react explosively with water without requiring heat or confinement. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 1).	H260, Category 1; Contact with water releases flammable gases which may ignite spontaneously. Any substance or mixture which reacts vigorously with water at ambient temperatures and demonstrates generally a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate of evolution of flammable gas is equal to or greater than 10 liters per kilogram of substance over any 1 minute. (UN/DOT test methods: Test N.5, Part III, subsection 33.4.1.4)	
Water reactive	2	Materials that react violently with water or have the ability to boil water. Materials that produce flammable, toxic or other hazardous gases, or evolve enough heat to cause autoignition of combustibles upon exposure to water or moisture. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 2).	H261, Category 2; Contact with water releases flammable gas. Any substance or mixture which reacts readily with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 20 liters per kilogram of substance per hour, and which does not meet the criteria for Category 1.	
Water reactive	1	Materials that react with water with some release of energy, but not violently. Under the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), these are classified as substances or mixtures which, in contact with water, emit flammable gases (Category 3).	H261, Category 3; Contact with water releases flammable gas. Any substance or mixture which reacts slowly with water at ambient temperatures such that the maximum rate of evolution of flammable gas is equal to or greater than 1 liter per kilogram of substance per hour, and which does not meet the criteria for Categories 1 and 2.	

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a. The table illustrates that there is not perfect alignment between the IFC and GHS definitions and provides information on similarities and difference between the two classification systems.

E104.2 GHS hazardous materials definitions comparison table.

Table E104.2 provides a tabular presentation of the various definitions published within the *International Fire Code*. In addition, the table presents corresponding definitions, where available, from the ~~2012 edition of~~ DOL 29 CFR 1910.1200 along with applicable hazard statement codes. DOL 29 CFR 1910.1200 aligns with the UN's *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*. The table is not meant to imply perfect alignment between IFC and GHS definitions.

E104.1 Hazardous materials definitions.

The categorization and classification of hazardous materials enables the code user to determine the applicability of requirements based on hazard category and class related to the physical and health hazards of materials. The ~~current~~ definitions found in Chapter 2 have been developed using criteria found in NFPA codes and standards, model fire prevention codes, NIOSH, and requirements of the US Department of Transportation (DOTn 49 CFR) and US Department of Labor (DOL 49 CFR 1910).

The chemical industry has grown substantially since the inception of the IFC hazard definitions. Large-scale global production and distribution of common and specialty chemicals has become mainstream. In the 1990s, the United Nations (UN) developed the *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)* to create international congruency among chemical suppliers.

The GHS is an internationally agreed upon standard of classification and labeling that utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials.

The DOL ~~published a~~ revised the *Hazard Communication Standard*(DOL 29 CFR 1910.1200) to align with the GHS ~~in March 2012. It became effective in May 2012.~~ All manufacturers selling, producing or transporting chemicals in the United States are ~~now~~ required to comply with the GHS and provide ~~this~~ standardized hazard information on all Safety Data Sheets (SDS).

SDS are a primary source of information for identifying hazards for chemicals and mixtures containing hazardous materials. It can be helpful for fire code officials to become familiar with the GHS definitions and how they relate to IFC hazard definitions.

Reason:

Fire Code officials must enforce the hazardous materials provisions of the International Fire Code (IFC) and the International Building Code (IBC) to ensure that people and property in our communities are safe. While code officials need to verify and validate the hazards of materials, classifying hazardous materials in accordance with definitions and hazard classes in the I-codes is the responsibility of facility owners which continues to be a challenge. Consequences of missing or incorrect classification include increased fire and life safety risk and can lead to misclassification of an occupancy.

Due to the expansion of international chemical trade, the United Nations (UN) developed a Globally Harmonized System (GHS) of classification of hazardous materials. The GHS is an internationally agreed upon standard of classification and labeling that in most cases utilizes prescriptive, standardized testing procedures and criteria to classify hazardous materials. Federal law (29 CFR 1910.1200 (OSHA) and 49 CFR 173.127 (DOT)) mandates that manufacturers selling, producing or transporting chemicals in the United States classify chemicals according to the GHS system and make the information readily available in product Safety Data Sheets (SDSs).

This proposal aims to incorporate the readily available GHS (Revision 7) classifications into the I-code definitions to better align with federal standards for hazardous materials classification. Proper identification of multiple hazards and the degree of hazard are likely outcomes of utilizing the GHS.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the FCAC Website

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

This proposal is meant to provide correlation with the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) which is used globally and by OSHA. This comparison will make compliance more straightforward. In some cases, utilizing GHS definitions may more heavily regulate additional materials for new buildings; conversely, in other cases GHS definitions will result in reduced classification of materials. However, any differences are balanced out by the coordination and ease of enforcement that comes with being aligned with GHS and OSHA. US manufacturers and distributors of hazardous materials have been required to use the GHS classification system to communicate the hazards of materials in Safety Data Sheets (SDS) since 2012.

