ORDINANCE NO. 95-070

ADOPTED BY THE SACRAMENTO CITY COUNCIL

ON DATE OF DEC 1 2 1995

AN ORDINANCE AMENDING CHAPTER 15.02 OF TITLE 15 OF THE SACRAMENTO CITY CODE RELATING TO FIRE PREVENTION AND ADOPTING THE UNIFORM FIRE CODE, 1994 EDITION, SAVE AND EXCEPT SUCH PORTIONS AS ARE DELETED, ADDED OR AMENDED.

BE IT ENACTED BY THE COUNCIL OF THE CITY OF SACRAMENTO:

SECTION 1.

Chapter 15.02 of Title 15 of the Sacramento City Code is hereby amended to read as follows:

Chapter 15.02 Fire Prevention

15.02.200 Adoption of Uniform Fire Code.

There is hereby adopted by the City, a municipal corporation, pursuant to the provisions of its City Charter and also Article 2 (commencing with Section 50020) Chapter 1, Division 1, Title 5 of the Government Code, for the purpose of prescribing regulations governing conditions hazardous to life and property from fire or explosion, that certain code known as the Uniform Fire Code, 1994 Edition, including Appendices thereof, as recommended by the Western Fire Chiefs Association and the International Conference of Building Officials, save and except such portions as are hereinafter deleted, added or amended.

The Uniform Fire Code, 1994 Edition, is enacted by reference pursuant to the provisions of Section 50022.2 of the Government Code, and prior to the enactment of this article the City Council duly and regularly held a public hearing after the publication of notice in accordance with Section 6066 of the Government Code.

15.02.201 Short Title.

The Uniform Fire Code, as adopted by Section 15.02.200 with such deletions, amendments and additions thereof as are set forth in this article, shall be known and may be cited as the "Fire Prevention Code" of the City.

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Sec. 15.02.202 Amendment of Article 1, Section 101, General.

Subsection 101.3 Subjects not specifically regulated by this code. Is amended by adding to the first paragraph to read:

See Article 90 for adopted National Fire Protection Association Standards.

Sec. 15.02.203 Amendment of Article 1, Section 103, Inspection and Enforcement.

Subsection 103.1.1 Technical Assistance. Is amended by adding the following subsection:

Subsection 103.1.1.1 Contract Inspector.

The Fire Chief or his designated representatives may require the owner or the person in possession or control of the building or premises to provide, without charge to the fire department, a contract inspector, when the department has no technical expertise available to conduct the required inspections.

The contract inspector shall be a qualified person who shall demonstrate his competence to the satisfaction of the Fire Marshal, for inspection of a particular type of construction, operation, fire extinguishing or detection system, or process.

1. The contract inspector shall observe the work assigned for conformance with the approved design drawings and specifications.

2. The contract inspector shall furnish inspection reports to the Fire Marshal, building official, and other designated persons as required by the Fire Chief. All discrepancies shall be brought to the immediate attention of the contractor for correction, then if uncorrected, to the proper design authority, the Fire Marshal, and to the building official.

3. The contract inspector shall submit a final signed report stating whether the work requiring inspection was, to the best of his knowledge, in conformance with the approved plans and specifications and the applicable workmanship provision of this code.

Subsection 103.1.3 Practical Difficulties. Is amended to read as follows:

The Fire Marshal shall have power to modify any of the provisions of the Fire Prevention Code upon application in writing by the owner or lessee, or his or her duly authorized agent, when there are practical difficulties in the way of carrying out the strict letter of the code, provided

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that the spirit of the code shall be observed, public safety secured, and substantial justice done. The particulars of such modification when granted or allowed and the decision of the Fire Marshal shall be entered upon the records of the department and a signed copy shall be furnished the applicant.

Subsection 103.1.3.1 Modifications. Is added as follows:

Whenever the Fire Marshal shall disapprove an application or refuse to grant a permit applied for, or when it is claimed that the provisions of the code do not apply or that the true intent and meaning of the code has been misconstrued or wrongly interpreted, the applicant may request a hearing from the Fire Chief.

Subsection 103.1.4 Appeals. Is deleted.

All appeals described in Subsection 103.1.4 shall be governed by Chapter 9.19 of Title 9 of the Sacramento City Code or any successor provisions thereto.

Subsection 103.3.2.1.1 Plans. Is added as follows:

All plans for new construction, remodeling, or additions to buildings shall be submitted for review prior to construction.

Plan approval shall be required prior to issuance of a Fire Department Record Card by the Fire Marshal in those instances where the record card may be required.

Subsection 103.3.5 Inspection Record Card. Is added as follows:

Work requiring Fire Department approval may commence, but the person doing the work shall have posted or otherwise made available an inspection record card such as to allow the Fire Marshal or his designee to conveniently make the required entries thereon regarding inspection of the work. Work shall not be covered until the required inspections are completed. This card shall be maintained available by the permit holder until final approval has been granted by the Fire Marshal.

Subsection 103.4.1.2 Unsafe Heating or Electrical Equipment and Structural Hazards. Is amended by adding the word:

"remove" in the sixth line stating ... a written notice to remove, repair or alter...

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Subsection 103.4.1.3.1 Change of Occupancy. Is added as follows:

Any building not in compliance with Section 3405 U.B.C., 1994 (Change in Use) shall be considered a fire hazard and shall be vacated until a certificate of occupancy is issued by the building inspections division.

Subsection 103.4.4 Penalties for Violations. Is added as follows:

Any person violating any provision of the following sections of the Uniform Fire Code, as they may be amended, is guilty of a misdemeanor;

SECTION	MISDEMEANOR OFFENSE
103.4.3.1	Noncompliance with Orders of Notices
103.4.3.2	Noncompliance with Condemnation Tag
103.4.3.3	Removal and Destruction of Tags & Signs
103.4.4	Unlawful Continuance of Hazards
104.1.2	Interference at Fire Scenes

Any person violating any other provision of the Uniform Fire Code is guilty of an infraction. For penalties for violations see the amendment to the Bail Schedule, Uniform Fire Code Appendix A-VI-C-5.

Subsection 103.4.5 Unsafe Buildings. Is amended by deleting the last sentence of the paragraph and replacing it with:

See Title 50, the Dangerous Buildings Code of the Sacramento City Code.

Sec. 15.02.204 Amendment of Article 1, Section 104, Control and Investigation of Emergency Scenes.

Subsection 104.1.2 Interference. Is amended by adding a sentence at the end of the paragraph as follows:

Any person failing to obey such commands shall be guilty of a misdemeanor.

Sec. 15.02.205 Amendment of Article 1, Section 105, Permits.

Subsection 105.1.1 Permits and Certificates. Is added as follows:

Permits and Certificates. It shall be unlawful for any person, firm or corporation to use a

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building or premises or engage in any activities for which a valid permit is required by this code without first having obtained such valid permit. Permits are required from the Fire Marshal. The provisions of this article apply to permits required by Subsection 105.8, Uniform Fire Code or other provisions of this code.

Subsection 105.1.2 Failure to Obtain or Renew a Permit. Is added as follows:

Failure to obtain or renew a permit in accordance with Subsections 105.1.1 and 105.8 shall be an infraction citable under this subsection.

Subsection 105.7 Revocation of Permits. Is amended to read as follows:

The Fire Marshal is authorized to suspend or revoke a permit. A reinstatement hearing with the Fire Marshal may be requested. Failure to maintain a valid permit where a permit is required by this code shall be an infraction and a citation may be issued.

Subsection 105.7.1 Permit Renewal. Is added as follows:

A permit shall be renewed annually by remitting the renewal fee set by resolution of the Sacramento City Council.

Subsection 105.8 Permit Required. Is amended by adding, deleting, or modifying the following activities, operations, practices or functions:

Additions:

a Acetylene Generator. To operate portable or fixed generators, see 4901.3, 4910, 4911, Uniform Fire Code.

a.3.1 Airport - Commercial. To operate an airport, see Article 24, Uniform Fire Code.

a.3.2 Airport - Private. To operate a private airport, see Article 24, Uniform Fire Code.

a3.3 Apartments 3 to 8 units.
a3.4 Apartments 9 to 16 units.
a3.5 Apartments 17 to 30 units.
a3.6 Apartments 31 to 60 units.
a3.7 Apartments 61 to 100 units.
a3.8 Apartments 101 to 150 units.
a3.9 Apartments 151 to 200 units.
a3.10 Apartments 201 to 250 units.

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a3.11 Apartments 251 to 300 units.
a3.12 Apartments 301 to 350 units.
a3.13 Apartments 351 to 400 units.
a3.14 Apartments 401 to 450 units.
a3.15 Apartments 451 to 500 units.
a3.16 Apartments 501 to 550 units.
a3.17 Apartments 551 or more units.

a3.18 Artist Live/Work. To maintain an artist's work space containing living accommodations. See Sacramento City Code Title 9, Chapter 9.29.

b. Bonfires/Recreational Fires.

c1.1 Calcium Carbide.

c4.1 Christmas Tree Lots. (See Sacramento City Code, Title 15, Chapter 15.04). To operate a tree lot.

c.4.2 Church. See Article 25, Uniform Fire Code.

d. Day Care/Preschool - Commercial (E3), 7 to 49 persons, see Article 2, Uniform Fire Code.

da. Day Care/Preschool - Commercial (E3), 50 to 99 persons, see Article 2, Uniform Fire Code.

db. Day Care/Preschool - Commercial (E3), 100 persons and over, see Article 2, Uniform Fire Code.

dc. Day Care/Preschool - Residential/Large Family (R3), 7 to 12 persons, see Article 2, Uniform Fire Code.

dd. Demonstrations/Fire Prevention Talks.

e. Excavate Flammable Pipeline(s), see Section 7901.3.1, Uniform Fire Code.

f. Fire Alarm System. To install or remodel or operate a fire alarm system regulated by Article 10, Uniform Fire Code.

f2.1 Fireworks Sale Booth. See Title 15 SCC.

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f.3.2.3 Flammable and Combustible Liquids.

h.2.2 Heliport. To operate a heliport not on an established airport, see Article 24, Uniform Fire Code.
h.2.3 Helistop. To operate a helistop not on an established airport, see Article 24, Uniform Fire Code.
h.2.4 Helistop Undesignated. To use an area as a temporary landing facility for amusement, working lifts or drops.

h4. Hotel, Motel - 3 to 8 rooms.
h5. Hotel, Motel - 9 to 16 rooms.
h6. Hotel, Motel - 17 to 30 rooms.
h7. Hotel, Motel - 31 to 60 rooms.
h8. Hotel, Motel - 61 and + rooms.

i Inspections/Courtesy, Requested.

i.1 Institutions/Hospitals

1. Nurseries for the full time care of children under the age of 6 (each accommodating more than 5 children).
2. Hospitals, Sanitariums, Nursing Homes with non-ambulatory patients and similar buildings (each accommodating more than 5 patients).

i.1.2 Health-Care Centers.

1. For ambulatory patients receiving outpatient medical care which may render the patient incapable of unassisted self-preservation (each center accommodating more than 5 such patients).

i.2 Nursing homes for ambulatory patients.

1. Homes for Children 6 years of age or over (each accommodating more than 5 persons).

i.3 Mental Hospitals, Mental Sanitariums, Jails, Prisons, and Reformatories.

1. Buildings where personal liberties of inmates are similarly restrained.

1.1 From 6 to 49 persons.
1.2 From 50 to 149 persons.

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1.3 From 150 or more persons.
1.4 From 150 or more persons with multiple buildings.

m2.1 Marina. To operate a marina. See Appendix II-C and Article 52, Uniform Fire Code.

m2.2 Marina - Open Flame. To use open flame for vessel maintenance and repair. See Appendix II-C, Uniform Fire Code.

m2.3 Marina - Barbecue. To use open flame for cooking purposes at a marina. See Appendix II-C, Uniform Fire Code.

m4 Multiple Story Building - 3 stories to less than 75 feet in height.

m5 Multiple Story Building - 75 feet or more in height.

o.1.1 Oil and natural gas wells.

o1.2 Oil Burning Equipment.

R4 Roofing/Special Application. To operate a flame producing device for roofing application. See Section 1109.3.2, Uniform Fire Code.

W3 Woodworking Shop/Cabinet, Molding shop. See Article 30, Uniform Fire Code.

Deletions:

fi (Handled by City Water Department).

Modifications:

f2 Fireworks, For Permits For Fireworks, See Sacramento City Code, Title 15, Chapter 15.03.

m.2 Mall Covered or Partially Covered. See definition Article 2 and Article 35, Uniform Fire Code. To use a covered or partially covered mall in the following manner:

1 Placing or constructing temporary kiosks, display booths, concession equipment or the like in the mall.

2 To use a mall as a place of assembly.

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3 Deleted. See Section 3504.8, Uniform, Fire Code.

4 To display any liquid or gas-fueled powered equipment.

p.3 For permits for pyrotechnical special effects material, See Title 15 Sacramento City Code and Title 19 California Code of Regulations.

Sec. 15.02.206 Amendment of Article 2, Definitions and Abbreviations.

Section 202-A is amended to read as follows:

ALARM SIGNAL is an audible or visual signal or both indicating the existence of an emergency fire condition. The alarm signal shall be easily distinguishable from any nonfire signaling device.

Section 202-A is amended by adding:

ARTIST LIVE/WORK SPACE is an artist workshop which contains living quarters and which may be used for artistic display/demonstrations with an occupant load of less than 50 persons. Identified as an ALW occupancy within its own classification.

Section 204-C is amended by adding:

CONGREGATE RESIDENCE is any building or portion thereof which contains facilities for living, sleeping and sanitation, as required by this code, and may include facilities for eating and cooking, for occupancy by other than a family. a congregate residence may be a shelter, convent, monastery, dormitory, fraternity or sorority house but does not include jails, hospitals, nursing homes, hotels or lodging houses.

CONTAINER, PORTABLE is of approved material and construction having a tight fitting screwed or spring cover closure, and so designed that the contents can be dispensed without spilling. See Article 90, Sections U 1.2 and U 1.12 and Table 7902.1A.

Section 205-D is amended by adding:

DAY CARE/PRESCHOOL - COMMERCIAL is any nonresidential building or portion thereof used for day care purposes for more than 6 children/persons. Also any residential building used for day care purposes for more than 12 children/persons.

DAY CARE - LARGE FAMILY is a State licensed residence which provides day care for 7-12 children/persons inclusive.

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Section 206-E is amended by adding:

ELECTRONIC MONITORING SYSTEM shall mean an approved method to electronically detect and transmit to an approved alarm service provider's Type A (listed) Central Station, information indicating that the automatic fire sprinkler system or automatic fire alarm system has been activated. The central monitoring station shall have the ability to relay the alarm to the Sacramento Regional Fire, EMS Communications Center in an approved manner.

EXIT DISCHARGE AREA is an area designated for occupant discharge, dispersal or refuge (see Section 1213, Uniform Fire Code).

Section 207-F is amended by adding:

FIRE APPARATUS ACCESS ROAD is a required access roadway having an unobstructed width of not less than 20 feet and an unobstructed vertical clearance of not less than 13 feet 6 inches. (See Article 9 Section 902, Fire Department Access, Uniform Fire Code).

FIRE LANE is a fire apparatus access road - See definition for fire apparatus access road and Article 9, Section 902, Uniform Fire Code.

Section 209-H is amended by adding:

HELIPORT is an identifiable area used or intended to be used for the landing and take off of helicopters and may include fueling, maintenance, and storage.

HELISTOP is the same as a heliport, except that no refueling, maintenance, repairs or storage of helicopters is permitted.

HELISTOP UNDESIGNATED is an approved area of temporary use for public relations, amusement rides, display or working lifts or drops by helicopters.

Section 213-L is amended by adding:

LOCAL ALARM is any visual/audio device used for alerting building occupants.

Section 214-M is amended by adding Marina and Multiple Story Building and by modifying Mall to read as follows:

MALL is a roofed or covered common pedestrian area within a covered or partially covered mall building which serves as access for two or more tenants and may have three levels that are open to each other.

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MARINA. See Appendix II-C, Section 4, Definitions, Uniform Fire Code.

MULTIPLE STORY BUILDING is a building containing 3 or more stories.

Section 215-N is amended by adding:

NEGLIGENT is lacking of proper care or concern, or disregarding or ignoring, or failing to care for or give proper attention to.

NESTING is a method of securing cylinders upright in a tight mass using a contiguous three-point contact system whereby all cylinders within a group have a minimum of three points of contact with other cylinders, walls or bracing.

Section 220-S is amended to read as follows:

STREET is any thoroughfare or public way not less than 20 feet in width which has been dedicated or deeded to the public for public use. See Article 9, Section 902 Fire Department Access, Uniform Fire Code.

Section 223-V is amended by adding:

VALID PERMIT means that a permit is not expired, suspended or revoked. Failure to maintain a valid permit where such permit is required by this code is an infraction.

Sec. 15.02.207 Amendment of Article 9, Section 901, General Provisions for Safety.

Subsection 901.4.4 Premises Identification. Is amended to read as follows:

Premises identification shall be in accordance with this section and the Uniform Building Code.

1. Approved numbers or addresses shall be placed on all new and existing buildings and fire department connections and shall be in accordance with items 1.1, 1.2 and 1.3 of this section. Numbers and addresses shall be placed on a contrasting background and shall be in such a position as to be plainly visible and legible from the street or road fronting the property.

    1.1 Numbers or addresses shall be displayed on the rear of buildings containing multiple tenant spaces where vehicle access is available to the rear by means of driveways, parking lots, or alleyways. Doors servicing individual tenant spaces, and doors serving alleyways shall be marked with numbers or addresses.

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1.2 Numbers or addresses shall be displayed on the rear of tenant spaces served by corridors, exit corridors or exit yards.

1.3 Numbers or addresses shall be placed over the entrance door where tenant spaces front on interior walkways or pedestrian malls.

1.4 Illuminated annunciators and/or directory boards shall be required at each entrance as deemed necessary by the Fire Marshal.

1.5 Minimum stroke height of numerals shall be four inches when 50 feet or less from the roadway and six inches when more than 51 feet from the roadway.

Subsection 901.6.1 Access to Mobile Home Parks. Is added as follows:

Gates which are placed across main entrances to mobile home parks shall be approved by the Fire Marshal. Plans shall be submitted, reviewed, and approved by the Fire Marshal prior to construction start. Other access points to mobile home parks shall be of a type approved by the Fire Marshal. See 902.2.4.

Sec. 15.02.208 Amendment of Article 9, Section 902, Fire Department Access.

Subsection 902.2.4.3 Gates and Barriers. Is added as follows:

All installation of gates and barriers on fire department apparatus access roads shall be plan reviewed and approved by the Fire Marshal prior to construction start.

Sec. 15.02.209 Amendment of Article 9, Section 903, Water Supplies and Fire Hydrants.

Subsection 903.1 General. Is amended by adding the following at the end of the subsection.

Water supplies and fire hydrants shall also be in accordance with City of Sacramento's Standard Specifications For Public Works Construction.

Subsection 903.1.1 Fire Service. Is added as follows:

The fire sprinkler system in each building shall be supplied by an individual water main.

Subsection 903.1.2 Fire Department Connections. Is added as follows:

1. Fire department connections shall supply to the system side of any fire sprinkler system without intervening valves.

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2. Fire department connections shall identify on a durable sign the building served.

3. Fire department connections shall be protected by bollards or other means when required by the Fire Marshal.

Subsection 903.2 Required Water Supply for Fire Protection. Is amended by adding the following:

Group R Division III Occupancies without an approved fire flow shall be sprinklered.

Sec. 15.02.210 Amendment of Article 10, Section 1001, Fire Protection Systems and Equipment.

Subsection 1001.1.2 Fire Alarm System Permit. Is added as follows:

A separate permit shall be taken for any fire alarm system installation. See Subsection 105.8.

Subsection 1001.3 Plans for Fire Alarm Systems. Is amended to read as follows:

1. Complete plans and specifications for fire alarm systems shall be submitted for review and approval prior to system installation. Plans and specifications shall include, but not be limited to, a floor plan, location of all alarm initiating and alarm signaling devices, alarm control and trouble signaling equipment, annunciation, provide manufactures model number and UL listing for all devices and equipment power connections, voltage drop calculations, and conductor type and size, battery calculations, and alarm matrix/sequence of operations, and controls, and shall include the total number of devices, and the California State Fire Marshal listing number.

2. Submittal of fire alarm system plans shall also be in accordance with Subsection 1001.3.2, paragraphs 2, 3, and 4.

Subsection 1001.3.1 Fire Sprinkler System Permits. Is added as follows:

A permit shall be taken for any fire sprinkler system installation. Fire sprinkler system permits may be taken in combination or separately for each type of system.

Subsection 1001.3.2 Plans for Fire Sprinkler Systems. Is amended to read as follows:

1. Separate plans shall be submitted for the following, being drawn on separate sheets; underground piping, fire pumps and fire pump rooms, overhead fire sprinkler piping systems, portions of systems which may be uncharacteristic to the main system and may

include dry pipe systems, pre-action systems or combinations thereof.

2. For other than pre-engineered systems, all plans for proposed fixed fire protection systems shall bear the stamp of approval of a qualified registered professional engineer or a fire protection contractor licensed for said work by the State of California. Plans shall be provided at no cost to the Fire Department.