F276-24

F277-24

IFC: FIGURE H101.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Delete and substitute as follows:

~~1. Business Name:__________ Phone:__________~~
~~Address:__________~~

~~2. Person Responsible for the Business~~
~~Name: Title: Phone:~~

~~3. Emergency Contacts:~~
~~Name: Title: Home Number: Work Number:~~

~~4. Person Responsible for the Application/Principal Contact:~~
~~Name: Title: Phone:~~

~~5. Principal Business Activity:~~

~~6. Number of Employees:________~~

~~7. Number of Shifts:________~~
~~a. Number of Employees per Shift:~~

~~8. Hours of Operation: ________~~

~~**FIGURE H101.1 HAZARDOUS MATERIALS MANAGEMENT PLAN SECTION I: FACILITY DESCRIPTION**~~

1. Business Name:________________________ Phone:____________
Address:____________________________

2. Person Responsible for the Business

Name:	Title:	Phone:
__________	__________	__________

3. Emergency Contacts:

Name:	Title:	Primary Number: ~~Home Number:~~	Emergency Number: ~~Work Number:~~
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	________

4. Person Responsible for the Application/Principal Contact:

Name:	Title:	Phone:
__________	__________	__________

5. Principal Business Activity:

____
____
____

6. Number of Employees:_________

7. Number of Shifts: _________
   a. Number of Employees per Shift:

____
____
____

8. Hours of Operation: _________

FIGURE H101.1 HAZARDOUS MATERIALS MANAGEMENT PLAN SECTION I: FACILITY DESCRIPTION

FIGURE H101.1 HAZARDOUS MATERIALS MANAGEMENT PLAN SECTION I: FACILITY DESCRIPTION

Reason: Update the language on the form to reflect the widespread use of mobile phones in lieu of land lines.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The changing of the naming convention for the required phone numbers has no associated cost.

F277-24

F278-24

IFC: L101.1, L101.2 (New), L102.1, SECTION 202 (New), SECTION 202, L104.5, L104.5.1, L104.5.2, L104.7, L104.13, L104.13.1, L104.13.2, L104.14, L104.14.1, L105.1

Proponents: Mark Fessenden, Johnson Controls, Firefighter Air Coalition

2024 International Fire Code

Revise as follows:

L101.1 Scope.
Firefighter air replenishment systems (FARS) shall be provided in accordance with this appendix. The adopting ordinance shall specify building characteristics or special hazards that establish thresholds triggering a requirement for the installation of a FARS. The requirement shall be based on the fire department's capability of replenishing firefighter breathing air during sustained emergency operations. Considerations shall include:

1. Building characteristics, such as number of stories above or below *grade plane*, floor area, type of construction and fire-resistance of the primary structural *frame* to allow sustained firefighting operations based on a rating of not less than 2 hours.
2. Special hazards, other than buildings, that require unique accommodations to allow the fire department to replenish firefighter breathing air.
3. Fire department staffing level.
4. Availability of a fire department ~~breathing replenishment vehicle~~mobile air unit.

Add new text as follows:

L101.2 Where required. A fire fighter air replenishment systems (FARS) shall be installed in the following buildings:

1. High-rise buildings where the floor of an occupiable story is greater than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.
2. Underground structures that are three or more floors below grade with an area greater than 20 000 square feet (1858 m2).
3. Large area structures with an area greater than 200 000 square feet (18 580 m2) and where the travel distance from the building centerline to the closest exit is greater than 500 feet (152 m), such as warehouses, manufacturing complexes, malls, or convention centers.
4. Underground transportation or pedestrian tunnels exceeding 500 feet (152 m) in length.

L102.1 Definitions. For the purpose of this appendix, certain terms are defined as follows:

Add new definition as follows:

EXTERIOR MOBILE BREATHING AIR FILL CONNECTION. A permanently installed external connection where a mobile air unit can supply the FARS breathing air standpipe.

FIREFIGHTER AIR REPLENISHMENT SYSTEM (FARS). A permanently installed arrangement of piping, valves, fittings and equipment to facilitate the replenishment of breathing air in self-contained breathing apparatus (SCBA) for firefighters engaged in emergency operations.

Add new definition as follows:

INTERIOR CYLINDER FILL PANELS. Lockable interior panels that provide firefighters the ability to regulate breathing air pressure and refill self-contained breathing apparatus (SCBA) cylinders.

INTERIOR CYLINDER FILL STATIONS AND ENCLOSURES. Freestanding fill containment stations that provide firefighters the ability to regulate breathing air pressure and refill self-contained breathing apparatus (SCBA) cylinders.

SELF-CONTAINED BREATHING APPARATUS (SCBA). An atmosphere-supplying respirator that supplies a respirable air atmosphere to the user from a breathing air source that is independent of the ambient environment and designed to be carried by the user.

Revise as follows:

L104.5 Breathing air supply.
~~Where a fire department mobile air unit is available, the~~The FARS breathing air standpipe shall be supplied by an external mobile breathing air fill connection in accordance with Section L104.14. Where a fire department mobile air unit is not available, a stored pressure air supply shall be provided in accordance with Section L104.5.1. A stored pressure air supply shall be permitted to be added to a system supplied by an external mobile breathing air fill connection provided that a means to bypass the stored pressure air supply is located at the external mobile breathing air fill connection.

L104.5.1 Stored pressure air supply.
A stored pressure air supply shall be designed based on Chapter 24 of NFPA 1901 except that provisions applicable only to mobile apparatus or not applicable to system design shall not apply. A stored pressure air supply shall be capable of refilling not less than 50 empty 45 cu ft.(1274 L) breathing air cylinders~~ of a size and pressure used by the fire department~~.

L104.5.2 Retrofit of external mobile breathing air fill connection. A FARS not initially provided with an external mobile breathing air fill connection due to the lack of a mobile air unit shall be retrofitted with an external mobile breathing air fill connection where a mobile air unit becomes available. Where an external mobile breathing air fill connection is provided, a means to bypass the stored pressure air supply shall be located at the external mobile breathing air fill connection. The retrofit shall be completed not more than 12 months after notification by the *fire code official*.