3. Three copies of the complete plans, specifications, and information regarding the fire detection system or fire protection system including specifications and floor plans shall be submitted to the fire department or the Fire Chief's designated representatives, for approval prior to installation and/or construction. All automatic fire protection and electronic fire detection system plans and calculations shall bear the stamp of approval of a qualified registered professional engineer or a fire protection contractor (C-16) or fire alarm contractor (C-7, C-10,), licensed for said work by the State of California. One copy may be retained by the Fire Marshal.

4. When a test or inspection is scheduled and or work requires additional inspections which are not included in the original permit fee or the contractor fails to perform to the satisfaction of the authority having jurisdiction, the authority having jurisdiction may bill the contractor for actual time spent traveling to and from the test/inspection location and the time spent at the test/inspection site as well as administrative costs.

Subsection 1001.5.1 General. Is amended to read as follows:

1. All sprinkler systems, fire hydrant systems, standpipes, fire alarm systems, portable fire extinguishers, smoke and heat ventilators, smoke-removal systems and other fire protection or extinguishing systems or appliances shall be maintained in an operative condition at all times and shall be replaced or repaired where defective. The fire department having jurisdiction shall be notified immediately by the building owner, his agent or service company, of any malfunction of any fire protection equipment, extinguishing system, and at any time when repair, or maintenance of same are to be performed. All work shall be promptly completed without interruption and protection restored as promptly as possible.

2. When changes or repairs involve shutting off water from any number of sprinklers for more than two hours, temporary water supply connections shall be made to sprinkler systems so that reasonable protection can be maintained. Protection shall be restored each night. The Fire Marshal may require a fire watch while any system is inoperative. See the Fire Watch Standard in Article 25.

3. All additions, repairs, alterations and servicing shall be in accordance with recognized

standards. All individuals or companies installing repairing, testing, servicing or maintaining sprinkler systems, fire hydrant systems, standpipes, fire alarm systems, portable fire extinguishers, smoke and heat ventilators, smoke-removal systems and other fire protection or extinguishing systems or appliances shall be a fire protection contractor or contractor licensed for said work by the State of California and have the appropriate license required by the California State Fire Marshal's Office.

4. See Subsection 1007.1.3 and 1007.1.4 for approval and testing.

Subsection 1001.5.2 Fire Department Notification for Fire Alarm Servicing. Is amended by adding the following at the end of the paragraph:

See Uniform Fire Code Subsections 1110.4 and 8705.2.

Subsection 1001.7.1 General. Is amended by adding:

To place any other obstruction, material, or thing within 15 feet on either side of any public or private fire hydrant along any public or private street or roadway shall be an infraction. See the amended Bail Schedule, Appendix A-VI-C-5, Uniform Fire Code.

Subsection 1001.7.2.1 Vehicle Parking. Is amended by adding:

To park, place or leave standing any unattended vehicle within 15 feet on either side of any public or private fire hydrant along any public or private street or roadway shall be an infraction. See the amended Bail Schedule Appendix A-VI-C-5 Uniform Fire Code.

EXCEPTION: If the vehicle is owned or operated by a fire department and is clearly marked as a fire department vehicle.

Subsection 1001.7.4 Fire Alarm Equipment. Is amended to read as follows:

Fire control panels and annunciators shall not be concealed, obstructed or impaired unless approved by the Fire Marshal.

Subsection 1001.7.4.1 Alarm Reset. Is added as follows:

No fire alarm system shall be reset when in an alarm condition by a building owner or representative unless directed to do so by the fire department.

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Subsection 1001.8 Marking of Fire Protection Equipment and Fire Hydrants. Is deleted.

Subsection 1001.10 Fire Appliances. Is amended to read as follows:

The Fire Chief is authorized to designate the type and number of fire appliances to be installed and maintained in and upon all buildings, residences and premises.

This designation shall be based upon the relative severity of probable fire, including the rapidity with which it could spread. Such appliances shall be of a type suitable for the probable class of fire associated with such building, residence, premises or exposure and shall have the approval of the Fire Chief.

Sec. 15.02.211 Amendment of Article 10, Section 1002, Portable Fire Extinguishers.

Subsection 1002.4 Where Required. Is added as follows:

Fire extinguishers are required for all occupancies as specified in NFPA Standard 10, and UFC Standard 10-1 and at the discretion of the Fire Chief.

Subsection 1002.5 Minimum Size. Is added as follows:

1. Minimum size fire extinguishers for all occupancies shall be 2A10BC (5lb. dry chemical).

2. Where a B rated fire extinguisher is specified by this code the minimum protection established in Table 3-3.1 of UFC Standard 10-1 for the particular hazard level shall be used.

Sec. 15.02.212 Amendment of Article 10, Section 1003, Fire Extinguishing Systems.

Subsection 1003.1.2 Standards. Is amended to read as follows:

Fire extinguishing systems shall comply with the Building Code and the appropriate National Fire Protection Standard when approved by the Fire Chief.

EXCEPTIONS:

1. Automatic fire extinguishing systems not covered by the Building Code shall be approved and installed in accordance with approved standards.

2. Automatic sprinkler systems when connected to a domestic water supply shall be connected between the public water main or meter

and the building shutoff valve and there shall not be intervening valves or connections. The fire department connection may be omitted when approved by the Fire Chief.

3. Automatic sprinkler systems in Group R Occupancies 4 stories or less shall be in accordance with the Building Code and the National Fire Protection Standards and shall be approved by the Fire Chief.

Subsection 1003.1.3 Modifications. Is amended to read as follows:

When commercial residential fire sprinkler systems as set forth in the Building Code are provided, exceptions to, or reductions in, Building Code requirements based on the installation of an automatic fire extinguishing system are not allowed.

Subsection 1003.2.2 All Occupancies Except Group R Division III and Group U Occupancies. Is amended to read as follows:

For Group R Division III Occupancies, see Section 1003.2.9. For Group U Occupancies, see Section 1003.2.10.

An automatic fire sprinkler system shall be installed and equipped with an electronic monitoring system as follows:

1. In every story or basement of all buildings when the floor area exceeds 1,500 square feet and there is not provided at least 20 square feet of opening entirely above the adjoining ground level in each 50 lineal feet or fraction thereof of exterior wall in the story or basement on at least one side of the building. Openings shall have a minimum dimension of not less than 30 inches. Openings shall be accessible to the fire department from the exterior and shall not be obstructed in a manner that firefighting or rescue cannot be accomplished from the exterior.

   When openings in a story are provided on only one side and the opposite wall of such story is more than 75 feet from such openings, the story shall be provided with an approved automatic sprinkler system, or openings as specified above shall be provided on at least two sides of an exterior wall of the story.

   If any portion of a basement is located more than 75 feet from openings as required in in this section, the basement shall be provided with an approved sprinkler system.

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2. At the top of rubbish and linen chutes and in their terminal rooms. Chutes extending through three or more floors shall have additional sprinkler heads installed within such chutes at alternate floors. Sprinkler heads shall be accessible for servicing.

3. In rooms where nitrate film is stored or handled. See also Article 33.

4. In protected combustible fiber storage vaults as defined in Article 2. See also Article 28.

5. In every new building where the total floor area exceeds 4,999 square feet or greater. (See Item 9 below). Nothing in this subsection shall preclude the use of fire resistive substitutions otherwise permitted under UBC Section 508. For Group R Division 3 Occupancies see Section 1003.2.9, for Group U Occupancies see Section 1003.2.10.

6. An automatic fire sprinkler system shall be installed in any portion of a building when there is a change of occupancy and the floor area of that portion of the building which is changed exceeds 4,999 square feet. Refer to UBC Section 302.1 for accessory use.

7. In every building where there is an addition to the floor area in existence on the effective date of this ordinance of 20 percent or more and the aggregate floor area of the building exceeds 4,999 square feet.

8. For the provisions of this section two or more buildings existing entirely within the property lines of one parcel shall be considered a single building when exterior wall protection is not provided and the aggregate floor area exceeds 4,999 square feet when applying Uniform Building Code Section 503.3.

9. For the provisions of this section, area separation walls shall not apply to eliminate the installation of a sprinkler system.

Subsection 1003.2.3 Group A Occupancies. Is amended to read as follows:

An automatic sprinkler system shall be installed in rooms used by occupants for assembly and the consumption of alcoholic beverages uses where the total square footage exceeds 4,999 square feet.

Subsection 1003.2.3.1 Drinking Establishments. Is amended to read as follows:

An automatic sprinkler system shall be installed in rooms used by the occupants for the consumption of alcoholic beverages where the aggregate floor area exceeds 4,999 square feet of all rooms used for such purposes.

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Subsection 1003.2.3.2 Basements. Is amended to read as follows:

An automatic sprinkler system shall be installed in all basements classified as a Group A Occupancy.

Subsection 1003.2.3.3 Exhibition and Display Rooms. Is amended to read as follows:

An automatic sprinkler system shall be installed in Group A Occupancies which have more than 4,999 square feet of floor area.

Subsection 1003.2.4.1 General. Is amended to read as follows:

An automatic fire sprinkler shall be installed throughout all buildings containing a Group E Division I Occupancy. **EXCEPTIONS:**

1. When each room used for instruction has at least one exit door directly to the exterior at ground level, and is not used for assembly, a sprinkler system need not be provided. Assembly rooms shall be sprinklered as provided elsewhere in this code.

2. Exception No. 2 is deleted.

Subsection 1003.2.5.3 Group H Division 6 Occupancies. Is amended by changing the second sentence in the paragraph to read as follows:

The design of the sprinkler system shall not be less than that required under National Fire Protection Standard 13 and the Building Code for the occupancy hazard classification as follows:

Subsection 1003.2.6 Group I Occupancies. Is amended by changing the exception to read as follows:

In jails, prisons and reformatories, the piping system may be dry, provided a manually operated valve is installed at a continuously monitored location. Opening of the valve will cause the piping system to be charged. Sprinkler heads in such systems shall be equipped with fusible elements or the system shall be designed as required for deluge systems as per National Fire Protection Association Standard 13 and the Uniform Building Code.

Subsection 1003.2.8 Group R Division I Occupancies. Shall be amended to read as follows:

An automatic sprinkler system shall be installed throughout apartment houses three or more stories in height or containing 16 or more dwelling units; in congregate residences three or more stories in height and having an occupant load of 20 or more, and in hotels and motels three or

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more stories in height or containing 20 or more guest rooms. An automatic sprinkler system shall be installed throughout all apartment houses, congregate residences, and hotels and motels exceeding 4,999 square feet (464.42 m2) of floor area of all floors. For the provisions of this section, area separation walls shall not apply to eliminate the installation of sprinkler systems.

EXCEPTION: Group R Division I Occupancies separated by continuous area separation walls of four hour fire resistive construction without openings.

Residential or quick-response standard sprinklers shall be used in the dwelling units and guest room portions of the building.

Subsection 1003.2.9 Group R Division III Occupancies. Is added as follows:

An approved automatic fire sprinkler system may be installed in new Group R Division III Occupancies. The increased protection provided by fire protection systems installed under the provisions of this subsection would be considered when determining the minimum acceptable requirements for, but not limited to the following:

1. One hour fire resistive substitution.

2. Increase of one additional story from maximum established by UBC Table 5D.

3. Exception to required fire apparatus access roads as outlined in Article 9 of this code.

4. Exception to the required fire flows as outlined in Appendix III-A of this code.

Subsection 1003.2.10 Group U Occupancies. Is added as follows:

Group U Occupancies located within six feet of sprinklered Group R3 Occupancies shall have fire sprinklers installed.

Subsection 1003.3.1 Where Required. Is amended to read as follows:

1. All valves controlling the water supply for automatic sprinkler systems and water flow switches on all sprinkler systems shall be electrically supervised by an approved alarm service provider Type A (listed) central station. The approved central station or alarm company shall issue an approved NFPA 72 type certificate on each system it monitors.

2. Valve supervision and water flow alarm and trouble signals shall be distinctly different and shall be automatically transmitted to an approved alarm service provider Type A (listed) central station.

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EXCEPTION: Underground key or hub valves in roadway boxes provided by the municipality or public utility need not be supervised.

3. Valves controlling sprinkler systems shall be maintained in an open position by locking the valve open in an approved manner.

Subsection 1003.3.2 Alarms. Is amended to read as follows:

An approved audible sprinkler flow alarm (water flow bell) shall be provided on the exterior of the building at each fire sprinkler riser assembly immediately adjacent to the riser assembly.

Subsection 1003.4 Permissible Sprinkler Omissions. Paragraph 3 is amended to read as follows:

Safe deposit or other vaults of fire resistive construction, when used for the storage of records, files and other documents, and when stored in metal cabinets, shall be provided with smoke and or heat detection connected to the main fire alarm panel.

Sec. 15.02.213 Amendment of Article 10, Section 1004, Standpipes.

Subsection 1004.5 Location of Class III Standpipe Hose Connections. Is amended by adding a sentence at the end of the subsection as follows:

Any standpipe that is provided on the roof shall have a minimum of two 2½ inch outlets.

Sec. 15.02.214 Amendment of Article 10, Section 1006, Commercial Cooking Operations.

Subsection 1006.1.1 Ventilation. Is added as follows:

The ventilation system required for commercial kitchen hoods shall not be used as part of a building mechanical smoke control system or a building mechanical smoke exhaust system. Operation of a hood system shall not adversely affect any air flow method used as a smoke control exhaust system.

Subsection 1006.2.2.1 Alarm Activation. Is added as follows:

Automatic or manual activation of the fire suppression system provided for protection of commercial type food-heat processing equipment shall cause an alarm to be automatically transmitted to the building main fire alarm system and shall be annunciated on a separate zone. (See Subsection 1006.1.1).

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Subsection 1006.2.3.1.1 Duct Protection. Is added as follows:

1. Hood duct protection. Automatic fire sprinkler protection installed in accordance with NFPA 13 shall be required for hood duct protection along the entire length of duct.

   EXCEPTION: Ducting less than 10 feet in length.

2. Access Doors. Access doors of the required rating shall be provided at required intervals along the entire length of the duct to service duct fire sprinklers.

Sec. 15.02.215 Amendment of Article 10, Section 1007, Fire Alarm Systems.

Subsection 1007.1.1 Applicability. Is amended by adding the following:

Installation and maintenance of fire alarm systems shall be in accordance with this article and National Fire Protection Association Standards. The regulations contained in this article require the installation of electronically supervised fire alarm systems. For the purpose of this article separation walls shall not define separate buildings.

Subsection 1007.1.1.1 Permits. Is added as follows:

Permits from the Fire Prevention Division and the Building Inspections Division are required for the installation or modification of a fire alarm system.

Subsection 1007.1.3.1 Qualified Personnel. Is added as follows:

1. Service personnel shall be qualified and experienced in the inspection, testing and maintenance of fire alarm systems. Examples of qualified personnel shall be permitted to include but are not limited to:

   1.1 Factory trained and certified.

   1.2 National Institute for Certification and Engineering Technologies Fire Alarm certified.

   1.3 International Municipal Signaling Association Fire Alarm certified.

   1.4 Certified by State or local authority.

   1.5 Trained and qualified personnel employed by an organization listed by a national testing laboratory for the servicing of fire alarm systems.

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Subsection 1007.1.4.1 Replacement of Existing Fire Alarm System Components. Is added as follows:

In order to ensure compatibility of components such replacements or additions to existing systems shall be approved by the Fire Marshal. Restored systems shall be tested in the presence of the Fire Marshal or his authorized representative.

Subsection 1007.2.2 Group A Occupancies. Is amended to read as follows:

1. General. Group A, Division 1, 2 and 2.1 shall be provided with a manual and automatic fire alarm system in the following manner.

    1.1 All dressing rooms/areas of similar purpose shall be provided with smoke detection.

    1.2 Stage areas shall be provided with heat detection.

    1.3 All other areas shall have manual fire alarm system.

Subsection 1007.2.2.2 System Initiation. Is amended to read as follows:

Activation of the fire alarm system shall immediately initiate a local alarm (see UFC Standard 14-1) which is audible above the ambient noise level of the assembly occupancy. A single smoke detector monitored by an alarm verification zone, the automatic sprinkler system or other approved fire detection device shall automatically:

1. Stop confusing sounds and visual effects.

2. Activate approved directional marking, and

3. Cause illumination of the exit path with light of not less than one foot candle at the walking surface.

4. When approved by the Fire Marshal the public address system may also serve as an alarm and shall be installed per NFPA 72.

Subsection 1007.2.9.1.1 General. Is amended to read as follows:

A Group R1 occupancy shall be provided with a manual and automatic fire alarm system as required by the Uniform Fire Code and/or at the discretion of the Fire Marshal.

Such fire alarm system shall be electrically supervised and shall be designed to alert all occupants of the building simultaneously.

Subsection 1007.2.9.1.4 Heat Detectors. Is amended to read as follows:

Heat detectors shall be provided in common areas, laundry rooms, furnace rooms and similar areas in accordance with Uniform Fire Code Standard 10-3.

Subsection 1007.2.9.3 Group R Division III Occupancies. Is added as follows:

Subsection 1007.2.9.3.1 Residential Fire Alarm System Installations.

Residential fire alarm system installation shall be in accordance with the requirements of this section and National Fire Protection Association Standard 72, Chapter 2, Household Fire Warning Equipment. Each new fire alarm system shall be certified in writing to the building owner and the Fire Marshal.

Subsection 1007.2.9.3.2 Smoke Detectors.

Smoke detectors shall be located,installed and maintained in Group R Division III occupancies in accordance with this section and the Uniform Building Code.

Subsection 1007.2.9.3.3 False Alarms, Cost Recovery and Citations.

False alarms and cost recovery shall be in accordance with Article 13 Section 1302 of the Uniform Fire Code. False alarm citations shall be in accordance with UFC Section 1302.3.2.

Subsection 1007.2.9.3.4 Plan Submittal, Installation Permit Issuance and Field Verification Inspections.

The submission of plans shall be in accordance with Uniform Fire Code Section 1001.3. All work from approved plans is subject to the approval of the fire department field inspector. Plan review and inspection fees as established by City Council Resolution shall be paid prior to issuance of an installation permit.

Subsection 1007.2.12.1.3 System Response. Is amended by adding the following at the end of the subsection:

Failure of the system to reset within 180 seconds shall cause the alarm to sound automatically. No fire alarm system shall be reset when in an alarm condition by a building owner or representative unless directed to do so by the fire department.

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Subsection 1007.2.12.2 Highrise Buildings. Is amended to read as follows:

Refer to Title 9 and Title 15 of the Sacramento City Code for highrise requirements.

Subsection 1007.2.12.5 Special Egress Control Devices. Is amended by adding the following to the subsection:

Special egress - control devices. When special egress-control devices are installed on exit doors, an automatic smoke detection system shall be installed throughout the building. When exit doors and intervening doors leading to exits are controlled by building security systems, the building life safety system shall override the security systems when the building is in alarm. Standby power supplied to building fire alarm systems shall provide power at a same or greater duration as the building security system is supplied. Upon failure of electrical power, locking mechanisms shall be retracted to the unlocked position. No other system shall adversely affect the unlocking of any door when the building is in an alarm condition.

Subsection 1007.2.12.6 Corridors in Office Uses. Is amended by adding a sentence at the end of the subdivision as follows:

Fire alarm control units shall be located in accordance with Subsection 1007.3.3.2.1.

Subsection 1007.3.3.2.1 Alarm Control Units. Is amended to read as follows:

1. The alarm control unit shall be located in an accessible location at the building main entrance. Such locations shall not include storage rooms, closets, janitor rooms, telephone equipment rooms, electrical rooms or similar areas.

2. The name and telephone number and instructions for calling the central station shall be placed on the alarm control unit in a manner specified by the Fire Marshal.

3. For alarm control unit locations in high rise buildings, see Title 15 and Title 9 of the Sacramento City Code Life Safety Requirements for High Rise Buildings.

4. No fire alarm system shall be reset when in an alarm condition by a building owner or representative unless directed to do so by the fire department.

Subsection 1007.3.3.2.2 Fire Control Rooms. Is added as follows:

1. Fire control rooms shall contain:

1.1 Plans for fire sprinkler systems, fire alarm systems, electrical systems, and floor layout.
1.2 Permanently dedicated telephone.
1.3 Minimum size 3 x 5 feet writing table.
1.4 Dry marker board minimum 2 x 3 feet and accessories.

Subsection 1007.3.3.3.1 General. Is amended to read as follows:

When activated, alarm initiating devices shall activate an alarm signal which is audible throughout the building. Such alarm signal shall include both audible and visual alarms simultaneously.

EXCEPTION: Single station detectors in dwelling units, rooms used for sleeping purposes in hotels and lodging houses, and patient sleeping rooms in hospitals and nursing homes.

Subsection 1007.3.3.3.2 Alarm Signal. Is amended to read as follows:

Manual or automatic initiating devices shall immediately cause an alert tone to sound throughout the building.

EXCEPTION: 1. Group A Occupancies when approved by the Fire Marshal.

2. Patient and inmate areas of Group I Occupancies.

Subsection 1007.3.3.3.2.1 Combination System. Is added as follows:

Where a fire alarm and public address system are combined it shall meet requirements in NFPA 72 and shall be approved by the Fire Marshal.