L104.7 Pressure relief valve.
~~Pressure relief valves shall be installed at each point of supply and at the top or end of every riser. The relief valve shall meet the requirements of CGA S-1.3 and shall not be field adjustable. Pressure relief valves shall discharge in a manner that does not endanger personnel who are in the area. Valves, plugs or caps shall not be installed in the discharge of a pressure relief valve. Where discharge piping is used the end shall not be threaded.~~Pressure-relief valves shall be installed downstream of the pressure regulator inlet. The relief valve shall meet the requirements of CGA S-1.3 and shall not be field adjustable. The relief valve shall have a set-to-open pressure not exceeding 1.1 times the design pressure of the system. Pressure-relief valve discharge shall terminate so that the exhaust air stream cannot impinge upon personnel in the area. Valves, plugs, or caps shall not be installed in the discharge of a pressure-relief valve. Where discharge piping is used, the end shall not be threaded.

L104.13 Fill ~~stations~~panels.
Firefighter air replenishment fill ~~stations~~panels shall comply with Section L104.13.1 through L104.13.3.

L104.13.1 Location. Interior cylinder fill panels ~~Fill stations~~ for refilling breathing air cylinders shall be located as follows:

1. In high-rise buildings an interior cylinder fill panel or station shall be installed commencing on the third floor and every third floor thereafter above grade.
2. Underground floors in buildings with more than five underground floors, an interior cylinder fill panel or station shall be installed commencing on the third floor below grade and every three floors below grade thereafter, except for the bottom-most floor.
3. In large area structures the specific location or locations on each floor shall be approved by the *fire code official*.

~~1. Fill stations shall be provided at the fifth floor above and below the ground level floor and every third floor level thereafter.~~

~~2. On floor levels requiring fill stations, one fill station shall be provided adjacent to a required exit stair at a location designated by the *fire code official*. In buildings required to have three or more exit stairs, additional fill stations shall be provided at a ratio of one fill station for every three *stairways*.~~

L104.13.2 Design. Fill ~~stations~~panels for breathing air cylinders shall be designed to meet the following requirements:

1. A pressure gauge and pressure-regulating devices and controls shall be provided to allow the operator to control the fill pressure and fill rate on each cylinder fill hose.
2. Valves controlling cylinder fill hoses shall be slow-operating valves.
3. A separate flow restriction device shall be provided on each fill hose.
4. A method shall be provided to bleed each cylinder fill hose.
5. The interior cylinder fill ~~station~~ stations and enclosures shall be designed to provide a containment area that fully encloses any cylinder being filled and flexible cylinder fill hoses, and directs the energy from a failure away from personnel. Fill stations shall be designed to prohibit filling of cylinders that are not enclosed within the containment area.

   Exception: Where required or *approved* by the *fire code official* in consultation with the *fire chief*, fill ~~stations~~ panels providing for the direct refilling of the firefighters' breathing air cylinders using Rapid Intervention Crew/Company Universal Air Connection (RIC/UAC) fittings shall be used in lieu of cylinder fill ~~stations~~panels that utilize containment areas.

L104.14 External mobile breathing air fill connection.
An external mobile breathing air fill connection shall be provided for fire department mobile air ~~apparatus~~units where required by Section L104.5 to supply the system with breathing air.

L104.14.1 Location. The location of the external mobile breathing air fill connection shall have access for mobile air ~~apparatus~~units and *approved* by the *fire code official*.

L105.1 Acceptance tests.
Upon completion of the installation, a FARS shall be acceptance tested to verify compliance with equipment manufacturers' instructions and design documents. Oversight of the acceptance tests shall be provided by a *registered design professional*. Acceptance testing shall include all of the following:

1. A pneumatic test in accordance with ASME B31.3 of the complete system at a minimum test pressure of 110 percent of the system design pressure using oil free dry air, nitrogen or argon shall be conducted. Test pressure shall be maintained for not less than 24 hours. During this test, all fittings, joints and system components shall be inspected for leaks. Defects in the system or leaks detected shall be documented and repaired.
2. A cylinder-filling performance test shall be conducted to verify compliance with the required breathing air cylinder refill rate from the exterior mobile air connection and, where provided, a stored air pressure supply system.
3. The air quality monitoring system shall be tested to verify both of the following conditions:
   3.1. Visual indicators required by Section L104.15.1 function properly.
   3.2. Supervisory signals are transmitted as required by Section L104.15.2 for each sensor based on a sensor function test.
4. Connections intended for fire department use shall be confirmed as compatible with the fire department's mobile air unit, SCBA cylinders and, where provided, RIC/UAC connections.
5. Air samples shall be taken from not less than two fill ~~stations~~panels and submitted to an *approved* gas analysis laboratory to verify compliance with NFPA 1989. The FARS shall not be placed into service until a written report verifying compliance with NFPA 1989 has been provided to the *fire code official*.

Reason: The attached revisions to Appendix L create consistency in the in the guidance provided in the appendix, NFPA 1 Appendix D, and the UPC Appendix F. the changes include guidance on thresholds for NFPA 1 and the UPC, consistency in definitions, guidance on cascade system volume where provided, and consistency in relief valve use.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

The changes are being made to an optional adoptable appendix.

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IFC: APPENDIX N, SECTION N101, N101.1, N101.1.1, N101.1.2, N101.2, N101.3, SECTION N102, N102.1, SECTION 202, SECTION N103, N103.1, N103.2, N103.3, SECTION N104, N104.1, N104.2, SECTION N105, N105.1, N105.2, N105.3, N105.4, N105.5, N105.6, SECTION N106, N106.1, N106.2, SECTION N107, N107.1, N107.1.1, N107.2, N107.3, N107.3.1, N107.3.2, N107.3.2.1, N107.3.2.2, N107.3.2.3, N107.3.2.4, N107.3.3, N107.3.4, N107.3.4.1, N107.3.4.2, N107.3.4.3, N107.3.5, N107.4, N107.5, N107.5.1, N107.5.2, N107.5.3, N107.5.4, N107.5.5, N107.6, SECTION N108, N108.1, N108.2, N108.3, SECTION N109, N109.1, TABLE N109.1

Proponents: Robert Marshall, FCAC, FCAC (fcac@iccsafe.org)

2024 International Fire Code

Delete without substitution:

~~APPENDIX N INDOOR TRADE SHOWS AND EXHIBITIONS~~

~~SECTION N101~~
~~GENERAL~~

~~**N101.1 Scope.**~~
~~Indoor trade shows and exhibitions with temporary vendor displays or booths within any indoor occupancy classification shall be in accordance with this appendix and all other applicable requirements of this code.~~
~~Compliance with this appendix is not required where Section N101.1.1 or N101.1.2 is applicable.~~

~~**N101.1.1 Nonsprinklered buildings.**~~
~~In a building that is not equipped throughout with an *automatic sprinkler system*, the aggregate exhibit area must be less than 1,500 square feet (139 m²) of floor area and meet both of the following conditions:~~

1. ~~The exhibit area does not include any covered or multiple-level exhibits or booths.~~
2. ~~Not fewer than two remote *exits* or *exit access* doors in compliance with Chapter 10 are provided.~~

~~**N101.1.2 Sprinklered buildings.**~~
~~In a building that is equipped throughout with an *automatic sprinkler system* with a minimum design density of ordinary hazard Group 1, the aggregate exhibit area must be less than 4,500 square feet (418 m²) of floor area and meet both of the following conditions:~~

1. ~~The exhibit area does not include any covered or multiple-level exhibits or booths.~~
2. ~~Not fewer than two remote *exits* or *exit access* doors in compliance with Chapter 10 are provided.~~

~~**N101.2 Permit required.**~~
~~An operational permit for trade shows and exhibitions shall be required as set forth in Section 105.5.15.~~

~~**N101.3 Application.** A permit application for a trade show or exhibition shall be submitted to the *fire code official* prior to the start of the event in a time frame established by the jurisdiction. The application shall include documentation that identifies all of the following:~~

1. ~~The *means of egress*.~~
2. ~~The locations and widths of *exits* and *aisles*.~~
3. ~~The locations of *exit* signs.~~
4. ~~The total square footage (square meters) of spaces.~~

5. ~~The location and arrangement of all booths and cooking equipment.~~
6. ~~The location of all fire protection equipment.~~
7. ~~The type and location of any heating and electrical equipment, where applicable.~~
8. ~~The location of any covered or multiple-level booths.~~
9. ~~*Construction documents* for any covered or multiple-level booths.~~
10. ~~The storage locations and quantities of any highly combustible goods.~~
11. ~~The location and type of any vehicle displays, where applicable.~~

~~SECTION N102~~
~~DEFINITIONS~~

~~**N102.1 Definitions.** For the purpose of this appendix, certain terms are defined as follows:~~

~~**COOKING.** Heating food products to a temperature of 145°F (63°C) or higher by baking, braising, boiling, frying or grilling.~~

~~**COVERED BOOTH.** An exhibit that has an obstruction placed over the exhibit above floor level that resembles a roof, canopy, tent or other obstruction, other than vertical signs or banners.~~

~~**MULTIPLE-LEVEL BOOTH.** An exhibit that has a second level or tier constructed on top of the exhibit or portion of the exhibit that is open to the public, or includes a live load above the exhibit area floor level.~~

~~SECTION N103~~
~~PUBLIC SAFETY FOR EVENTS~~

~~**N103.1 Fire safety and evacuation plan.** A fire safety and evacuation plan shall be provided in accordance with Section 404.2.~~

~~**Exception:** Where the *fire code official* determines that the nature of the exhibition, display or the activities therein does not pose an increased hazard to public safety.~~

~~**N103.2 Fire watch personnel.**~~

~~Where, in the opinion of the *fire code official*, it is essential for public safety in a trade show or exhibition, either because of the number or persons present or because of the nature of the performance, exhibition, display or activity, the *owner* or *owner's* authorized agent shall provide one or more *fire watch* personnel in accordance with Section 403.11.1.~~

~~**N103.3 Crowd managers.**~~

~~Where events involve a gathering of more than 1,000 people, trained crowd managers shall be provided in accordance with Section 403.11.3.~~

~~SECTION N104~~
~~INTERIOR FINISH AND DECORATIVE MATERIALS~~

~~**N104.1 General.**~~

~~Interior finish, interior trim, furniture, furnishings and decorative materials, including decorative vegetation, used in exhibition areas shall comply with the requirements of this section and Chapter 8.~~