Subsection 1007.3.3.3.3 Audibility. Is amended by adding the following at the end of the subsection:

The alarm signal shall exceed ambient sound levels as required without exceeding 120 decibels or ambient sound shall be electronically shunted upon alarm system initiation.

Subsection 1007.3.3.3.4 Visual Alarms. Is amended to read as follows:

Alarm systems shall include both audible and visual alarms. Alarm devices shall be located in hotel guest rooms as required by the Building Code (see UBC Section 1105.4.6); accessible public and common use areas, including toilet rooms and bathing facilities; hallways; and

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lobbies. Rooms or areas for service of the building including but not limited to mechanical and equipment rooms shall be provided with visible and audible alarms.

Subsection 1007.3.3.6 Monitoring. Is amended to read as follows:

1. Fire alarm systems shall be monitored by an approved central, proprietary or remote station service which meets all requirements of NFPA 72, or at a constantly attended location when approved by the Fire Marshal.

2. No fire alarm system shall be reset when in an alarm condition by a building owner or representative unless directed to do so by the fire department.

Subsection 1007.3.3.7 Annunciation. Is amended to read as follows:

1. Alarm, water flow and trouble signals shall be annunciated in the central control station by means of an audible signal and a visual display which indicates the building, floor, zone or other designated area from which the alarm, water flow or trouble signal originated.

2. For purposes of local annunciation, zoning shall be in accordance with the following, unless otherwise deemed necessary by the Chief:

   2.1 Annunciation shall be by a graphic or LCD digitized display.

   2.2 A building plan view and elevation shall be permanently affixed within a protecting cover or enclosure which will be located adjacent to the fire control panel annunciator.

   2.3 Illuminated annunciators and/or directory boards shall be required at each entrance as deemed necessary by the Chief.

   2.4 When the system serves more than one building, each building shall be considered as a separate zone.

   2.5 Each floor shall be considered as a separate zone.

   2.6 Each section of floor separated by area separation walls or by horizontal exits shall be considered as a separate zone.

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2.7 Each zone shall display:

2.7.1 Every smoke detector in that zone.
2.7.2 Every duct detector in that zone.
2.7.3 Every water flow alarm and tamper in that zone.
2.7.4 Every manual pull in that station zone.
2.7.5 Every heat detector in that zone.
2.7.6 Any other fire extinguishing system in that zone.
2.7.7 Fire pump for pump running, controller power off, trouble and phase reversal, and other as appropriate as a separate zone.

Sec. 15.02.216 Addition to Article 10 of Section 1008, Fire Pump Rooms.

Subsection 1008.1 Fire Pump Rooms.

1. **General.** When fire pumps are required, fire pump rooms and equipment protection shall be in accordance with this section and National Fire Protection Association Standard 20. The size and location of fire pump rooms shall be approved by the Fire Marshal. Plans shall be submitted in accordance with Subsection 1001.2.2 and shall indicate all dimensions, working clearances and locations of pumps, controls and fuel tanks. Co-location of non-fire related equipment is prohibited in fire pump rooms. Water flow direction shall be indicated on the piping.

2. **Construction Requirements.** Fire pump rooms shall be of 2 hour fire resistive construction. Pump room drains shall be sized to accommodate pump operation and other combined outflow of released water regardless of source. Pump rooms which are located below grade shall be provided with adequate sump capability.

   Standby power, if required, shall supply power to the sump pump. Seismic protection in pump rooms for piping, equipment and tanks shall be in accordance with the earthquake regulations of the Uniform Building Code.

3. **Fire Protection.** Fire pump rooms shall be provided with automatic sprinkler protection. Fire pump rooms which are isolated from the protected property or are located in separate structures or in adjacent unprotected structures, shall be protected with automatic sprinklers. A fire extinguisher of a 20BC minimum rating shall be provided near the pump room entry.

4. **Annunciation.** Pump room annunciation shall be in accordance with this section and NFPA Standard 20. The pump room annunciation shall be integrated within the main fire alarm panel and shall show alarm and any trouble condition existing for electric

drive: pump running, phase reversal, power off, sump level, tamper, and for diesel drive: pump running, switch/power off, battery failure, overspeed, start failure, high temperature tamper and low fuel status, and any other condition as required by the Fire Marshal. Remotely located fire pump houses shall have installed a strobe light on the exterior which will be visible to the public way to indicate pump running.

5. **Electric Fire Pumps and Controllers.** Power supply for electric fire pumps/controllers shall be supplied ahead of the building main. Current carrying parts shall be twelve inches above finished floor. Power supply shall be in conformance with NFPA 20 and the California Electric Code. Controllers shall be supplied with standby power and shall have automatic switching to standby power.

6. **Method of Stopping.** The stopping method for diesel or electric fire pumps shall be manual. Automatic shutdown is prohibited unless both diesel and electric pumps are provided.

7. **Fuel Supply.** Fuel supply use, storage and piping and over-fill protection shall be in accordance with Article 79. Fuel shall be provided for 8 hours running time at full power. Low fuel annunciation shall be at 1/2 full tank based on manufacturer's consumption curves. For protection of piping entering buildings, see Article 79. The product name and fuel flow direction shall be indicated on piping.

8. **Personnel Safety.** Overhead piping in fire pump rooms shall accommodate a vertical clearance of seven feet. Hearing protection shall be available in the pump room. Personnel shall be protected from heated surfaces and areas of high voltage. Plans for pump and controller operation and wiring shall be kept in the pump room.

9. **Signage.** Fire pump room doors shall be identified by signage approved by the Fire Marshal.

10. **Fire Phone.** A fire phone shall be placed within 10 feet of a fire pump room entryway.

Sec. 15.02.217 <u>Amendment of Article 11, Section 1101, General</u>.

Subsection 1101.3 Permits. Is amended to read as follows:

Permits are required to conduct open burning, bonfires and recreational fires, use flame producing devices for the application of roofing, store tires outdoors, store combustible material and operate a parade float as set forth in Section 105.

Sec. 15.02.218 Amendment of Article 11, Section 1103, Combustible Materials.

Subsection 1103.3.2 Ceiling Clearance. Is amended to read as follows:

Storage of combustible material in buildings shall be orderly and maintained not less than 3 feet from the ceiling and not less than 18 inches below sprinkler head deflectors.

Subsection 1103.3.6.2 Individual Piles. Is amended to read as follows:

Where tire storage is less than 500 units individual piles shall not exceed 2400 cubic feet (20x20x6) in volume. Where storage exceeds 500 units such storage shall be in accordance with NFPA 231D Appendix C, (see UFC Article 90).

Subsection 1103.3.6.3 Separation. Is amended to read as follows:

A clear space of at least ten feet shall be maintained between piles. A clear space of ten feet shall be maintained between a face of any pile and a building or structure. A clear space of ten feet shall be maintained between a face of any pile and a property line. The clear space shall not contain any flammable/combustible material or vegetation.

EXCEPTION: An approved barrier wall may be substituted for clear space distance.

Subsection 1103.3.6.3.1 Height. Is amended as follows:

The height of storage piles shall be measured from surrounding grade. Tires shall not be stored below grade. Excavating for the purpose of below grade tire storage is prohibited.

Subsection 1103.3.6.3.2 Storage on Roofs. Is amended as follows:

Tires shall not be stored on roofs of buildings or structures.

Subsection 1103.3.6.3.3 Level Surface. Is added as follows:

Tire piles and tire storage shall be on a level surface.

Sec. 15.02.219 Amendment of Article 11, Section 1105, Asphalt Kettles.

Subsection 1105.3 Fire Protection. Is amended by adding a sentence at the end of the subsection to read as follows:

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Additional fire protection equipment may be required by the Fire Marshal.

Sec. 15.02.220 **Amendment of Article 11, Section 1107, Heat Producing Appliances**

Subsection 1107.3 Unvented Kerosene or Similarly Fueled Heating Appliances. Is added as follows:

Portable and nonportable unvented kerosene or similarly fueled heating appliances shall not be used within rooms or buildings unless approved by the Fie Marshal.

Sec. 15.02.221 **Amendment of Article 11, Section 1110, Vacant Buildings.**

Subsection 1110.4 Fire Protection Systems in Vacant Buildings. Is added as follows:

Fire protection systems shall be maintained and remain operable in vacant buildings.

Sec. 15.02.222 **Amendment of Article 11, Section 1112, Maintenance of Fire Resistive Construction.**

Subsection 1112.1 Fire Resistive Construction. Is amended by deleting the second paragraph.

Sec. 15.02.223 **Amendment of Article 12, Section 1208, Gates and Barriers.**

Subsection 1208.5 Landing. Is added as follows:

When gates or barriers are used within stair enclosures or on exterior stairways there shall be a landing on either side of the gate or barrier conforming to the requirements of the Uniform Building Code.

Subsection 1208.6 Exterior Dining Areas/Patios. Is added as follows:

The exit width of gates serving patios or exterior dining areas which are part of a building exit system shall not be reduced in width below that required for the building's occupant load.

Subsection 1208.7 Gate Identification. Is added as follows:

Gates or barriers which are a part of the exit system pathway, and are not immediately discernible from surrounding construction, shall be identified with an approved sign.

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Sec. 15.02.224 Addition of Article 12, Section 1210, Stairways and Ramps.

Subsection 1210.7 Locked Stairway Doors. Is added to read as follows:

When exit doors from corridors to exit stairways or exit doors from suites to exit stairways are locked to prohibit access from the stairway side they shall have the capability of being unlocked simultaneously without unlatching upon a signal from the central control station. Upon failure of electrical power, the locking mechanisms shall be retracted to the unlocked position or in lieu thereof, master keys which will unlock all such doors from the stairway side shall be provided in such numbers and locations as approved by the Fire Marshal. Push button or similar padlock type devices are not acceptable. A key safe shall be considered an acceptable location for the keys.

Sec. 15.02.225 Addition of Article 12, Section 1211, Exit Illumination.

Subsection 1211.2.1 Emergency Illumination. Is added as follows:

When required by the Fire Marshal, emergency exit illumination shall be installed in all occupancies containing interior corridors and/or enclosed stairwells.

Sec. 15.02.226 Amendment of Article 12, Section 1213, Discharge, Dispersal and Refuge.

Subsection 1213.1 Exit Discharge. Is amended to read as follows:

All exits shall discharge directly to the street, or to a yard, court or other open space, as defined by the Uniform Building Code, that gives safe access to a public way. The streets to which the exits discharge shall be of a width adequate to accommodate all persons leaving the building. Approved yards, courts or other open spaces to which exits discharge shall also be of adequate width and size to provide all persons leaving the building with ready access to the streets.

1. Where any doorway, ramp, walkway, stairway or ladder landing exits directly into the path of vehicular traffic, an adequate barrier and warning shall be installed to prevent persons from stepping directly into vehicular traffic.

2. Exit stairs that continue beyond the floor of discharge shall be interrupted at the floor of discharge by partitions, doors or other physical barriers.

3. Areas designated for occupant discharge or dispersal shall be maintained unobstructed and clear of storage.

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Sec. 15.02.227 Amendment of Article 13, Section 1302, False Alarms.

Subsection 1302.3.1 Cost Recovery. Is added as follows:

Any person or entity who willfully or negligently sends, transmits, or sounds any false alarm of fire, by means of any fire alarm system or signal, or by any other means or method, is responsible for all costs incurred by the fire department related to any response.

Subsection 1302.3.2 Citations. Is added as follows:

False alarms are citable under this section. Any person who violates this section is guilty of an infraction. (See Bail Schedule, Appendix A-VI-C-5).

Sec. 15.02.228 Amendment of Article 13, Section 1303, Emergency Plans and Procedures.

Subsection 1303.3.3.2 Fire Drills. Is amended by adding:

An infraction citation may be issued for failure to conduct fire drills as required by this subsection.

Subsection 1303.3.4.4.2 Notification by Occupants. Is deleted.

Subsection 1303.6.1 General. Is amended by adding:

The monitoring central station shall be notified at drill initiation and commencement.

Sec. 15.02.229 Amendment of Article 24, Section 2401, General.

Subsection 2401.1 Scope. Is amended as to read as follows:

Airports, Heliports, Helistops and aircraft hangars shall be in accordance with Article 24. For the definition of Heliport, Helistop Emergency and Helistop Undesignated, see Article 2.

Subsection 2401.2 Permits. Is amended to read as follows:

For permits to operate airports, heliports and or helistops, or to use structures or enclosures for aircraft servicing or repair and aircraft fueling vehicles and for undesignated helistops, see Section 105.8.

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Subsection 2401.2.1 Helicopter Use Permit Requirements. Is added as follows:

1. Any person, firm, or business requesting to land a helicopter at a site other than an approved airport or heliport as described by the Federal Aviation Administration F.A.R. Part 77, for the purpose of advertising, promotions, or rides whether for public or private use shall provide the following:

   1.1 Documentation of application and approval from F.A.A. (Federal);

   1.2 Authorization from the property owner/s;

   1.3 Make and model of the helicopter to be used;

   1.4 A detailed plan indicating the area to be used, the proposed takeoff/landing area, and final approach and takeoff (F.A.T.O.);

   1.5 The FATO shall not pass over any area in which the public or viewing area is established, within 1,000 feet of any school, hospital, or residential area;

   1.6 No person/s other than the operator(s) and authorized personnel shall be allowed around or near the helicopter until the main and rear rotor have come to a complete and full stop;

   1.7 A clear safety zone radius shall be established around the takeoff/landing site at a distance of 50 (fifty) feet for every 1,000 (one thousand) pounds of gross helicopter weight;

   1.8 The safety zone shall be established by physical barriers which will restrict any person from entering the safety zone;

   1.9 Personnel shall be posted around the perimeter of the safety zone to keep traffic and crowds away from the helicopter. Such personnel shall be stationed every 50 lineal feet at the posted perimeter. This will be in addition to any requirement made by any other Sacramento City Ordinance for Sacramento Police Officers;

   1.10 The request shall indicate the day(s), time(s), and number or frequency of take-off and landings;

   1.11 Street closures permits;

   1.12 Certificate of insurance (4.01.007 Sacramento City Code);

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1.13 Sacramento Fire Department permit.

Subsection 2401.4.1 Fueling at Rooftop Heliports. Is added as follows:

Fueling at rooftop heliports shall not be permitted.

Sec. 15.02.230 Amendment of Article 24, Section 2403, Helistops.

Subsection 2403.1.1 Design. Is added as follows:

1. Helistops shall be designed in accordance with Title 21, Division of Aeronautics, Subchapter 2 and the U.S. Department of Transportation Federal Aviation Administration Advisory Circular 150/5390-2, January 4, 1988.

2. Helistops shall be designed to support a minimum 10,000 pounds live load.

Subsection 2403.3.1 Fuel Containment. Is added as follows:

Helistops shall be provided with a fuel containment system which directs fuel spillage to an approved location. Materials, design and methods are subject to the approval of the Chief. Spilled fuel shall not enter the building or the building's waste water drain system.

Subsection 2403.4 Exits. Is amended to read as follows:

1. At least two approved means of egress which are remotely located from each other shall be provided from the landing pad edge.

2. The exit path width of each exit path shall be a minimum of 3 feet.

3. The required width of exit paths shall not be obstructed by building structural elements.

4. The required width of exit paths shall not be obstructed by any machinery or equipment used or required to maintain or repair the building.

5. Exits from the helistop shall comply with the definition of exit found in Chapter 10 of the Uniform Building Code.

6. Exit illumination in accordance with the Building Code shall be provided for the landing pad exits.

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Subsection 2403.5.1 Plans. Is added as follows:

Plans for helistops shall be submitted to the Fire Marshal for approval.

Subsection 2403.6 Requirements for Undesignated Helistops. Is added as follows:

Use of an approved undesignated helistop by the permittee shall require a letter of authorization from the property owner, a congested area lift plan approved by the FAA, a narrative of the lift, a site plan, any required street closure permits, any required code enforcement special agreement or police officer contract and a certificate of insurance as required by Title 4 of the Sacramento Code.

Subsection 2403.7 Fire Protection. Is added as follows:

1. A Class II standpipe system shall be provided on the exterior within 10 feet from of the helistop exit stairs.

2. A minimum 4A60BC fire extinguisher shall be installed near the helistop stair.

3. See NFPA Standard 407 and 418.

Sec. 15.02.231 Amendment of Article 25, Section 2501, General.

Subsection 2501.3.1 Special Event Permit. Is added as follows:

A special event permit shall be obtained from the Fire Marshal for the following:

1. Helicopter lifts.

2. Pyrotechnic displays for indoor or outdoor assemblies.

3. Street fairs, festivals, art shows, concerts.

The Fire Marshal shall require a clearance inspection and shall have the discretion to require a fire watch or standby personnel.

Subsection 2501.5 Decorative Materials. Is amended by adding a sentence at the end of the subsection as follows:

Decorative materials shall be tested for fire retardancy treatment at any time at the discretion of the Fire Marshal. Also see 103.1.1.1.

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Subsection 2501.18.2 Flaming Foods and Beverages. Is amended by adding Item No. 6 as follows:

Open flame devices using portable containers of flammable gas are prohibited. (See Article 82).

Subsection 2501.20 Fire Watch Personnel. Is added to read as follows:

The Fire Marshal may require a fire watch staffed by fire company personnel. Costs for the fire watch shall be paid by the owner or manager of the facility or company.

When required by the Fire Marshal, fire watch personnel may consist of qualified persons from an independent company, or such persons as approved by the Fire Marshal, for fire watch duty. Fire watch persons and companies conducting a fire watch shall comply with the following:

1. All fire watch personnel shall be in the employ of a State licensed bonded and insured security service or shall be approved by the Fire Marshal.

2. All fire watch personnel shall be subject to the orders of the Fire Marshal or his authorized agent at all times when so employed.

3. Fire watch personnel shall not be required or permitted to perform any other duties.

4. An hourly patrol of all floors and common areas, keeping diligent watch for fires, shall be conducted.

5. Fire watch personnel shall keep a formal written log which notes patrols and reportable information in chronological order. Each log sheet shall cover 24 hour period, shall be signed and then faxed or transmitted daily by other means to the Fire Marshal. The information contained in the report or log shall indicate the patrol route, time and general observations including any life safety violations.

6. Means shall be immediately available to fire watch personnel to accomplish notification of all occupants in the event of emergency and to summon the fire department upon the discovery of a fire or emergency.

Sec. 15.02.232 Amendment of Article 28, Storage and Handling of Combustible Fibers.

Section 2803 Permits. Is amended by deleting the exception.

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Sec. 15.02.233 Amendment of Article 29, Repair Garages.

Subsection 2903.4.3.1 Crankcase Drainings. Is added as follows:

Crankcase drainings which may contain flammable or combustible liquids shall be stored and handled in accordance with the requirements for Class I liquids handling and storage.

EXCEPTIONS:

1. A maximum of 500 gallons may be stored inside a building in approved containers.
2. A maximum of two 55 gallon drums (with an additional drum working) may be stored outside. Drums shall be labeled with content and provided with approved secondary containment.

Sec. 15.02.234 Amendment of Article 30, Section 3002, Permits.

Section 3002 Permits. Is amended to read as follows:

Permits. For a permit to operate a woodworking shop, cabinet shop, molding shop or similar operation, or for a permit for a lumber yard to store lumber in excess of 100,000 board feet, see Section 105.

Sec. 15.02.235 Addition to Article 30, Section 3003, Exterior Lumber Storage.

Subsection 3003.1.1 Idle Pallet Storage. Is added as follows:

Exterior storage of wooden pallets shall be in accordance with this article and National Fire Protection Association Article 46.

Subsection 3003.5 Storage of Bulk Timber and Fire Wood. Is added as follows:

Bulk timber and fire wood shall be piled with due regard to stability of piles and in no case higher than 20 feet. Where bulk timber and fire wood is piled next to a property line on which a building has been erected, the distance from the pile to property line shall be not less than one half the height of the pile and in no case less than 5 feet.

Subsection 3003.6 Driveways. Is added as follows:

Driveways between and around bulk timber and fire wood piles shall be at least 20 feet wide and maintained free from accumulation of rubbish, equipment or other articles or materials. Driveways shall be so spaced that a maximum grid system unit of 50 feet by 150 feet is produced.

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Subsection 3003.7 Security. Is added as follows:

Bulk timber and fire wood storage, shall be surrounded with a suitable fence at least 6 foot high.

Subsection 3003.8 Burning Materials. Is added as follows:

Burning of scraps of bulk timber and fire wood is prohibited.

Subsection 3003.9 Smoking. Is added as follows:

Smoking shall be prohibited except in specified safe locations. NO SMOKING signs shall be posted throughout the storage area. Smoking shall be prohibited within 100 feet of any pile of bulk timber or fire wood.

Subsection 3003.10 Weed Control. Is added as follows:

Weeds shall be kept down throughout entire storage area. Weeds shall be sprayed as often as necessary for control. Dead weeds shall be removed.

Subsection 3003.11 Housekeeping. Is added as follows:

Debris such as sawdust, chips, and scrap wood shall be removed regularly.