~~**N104.2 Interior wall and ceiling finish.**~~

~~The materials used for interior wall and ceiling finish of exhibit booths and displays in exhibition areas shall comply with one of the following:~~

1. ~~Where the building is not equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, the wall and ceiling finish materials are required to be Class A in accordance with Section 803.~~
2. ~~Where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, the wall and ceiling finish materials are required to be not less than Class B in accordance with Section 803.~~

~~SECTION N105~~
~~MULTIPLE-LEVEL BOOTHS~~

~~**N105.1 Construction documents.** *Construction documents* for all multiple-level booths shall be stamped by a *registered design professional* and shall be submitted with the permit application to the *fire code official* or the *building code official*, as appropriate.~~

~~**N105.2 Structural design.**~~

~~Multiple-level booths shall be designed and constructed in accordance with Chapter 16 of the International Building Code.~~

~~**N105.3 Means of egress.**~~

~~Upper levels of multiple-level booths with an *occupant load* greater than 10 persons shall have not fewer than two *exits* or *exit access* that are separated in accordance with Section 1007.1.1.~~

~~**N105.4 Automatic sprinkler systems.** An *approved automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided in multiple-level booths exceeding 400 square feet (37.2 m^2) in floor area per level.~~

~~**N105.5 Inspection.** Inspection to verify that multiple-level booths are constructed in accordance with the *construction documents* and structural design details required by this section shall be *approved* by the *building code official*.~~

~~**N105.6 Fire alarm and detection.**~~

~~Each multiple-level booth with a floor area exceeding 120 square feet (11.1 m^2) on any level shall be provided with an *approved fire alarm system* in accordance with Section 907.2.~~

~~SECTION N106~~
~~COVERED BOOTHS~~

~~**N106.1 Automatic sprinkler systems.** An *approved automatic sprinkler system* in accordance with Section 903.3.1.1 shall be provided in covered booths exceeding 100 square feet (9.3 m^2) in floor area per level.~~

~~**N106.2 Fire alarm and detection.** Each covered booth with a floor area exceeding 120 square feet (11.1 m^2) on any level shall be provided with an *approved fire alarm system* in accordance with Section 907.2.~~

~~SECTION N107~~
~~DISPLAY AND STORAGE OF HAZARDOUS AND COMBUSTIBLE~~

~~MATERIALS~~

~~N107.1 Hazardous materials~~.

~~The display of hazardous materials shall comply with Section 314 and Chapters 50 through 67. The storage of hazardous materials in indoor trade shows and exhibition areas shall be prohibited.~~

~~N107.1.1 Display near exit.~~ ~~The display of hazardous materials within 5 feet (1524 mm) of an *exit* shall be prohibited.~~

~~N107.2 Storage of combustible materials~~.

~~Storage of combustible materials shall comply with Section 315.~~

~~N107.3 Vehicles~~.

~~The display of liquid- or gas-fueled vehicles, boats or other motor craft in indoor trade shows and exhibition areas shall comply with Sections 314.4 and N107.3.1 through N107.3.3.~~

~~N107.3.1 Batteries in vehicles.~~ ~~Vehicle batteries shall be rendered inoperable. Batteries in liquid- and gas-fueled vehicles shall be disconnected. Batteries in electric vehicles shall be rendered inoperable by the removal of fuses or other *approved* methods but shall not be required to be disconnected.~~

~~N107.3.2 Vehicle fuel~~.

~~Vehicle fuel shall comply with Sections N107.3.2.1 through N107.3.2.4.~~

~~N107.3.2.1 Fueling within the structure.~~ ~~Vehicles shall not be fueled or defueled within the structure.~~

~~N107.3.2.2 Vehicle fuel tanks~~. ~~Vehicle fuel tanks shall contain not more than one quarter of the tank capacity or 5 gallons (18.93 L) of fuel, whichever is less.~~

~~N107.3.2.3 Vehicle fuel systems~~. ~~Vehicle fuel systems shall be inspected for leaks prior to the vehicle being brought into the structure.~~

~~N107.3.2.4 Vehicle fuel tank openings~~. ~~Vehicle fuel tank openings shall be locked and sealed to prevent the escape of vapors.~~

~~N107.3.3 Obstruction by vehicles~~. ~~Vehicles shall not be located in such a manner that they obstruct a *means of egress*.~~

~~N107.3.4 Gas-powered vehicles~~.

~~Compressed natural gas (CNG), liquefied petroleum gas (LPG) or hydrogen-powered vehicles present in indoor trade shows and exhibition areas shall comply with Sections N107.3.4.1 through N107.3.4.3.~~

~~N107.3.4.1 Shutoff valves.~~ ~~Shutoff valves shall be closed and the engine shall be operated until it stops. Valves shall remain closed until the vehicle is removed.~~

~~N107.3.4.2 Battery hot lead~~. ~~The hot lead of the battery shall be disconnected.~~

~~N107.3.4.3 Dual-fuel vehicles equipped to operate on gasoline~~.

~~Dual-fuel vehicles equipped to operate on gasoline as well as on CNG, LPG or hydrogen shall comply with Section 3108.14.~~

~~**N107.3.5 Competitions or demonstrations**~~**.**
~~Competitions or demonstrations using any type of vehicle shall comply with Section 3108.14.5.~~

~~**N107.4 Fueled equipment other than vehicles**~~**.**
~~Fueled equipment other than vehicles shall comply with Section 313.~~

~~**N107.5 LP-gas containers**~~**.**
~~Liquefied petroleum (LP) gas containers shall comply with Sections N107.5.1 through N107.5.5 and Chapter 61.~~

~~**N107.5.1 LP-gas containers exceeding 12 pounds (5 kg) of water capacity.**~~ ~~The use of LP-gas containers exceeding 12 pounds (5 kg) of water capacity shall be prohibited.~~

~~**N107.5.2 Where more than one LP-gas container is present in the same area.**~~ ~~Where more than one LP-gas container is present in the same area, cylinders shall be separated from each other by a minimum of 20 feet (6096 mm).~~

~~**N107.5.3 Equipment for LP-gas containers**~~**.**
~~Equipment for LP-gas containers, including tanks, piping, hoses, fittings, valves, tubing and other related components, shall be *approved* and shall comply with Chapter 61 and with the applicable requirements of the International Fuel Gas Code.~~

~~**N107.5.4 Securing of LP-gas containers**~~**.** ~~Portable LP-gas containers shall be securely fastened in place to prevent unauthorized movement.~~

~~**N107.5.5 Spare LP-gas containers.**~~ ~~Spare LP-gas containers not connected to an *approved* appliance shall be stored in a location and manner *approved* by the *fire code official*.~~

~~**N107.6 Cooking and open-flame devices**~~**.**
~~All cooking equipment and any open-flame devices shall comply with the requirements of Section 308 of this code and with Chapter 5 of the International Mechanical Code. Cooking equipment shall be separated from combustible material display or storage by a horizontal distance of not less than 5 feet (1524 mm).~~

~~SECTION N108~~
~~MEANS OF EGRESS~~

~~**N108.1 Means of egress from the indoor trade show or exhibition area**~~**.**
~~*Means of egress* from the indoor trade show or exhibition area shall comply with Chapter 10 and with Sections N108.2 and N108.3.~~

~~**N108.2 Design of means of egress.**~~ ~~The design of *means of egress* shall take into consideration the exhibit layout and the anticipated crowd movement during the event.~~

~~**N108.3 Aisles and corridors.**~~ ~~*Aisles* and *corridors* within the exhibit area shall be kept free of obstructions when the public is present. Storage of any kind in *aisles* or *corridors* within the exhibit area is not permitted.~~

~~SECTION N109~~
~~REFERENCED STANDARDS~~

~~**N109.1 General.**~~

~~See Table N109.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.~~

~~**TABLE N109.1 REFERENCED STANDARDS**~~

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
IBC—24	*International Building Code*	N105.2
IFGC—24	*International Fuel Gas Code*	N107.5.3
IMC—24	*International Mechanical Code*	N107.6

Reason: Many of the provisions in Appendix N already exist in the body of the IFC. No fire loss data exists to support many of the other provisions in Appendix N. As Appendix N is currently drafted it contains numerous sections that are difficult to effectively and consistently enforce. Last cycle the FCAC proposed moving Appendix N to the body of the IFC. However, that was disapproved in part due to testimony regarding difficulties in attempting to adopt and enforce provisions of the Appendix encountered by a major jurisdiction that hosts large indoor trade shows. The testimony indicated that as written it could not be enforced. Currently no jurisdiction is enforcing the appendix as written. Loss data does not support moving to the body of the code or retaining this Appendix.

FCAC was established by the ICC Board of Directors in July 2011 to pursue opportunities to improve and enhance assigned International Codes or portions thereof. In 2023 and early 2024 the FCAC has held several virtual meetings and one in-person meeting open to any interested party. In addition, there were numerous virtual Working Group meetings for the current code development cycle, which included members of the committee as well as interested parties. Related documents and reports are posted on the **FCAC Website**

Cost Impact: Decrease

Estimated Immediate Cost Impact:

$0.00

Estimated Immediate Cost Impact Justification (methodology and variables):

Enforcing this Appendix if adopted is not related to construction costs. The deletion will avoid unnecessary costs in enforcement. As noted this appendix has been seen as problematic for enforcement.

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IFC: APPENDIX P (New), (New), SECTION P101 (New), P101.1 (New), P101.2 (New), SECTION 202 (New), P101.3 (New), SECTION P102 (New), P102.1 (New), P102.2 (New), P102.3 (New), P102.3.1 (New), P102.3.2 (New), P102.4 (New), P102.5 (New), P102.6 (New), P102.7 (New), P102.8 (New), P102.9 (New), P102.10 (New), SECTION P103 (New), P103.1 (New), P103.2 (New), SECTION P104 (New), P104.1 (New), P104.2 (New), P104.3 (New), P104.4 (New), SECTION P105 (New), P105.1 (New), P105.2 (New), P105.3 (New), SECTION P106 (New), P106.1 (New), P106.1.1 (New), P106.2 (New), SECTION P107 (New), P107.1 (New), SECTION P108 (New), E108.1 (New), TABLE P108.1 (New)

Proponents: Jeffrey Shapiro, International Code Consultants, Lake Travis Fire Rescue (jshapiro@LTFR.org)

2024 International Fire Code

Add new text as follows:

APPENDIX P
SHORT-TERM RESIDENTIAL RENTAL SAFETY PROGRAM

. *The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance or legislation of the jurisdiction.*

About this appendix: This appendix prescribes minimum safeguards for life-safety to protect *transient* occupants of a *short-term rental property.* It is intended for distribution to a *responsible party* to highlight select requirements of the International Fire Code and International Property Maintenance Code plus prescribe additional requirements that are uniquely applicable to *short-term rental properties.*

-

SECTION P101
GENERAL

P101.1 Scope. *Dwelling units*, *sleeping units*, and portions thereof classified as a *short-term rental property* shall comply with this appendix.