Subsection 3003.12 Water Supply. Is added as follows:

Approved water-supply and fire hydrants capable of supplying the required fire flow shall be provided to within 150 feet of all portions of the storage yard in accordance with Article 10.

Subsection 3003.13 Fire Extinguisher. Is added as follows:

Portable fire extinguishers shall be provided which are capable of extinguishing a Class A type fire. Fire extinguishers shall be not more than 50 feet apart.

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Sec. 15.02.236 Amendment of Article 32, Table 3205-A, Uniform Fire Code.

Table 3205-A is amended by retaining the footnotes unchanged and changing the table to read as follows:

TABLE NO. 3205-A LOCATION, ACCESS AND PARKING FOR TENTS, CANOPIES AND TEMPORARY MEMBRANE STRUCTURES

FLOOR AREA (Square Feet)	MINIMUM SEPARATION FROM ANY PROPERTY LINE, BUILDING, OTHER TENT, CANOPY, OR TEMPORARY MEMBRANE STRUCTURE [1]	MINIMUM FIRE ACCESS ROADWAY WIDTH [2]	MINIMUM DISTANCES FOR THE PARKING OF AUTOMOBILES OR OTHER INTERNAL COMBUSTION ENGINES
0-5,000	20 feet [3]	20 feet	30 feet
5,000-15,000	30 feet [3]	20 feet	40 feet
Over 15,000	50 feet [3]	20 feet	60 feet

Sec. 15.02.237 Amendment of Article 32, Section 3214, Exit Signs.

Subsection 3214.1 When Required. Is amended by adding a sentence at the end of the subsection as follows:

See Article 12, Section 1212.

Sec. 15.02.238 Amendment of Article 35, Section 3501, Scope.

Section 3501 Scope. Is amended to read as follows:

Temporary use of the common pedestrian area within a covered or partially covered mall building for promotional, educational, assembly, sales or similar activities shall be in accordance with this article.

Sec. 15.02.239 Amendment of Article 35, Section 3504, General Requirements.

Subsection 3504.3 Fueled Equipment. Is amended by adding a sentence at the end of the subsection as follows:

See Article 25, Section 2505.

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Subsection 3504.3.1 Barbecues. Is added as follows:

Open flame devices and barbecues shall not be operated in mall areas.

Subsection 3504.3.2 Propane Fueled Equipment. Is added as follows:

Use of propane fueled equipment within open air malls shall be as follows:

1. The size of containers shall be restricted to five water gallons.

2. Equipment fueled with propane shall be seismically secured, and shall be a fixed piece of equipment, not portable.

3. Persons charged with the installation or removal of propane containers shall be certified and trained in this process by the supplier. Evidence of such certification shall be in writing to the Fire Marshal.

4. Propane storage areas shall be approved by the Fire Marshal.

Sec. 15.02.240 Amendment of Article 45, Section 4502, Spray Finishing.

Subsection 4502.8.1 General. Is amended to read as follows:

Spray booths and spraying rooms shall be protected by approved automatic fire sprinkler systems. Such systems shall be extended to protect exhaust plenums, exhaust ducts and both sides of dry filters when such filters are used. For installation of automatic sprinklers in ducts, see the Uniform Mechanical Code.

Sec. 15.02.241 Amendment of Article 49, Welding and Cutting.

Subsection 4901.3 Permit. Is amended to read as follows:

For a permit to conduct welding and cutting operations or to operate an acetylene generator, see Subsection 105.8.

Sec. 15.02.242 Amendment of Article 52, Section 5201, Motor Vehicle Fuel Dispensing Stations.

Subsection 5201.3.1 Permits. Is amended by adding at the end of the paragraph:

For permits to remove or install an aboveground tank see Section 105.8.

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Subsection 5201.3.2 Plans and Specifications. Is amended by adding paragraph 4 as follows:

4. Accurate dimensions: For each type of station, plans and specifications shall indicate accurate dimensions.

Subsection 5201.6.2 Attendants. Is amended by adding the following at the end of the subsection:

The view of the dispensing area shall not be obstructed. Merchandise and signs, etc., shall not be placed in such a manner as to obstruct the view. Alternative means of supervision shall be approved by the Fire Marshal.

Subsection 5201.6.3.1 Unsupervised Dispensing. Is amended by adding the following:

During the hours of operation the system site shall be provided with a fire alarm transmitting device.

A publicly accessible telephone not requiring a coin to operate for emergencies may be approved by the Fire Marshal as an alternative.

Product delivery hoses shall be equipped with a listed emergency breakaway device designed to retain liquids on both sides of the breakaway point. Such devices shall be installed and maintained in accordance with manufacturers instructions.

Sec. 15.02.243 Amendment of Article 52, Section 5202, Flammable and Combustible Liquid, Motor Vehicle Fuel, Dispensing Stations.

Subsection 5202.2.3 Listed Equipment. Is amended to read as follows:

Tanks, electrical equipment, dispensers, hose, nozzles, and submersible or subsurface pumps used for the storage or dispensing of flammable and combustible liquids shall be listed and installed in accordance with industry standards when approved by the Fire Marshal.

Subsection 5202.3.6 Special Enclosures. Is amended to read as follows:

Class I, Class II, and Class III-A liquids shall be stored in closed containers as specified in Table 7902.1-A, or in approved underground storage tanks, or in special enclosures meeting all the requirements of the Sacramento Fire Department. Special enclosures shall be listed and tested by a nationally recognized laboratory. Class I and Class II liquids shall not exceed 1,000 gallons individual or aggregate. Tanks containing Class III-A liquids, shall not exceed 6,000 gallons individual or 18,000 gallons aggregate.

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Subsection 5202.3.8 Maintenance Testing. Is amended to read as follows:

Leak detecting devices shall be tested annually by the owner or occupant of the property on which they are located, and such testing shall meet all requirements of Title 16 of the Sacramento City Code. Test results shall be maintained on the premises and available to the Fire Marshal upon request.

Subsection 5202.3.9 Inventory Control. Is amended by adding:

Also see Title 16, Sacramento City Code for reconciliation requirements.

Subsection 5202.4.4 Supervision. Is hereby deleted.

Subsection 5202.4.5 Dispensing Inside Garages. Is amended by changing the second paragraph of the section as follows:

The dispensing area shall be approved by the Fire Marshal, and shall be provided with an approved mechanical ventilation system. Ventilating systems shall be sized and located to accommodate heavier than air and lighter than air vapors and gases which may be generated. Air changes conforming to those required in the Uniform Building Code for hazardous occupancies shall be maintained. Ventilating systems shall be electrically interlocked with Class I liquid dispensing units such that the dispensing units cannot be operated unless the ventilating fan motors are energized. Independent verification, separate from power provided verification, of air flow shall be provided to the dispenser which will be interlocked with such air flow indication. The interlock will not allow the dispenser to operate without positive indication of air flow. See also Subsection 5202.10.

The entire dispensing area shall be protected by an approved automatic fire sprinkler system, and have an approved system of containment for water runoff. The sprinkler system containment area shall meet the minimum requirements for contaminated water collection found in Uniform Fire Code Articles 79 and 80.

Electrical requirements shall meet the minimums found in Subsection 5202.6.

Subsection 5202.5.3.1 General. Is amended by adding the following paragraph:

Pipe joints dependent on the friction characteristics or resiliency of combustible materials for mechanical continuity or liquid tightness of piping shall not be used.

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Subsection 5202.10.3.2 Interlocks on Dispensers. Is amended by adding the following:

Independent verification of positive air flow shall be provided to the dispenser which shall be interlocked with such air flow indication.

Subsection 5202.11.3.2 Connections Between Aboveground and Underground Tanks. Is amended to read as follows:

Connections shall not be made between an aboveground and underground tank.

Subsection 5202.11.3.7 Electrical Equipment and Grounding. Is amended to read as follows:

Electrical equipment shall be installed and used in accordance with the National Electrical Code as it applies to wet, damp, and hazardous locations. Clearly identified emergency switches, which are readily accessible in case of fire or physical damage at a dispensing unit, shall be provided on each main float and at the shore approach to the pier, wharf or floating dock. Emergency switches shall be interlocked to the power supply in a manner which will shut off power to all pump motors from any individual location and shall be capable of being reset only from the master switch. Each switch is to be identified by an approved sign stating, "EMERGENCY PUMP SHUT OFF". The master switch shall be set in the off position before closing the marine motor vehicle fuel dispensing station at any time.

Piping used for transporting Class I liquids shall be grounded to control stray electrical current.

Subsection 5202.11.5.6.1 Vessel to Vessel Refueling. Is amended by adding the following:

Fuel shall not be transferred from one surface vessel to another surface vessel.

Subsection 5202.11.6.2 Fire Extinguishers. Is amended to read as follows:

Fire extinguishers, each having a minimum rating of 40BC shall be provided as follows:

1. One on each float.

2. One on the pier or wharf within 25 feet of the head of the gangway to the float, unless the office is within 25 feet of the gangway or is on the float and an extinguisher is provided thereon.

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Sec. 15.02.244 Amendment of Article 5203, LPG Fuel Dispensing Stations.

Subsection 5203.4 Location. Is amended by adding the following:

The location of a LPG dispenser shall be 30 feet or more from a gasoline dispenser.

Sec. 15.02.245 Amendment of Article 61, Oil Burning Equipment.

Subsection 6105.3 Location. Is amended as follows:

The use of listed portable unvented oil burning appliances shall be limited to supplemental heating in Group U Occupancies.

EXCEPTION: When approved by the Fire Marshal, portable unvented oil burning heating appliances may be used in any occupancy during construction when such use is necessary for the construction and the use does not represent a hazard to life or property.

Section 6106 Permit Required. Is added as follows:

A permit is required for oil burning equipment regulated by this article.

Sec. 15.02.246 Amendment of Article 74, Compressed Gases.

Subsection 7401.3 Permits. Is amended to read as follows:

1. Permits are required to store, transport on site, dispense, use or handle compressed gases in excess of quantities specified in Section 105, Permit c.7.

    1.1 A permit is required to install a medical gas system.

Subsection 7401.3.1 Plans. Is amended to read as follows:

Three copies of plans bearing the stamp of a registered engineer shall be submitted to the Fire Marshal for each medical gas system.

Sec. 15.02.247 Addition of Article 74, Section 7405, High Pressure Breathing Air Systems.

Subsection 7405.1 Permit to Install. Is added as follows:

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Three copies of plans shall be submitted to the Fire Marshal containing the engineering calculations, system capacity, piping locations within the building, pressure drop calculations, and types of grades of materials including fittings.

Subsection 7405.2 Testing of Breathing Air Systems. Is added as follows:

Breathing air systems piping shall be tested pneumatically at 7500 psi in the presence of the Fire Marshal or his designated representative.