P101.2 Definitions. For the purpose of this appendix, certain terms are defined as follows:

Add new definition as follows:

RESPONSIBLE PARTY. An *owner* or manager operating a *short-term rental* property.

SHORT-TERM RENTAL PROPERTY.
A *dwelling unit*, *sleeping unit*, or portion thereof providing one or more *sleeping spaces*, made available for temporary occupancy, whether rented or swapped, for a period of 30 days or less.

SLEEPING SPACE.
A bedroom or other location intended to provide sleeping accommodations.

Add new text as follows:

P101.3 Permit. A permit shall be required for each short-term rental property. Where two or more sleeping rooms are available for separate rental or exchange in a single *dwelling unit* or *sleeping unit*, only one permit for the *dwelling unit* or *sleeping unit* shall be required. A permit application shall be accompanied by a floor plan that identifies every *sleeping space* and a copy of the safety plan required by this appendix.

SECTION P102
GENERAL SAFETY FEATURES AND PRECAUTIONS

P102.1 General. *Short-term rental properties* shall comply with Sections P102.2 through P102.10.

P102.2 Permissible locations. *Short-term rental properties* shall be located in buildings that were constructed with an *approved* building code and are maintained in accordance with the International Property Maintenance Code.

Exception: The *fire code official* is authorized to accept *short-term rental properties* of a different type where justified in accordance with Section 104.2.3 or 104.2.4.

P102.3 Smoke alarms. *Smoke alarms* shall be installed and maintained in accordance with Section 907.2.11.

P102.3.1 Additional smoke alarms. Where a *sleeping space* would otherwise not require a *smoke alarm* based on the requirements of 907.2.11, a *smoke alarm* shall be installed in such space.

P102.3.2 Replacement. If a smoke alarm stops functioning or is more than 10-years old, based on the date marked on the back of the device, or if there is no marked date, such smoke alarm shall be replaced.

P102.4 Carbon monoxide alarms. Carbon monoxide alarms shall be provided and maintained in accordance with Section 915.

P102.5 Portable Fire extinguishers. A minimum of one portable fire extinguisher with a minimum rating of 2-A:10-B:C shall be provided on each story of a *short-term rental unit*, secured on a mounting bracket in a conspicuous and unobstructed location along a normal path of travel.

P102.6 Fire protection system maintenance. *Fire alarm systems* and *automatic sprinkler systems*, where provided, shall be inspected, tested, and maintained operational in accordance with this code.

P102.7 Electrical safety. Use of current taps, relocatable power taps and extension cords shall be in a safe manner and that complies with Sections 603.5 and 603.6.

P102.8 Portable heater safety. Portable heaters shall be listed and labeled and shall be located not less than 3 feet (914 mm) from any combustible material. Portable electric heaters shall be plugged directly into a permanent receptacle. Portable fuel-fired heaters shall not be placed in a *sleeping space* or within 5 feet (1524 mm) of an exit.

P102.9 Outdoor cooking. Outdoor cooking shall not be conducted on combustible balconies or decks or within 10 feet (3048 mm) of combustible construction.

P102.10 Clothes dryer maintenance. The lint trap, mechanical and heating components, and the exhaust duct system of clothes dryers shall be maintained free of lint accumulation.

SECTION P103
OCCUPANCY AND USE LIMITS

P103.1 Overcrowding. The number of occupants in a *short-term rental property* shall not exceed the limits established by Section 404 of the International Property Maintenance Code.

P103.2 Prohibited sleeping spaces. Kitchens and non-habitable spaces shall not be used as *sleeping spaces*.

SECTION P104
MEANS OF EGRESS AND ESCAPE

P104.1 Minimum access. Where more than one *sleeping space* is located in a *dwelling unit* or *sleeping unit*, a *sleeping space* shall not constitute the only means of access to other *sleeping spaces* or *habitable spaces* and shall not serve as the only means of egress from other *habitable spaces*.

P104.2 Exit identification. Where the egress path to an exit is not readily apparent, photoluminescent exit signs shall be installed to clearly mark the egress path.

P104.3 Emergency escape and rescue opening. Each *sleeping space* shall have an *emergency escape and rescue opening* that complies with the code that was in effect at the time of construction, and openings shall be maintained such that they are operational from the inside without the use of keys or tools. Where bars, grilles, grates or similar devices are placed over an *emergency escape and rescue opening*, the minimum net clear opening size that complies with the code that was in effect at the time of construction shall be maintained.

P104.4 Escape ladders. Where a *sleeping space* is located more than one *story* above *grade plane*, an emergency escape ladder complying with ASTM F2175 shall be provided at not less than one *emergency escape and rescue opening* on each such story.

SECTION P105
SAFETY PLAN

P105.1 General. The *responsible party* shall prepare, implement, and maintain a written safety plan for each *short-term rental property*.

P105.2 Approval. The safety plan shall be submitted to the *Fire Code Official* and *approved* before a permit is issued.

P105.3 Safety plan elements. *Short-term rental property* safety plans shall include the following:

1. Name and contact information of *responsible party*.
2. The procedure for a transient occupant to report an emergency and the means of communicating that procedure to transient occupants.
3. A graphic illustration of the full floor plan of the *dwelling unit* or *sleeping unit* with a *short-term rental property* that includes the following:
   - 3.1. The location of each *sleeping space*.
   - 3.2. Two escape paths for each *sleeping space*, including the path to the nearest outside exit door and to a designated *emergency escape and rescue opening* for the *sleeping space*.
   - 3.3. The location of *portable fire extinguishers*, *smoke alarms*, *carbon monoxide alarms*, and emergency escape ladders if provided.
4. Safety equipment records, including the following:
   - 4.1. Location and manufacturing date of each *smoke alarm*, as marked on the back of the alarm.
   - 4.2. Location and manufacturing date of each *carbon monoxide alarm*, as marked on the back of the alarm.
5. Location of fuel-fired equipment and *appliances*.

SECTION P106
FIRE SAFETY INSPECTIONS

P106.1 Responsible party inspections. The *responsible party* shall complete a monthly fire safety inspection of the *short-term rental property* to verify compliance with this appendix. All indoor and outdoor areas associated with the *short-term rental property* shall be inspected.

P106.1.1 Inspection of automatic sprinkler systems. Inspection of automatic sprinkler systems, where provided, shall include the following on a monthly basis unless otherwise indicated:

1. Control valves shall be verified as being in the open position.
2. Leaking, damaged, corroded, or painted sprinklers shall be replaced.
3. Decorations or other materials obstructing sprinkler discharge or attached to sprinklers shall be removed.
4. Water tanks or other stored water sources, if present, shall be verified as full.
5. Instruction signs and tags shall be installed near the main valve.
6. The owner's manual for the system shall be onsite.
7. Water pumps, if present, shall be tested annually to confirm proper operation.
8. Waterflow devices that initiate alarms, if present, shall be tested annually to confirm proper operation.

P106.2 Official inspections. Where required by the *fire code official*, an annual inspection by the *fire code official* or an approved third-party inspector shall be conducted at the *responsible party's* expense to verify compliance with this appendix. The results of each inspection shall be documented and maintained at the *short-term rental property* in a conspicuous location for transient occupants to review.

SECTION P107
VIOLATIONS

P107.1 General. Failure to comply with this appendix shall constitute an unlawful act in accordance with Section 113.1 and shall result in the issuance of a notice of violation to the short-term rental owner in accordance with Section 113.3.

SECTION P108
REFERENCED STANDARDS

E108.1 General. See Table P108.1 for standards that are referenced in various sections of this appendix. Standards are listed by the standard identification with the effective date, standard title, and the section or sections of this appendix that reference the standard.

TABLE P108.1 REFERENCED STANDARDS

STANDARD ACRONYM	STANDARD NAME	SECTIONS HEREIN REFERENCED
ASTM F2175-2015	Standard Specification for Portable and Permanent Emergency Escape Ladders for Residential Use	P104.4

Staff Analysis: A review of the standard proposed for inclusion in the code, ***Standard Specification for Portable and Permanent Emergency Escape Ladders for Residential Use (ASTM F2175-2015)***, with regard to some of the key ICC criteria for referenced standards (Section 4.6 of CP#28) will be posted on the ICC website on or before March 18, 2024.

Reason: Regulation of short-term rental (STR) properties is largely done by a patchwork of jurisdiction-by-jurisdiction requirements with little consistency from what I've found. My focus in submitting this proposal is gaining a level of consistency and education of STR owners and operators via a understandable consolidation of the "most important" safety requirements in ICC codes. Although the ICC codes, such as the IFC and IEBC, include a large number of safety-related provisions that are applicable to STRs (and served as the basis for much of the appendix content), they are currently dispersed in a way that does not promote understanding or compliance by people who don't live in the code world. "Most important" reflects my personal opinion of code requirements that I felt were appropriate to include/duplicate/reference in the new appendix to have the greatest impact on improving safety (primarily fire safety) if understood and followed by responsible parties. Certainly, others may have different perspectives, and hopefully the framework provided by the proposed appendix can be further populated as needed to address considerations raised by others during the code development process.

Some additional requirements, that are not otherwise provided for by current codes and seem appropriate for regulation of STRs, are also included in the proposal. These include, among others, as escape ladders for second story sleeping areas, declaration of sleeping spaces, and requiring that sleeping spaces are treated as bedrooms even though such spaces in a STR might be repurposed common areas that wouldn't have previously been considered or regulated as a bedroom.

It's important to note that while fires are not known to be frequent in STRs, they have resulted in significant life loss. Also note that the content of this appendix deliberately sidesteps some of the most controversial issues surrounding regulation of STRs by a jurisdiction, particularly nuisance complaints related to noise, parking and trash; neighborhood STR density limits; licensing; and collection of fees/lodging taxes.

Although I serve as a consultant to the National Fire Sprinkler Association, and while this proposal includes regulations that affect sprinklers, this proposal was not reviewed or endorsed by NFSA. And, I am not representing NFSA on this issue.

Cost Impact: The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification for no cost impact:

Actually, the proposal is not entirely editorial, but it should have no impact on the cost of construction because, for the most part, it simply consolidates/duplicates a selection of existing ICC code requirements into a single location. That's not to say that there wouldn't be costs associated with upgrading an otherwise non-compliant STR property or the required administrative oversight or safety feature additions, but these are not construction costs.

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