Subsection 7405.3 Breathing Air System Certification. Is added as follows:

Breathing air systems certifications for installation, materials, and testing shall be made in writing to the building owner and the Fire Marshal.

Sec. 15.02.248 Amendment of Article 77, Section 7701, Explosive Materials.

Subsection 7701.1 Scope. Is amended by modifying exceptions No. 3 and 10 to read as follows:

3. For sale, possession or use of Class C, common fireworks, see Sacramento City Code Title 15, Chapter 3.

10. The use and handling of Class B fireworks as set forth in Title 19 CCR.

Sec. 15.02.249 Deletion of Article 78, Fireworks and Pyrotechnic Special Effects Material.

Article 78 of the Uniform Fire Code is deleted.

Chapter III, of Title 15, Sacramento City Code, and Title 19, CCR replace requirements of this article.

Sec. 15.02.250 Amendment to Article 79, Section 7901, Flammable and Combustible Liquids.

Subsection 7901.3.1 Permits. Is amended by adding:

For permits to remove or install aboveground tanks see Section 105.8.

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Subsection 7901.8.3.4 Neutralizers and Treatment Systems. Is amended to read as follows:

Drainage systems for spillage and fire protection water which are directed to a neutralizer or treatment system shall comply with the following:

1. The system shall be designed to handle the maximum worse case spill from the single largest container plus the volume of fire protection water from the system over the minimum design area for a water flow duration of 20 minutes when the facility contains an alarm system monitored at a central station, or for a water flow duration of 60 minutes where such an alarm system is not installed.

2. Overflow control from the neutralizer or treatment system shall be provided to direct liquid leakage and fire protection water to a safe location away from the buildings, material or fire protection control valves, means of egress, adjoining properties, or fire apparatus access roadways.

Subsection 7901.8.4.2 Sizing. Is amended to read as follows:

Secondary containment shall be designed to contain the spill from the largest single container plus the design flow rate of the sprinkler system or area in which the storage is located or the sprinkler system design area whichever is smaller. The containment capacity shall be capable of containing the water flow from a discharge having a duration of 20 minutes when the facility contains an alarm system monitored at a central station or a water flow duration of 60 minutes when such alarm system is not installed.

Subsection 7901.11.8 Pipe Joints. Is amended by changing the third paragraph to read as follows:

Pipe joints dependent upon the friction characteristics or resiliency of combustible materials for mechanical continuity or liquid tightness of piping shall not be used.

Subsection 7901.11.10 Testing. Is amended by changing the second paragraph to read:

Existing piping shall be tested as described above when the Fire Marshal has a reason to believe a leak exists. Pneumatic tests of piping shall be conducted only with inert gas. Such tests shall be at the expense of the owner or operator.

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Sec. 15.02.251 Amendment of Article 79, Section 7902, Storage.

Table 7902.1-A Maximum Size of Containers and Portable Tanks. Is amended by retaining the footnotes unchanged and changing the table to read as follows:

TABLE NO. 7902.1-A MAXIMUM SIZE
OF CONTAINERS AND PORTABLE TANKS

		FLAMMABLE LIQUIDS		COMBUSTIBLE LIQUIDS	
Container Type	Class IA	Class IB	CLASS IC	CLASS II	CLASS III
Glass[1]	1 pt.	1 pt.	1 pt.	0 gal.	0 gal.
Metal (Other than DOT drums)	1 gal.	5 gal.	5 gal.	5 gal.	5 gal.
Approved Plastic	1 gal.	1 gal.	1 gal.	1 gal.	1 gal.
Safety Cans	2 gal.	5 gal.	5 gal.	5 gal.	5 gal.
Metal Drums (DOT Spec.)	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.
Approved Portable Tanks	660 gal.	660 gal.	660 gal.	660 gal.	660 gal.
Polyethylene[2]		Not permitted		60 gal.	60 gal.

Subsection 7902.1.7.1 General. Is amended to read as follows:

Tanks taken out of service as a result of a property's being abandoned or its use being changed shall be removed or abandoned in place in accordance with this article.

Subsection 7902.1.7.2.2 Out of Service 90 Days. Is amended by adding a sentence at the end of the subsection as follows:

Tanks taken out of service shall be safeguarded or removed in accordance with this section and Title 16 of the Sacramento City Code.

Subsection 7902.1.7.2.3 Underground Tanks Out of Service for One Year. Is amended to read as follows:

Underground tanks which have been out of service for a period of one year shall be removed from the ground in a manner approved by the Fire Marshal and the site shall be restored in an approved manner. When the Fire Marshal determines that the removal of the tank is undesirable due to its location, condition, or proximity to structures, abandonment in place may be permitted.

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Tanks removed from the ground shall be removed in accordance with Section 7902.1.7.4.1.

Tanks abandoned in place shall be in accordance with Title 16 of the Sacramento City Code.

Subsection 7902.1.7.2.5 Reinstallation of Tanks. Is amended to read as follows:

Used and/or reprocessed tanks shall not be reinstalled.

Subsection 7902.1.7.4.1 General. Is amended by adding Item 6 as follows:

Tanks shall not be cut, punctured, altered, repaired or scrapped by use of torch, cutting torch, metal tools, saws, snipper or other device which may cause ignition of flammable vapors. Removal of piping or fixture repair shall be conducted with non sparking tools.

Subsection 7902.1.8.2.9 Tank Lining. Is amended to read as follows:

1. Steel tanks are allowed to be lined only for the purpose of protecting the interior from corrosion or providing compatibility with the material to be stored. Only those liquids tested for compatibility with the lining material are allowed to be stored in lined tanks.

    1.1 Approved tank opening, cleaning, preparation, inspection, lining, closing and testing shall be in accordance with Sacramento City Code, Title 16 and UFC Standard 79-6 shall not apply.

    1.2 For permits to alter a tank, see Section 105.

    1.3 Interior-lined underground tanks shall be protected from corrosion in accordance with Section 7902.6.15.

Subsection 7902.1.8.2.11 Existing Oil Storage Reservoirs. This subsection is deleted.

Subsection 7902.1.12.2.3 Fill Pipe and Discharge Lines. Is amended by changing the third paragraph to read as follows:

For all tanks except those containing crude oil or asphalt the fill pipe shall be designed and installed in a manner which will minimize the possibility of generating static electricity by terminating the fill pipe within 6 inches of the bottom of the tank.

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Subsection 7902.1.12.3.1 Tank Opening Security. Is added as follows:

All openings including those for tank secondary containment, access, and openings for manual gauging shall be provided with a lockable liquid type cap or cover. Covers shall be kept locked 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.

Fill openings shall be equipped with a closure and locked for security. The fill opening shall be separate from the vent opening.

Subsection 7902.2.2.1 Locations Where Aboveground Tanks are Prohibited. Is amended by adding at the end of the subsection as follows:

See Sacramento City Code for zoning requirements.

Subsection 7902.2.3.2 Separation Between Adjacent Tanks Containing Unstable Liquids. Is amended to read as follows:

The diameter of all tanks shall be calculated when determining required separations. Minimum separations shall be not less than twenty feet.

Subsection 7902.2.7.2 Fill Pipe Openings. Is amended by adding the following at the end of the subsection:

Fill openings shall be equipped with a closure and locked for security.

Subsection 7902.4.3 Openings for Manual Gauging. Is amended by changing the first sentence in the subsection to read as follows:

Openings for manual gauging shall be provided with a liquid tight cover and shall be locked.

Subsection 7902.6.4 Depth and Cover. Is amended by modifying the second sentence of the first paragraph to read as follows:

Underground tanks shall be set on firm foundations and surrounded with at least one foot of noncorrosive inert material such as clean sand or gravel well tamped in place or in accordance with the manufacturer's installation instructions.

Subsection 7902.6.6 Inventory Control. Is amended to read as follows:

Daily inventory records shall be maintained for underground storage tank systems in accordance with Title 16 of the Sacramento City Code.

Subsection 7902.6.9 Used Tanks. Is amended to read as follows:

Used and/or reprocessed tanks shall not be reinstalled.

Subsection 7902.6.16.4 Used Tanks. Is amended to read as follows:

Used and/or reprocessed tanks shall not be reinstalled.

Sec. 15.02.252 Amendment of Article 79, Section 7903, Dispensing, Use, Mixing, and Handling.

Subsection 7903.1.3.5 Class I and II Liquids. Is amended by deleting Item 4, Gravity Dispensing.

Sec. 15.02.253 Amendment of Article 79, Section 7904, Special Operations.

Subsection 7904.2.8.1 General. Item 10 is added as follows:

10. The driver operator or attendant of any tank vehicle shall not make delivery to any storage tank(s) not conforming to Section 7902.1.8.2.1. This prohibition includes but is not limited to, tanks utilizing gravity feed dispensing and aboveground tanks in areas where prohibited.

Subsection 7904.4.8.2 Fire Extinguishers. Is amended to read as follows:

Suitable portable fire extinguishers with a rating of not less than 40-B shall be located within 75 feet of those portions of the facility where fires are likely to occur, such as hose connections, pumps and separator tanks.

Sec. 15.02.254 Amendment of Article 81, Section 8102, Fire Protection and Life Safety Features.

Subsection 8102.4 Fire Detection. Is amended to read as follows:

When required by Table No. 81-A an approved automatic fire-detection system shall be installed throughout the entire building containing the high-piled combustible storage area. Fire detection

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systems shall be monitored by an approved monitoring agency, and shall be installed in accordance with Article 10.

Subsection 8102.6.5 Controls. Is added as follows:

1. The smoke removal system shall be provided with a fire department control panel located in accordance with this article and Article 10.

2. The control panel room shall be of one hour construction in accordance with the Building Code. Accessory corridors providing access to the control panel room from the exterior shall be of one hour construction in accordance with the Building Code.

3. Automatic sprinkler coverage shall be provided in the control panel room. Automatic sprinkler protection shall be provided in accessory corridors providing access to the control panel room from the exterior. Automatic sprinkler coverage shall be in accordance with Article 81.

4. A graphic diagram of the building shall be provided for the control panel room indicating curtained areas and their respective controls.

Sec. 15.02.255 Addition to Article 81, Section 8104, Rack Storage.

Subsection 8104.3.1 General. Is amended to read as follows:

Flue spaces shall be maintained free of storage.

Sec. 15.02.256 Amendment to Article 82, Section 8202, Permits, Plans and Records.

Subsection 8202.1 Permits and Plans. Is amended to read as follows by deleting the exception and by adding the following:

Plans shall be submitted and approved for the installation of any LPG tank.

Sec. 15.02.257 Amendment of Article 82, Section 8206, Dispensing and Overfilling.

Subsection 8206.4 Tank Vehicle. Is added as follows:

The operator or other competent person shall be in attendance at all times while a tank vehicle or tank car is discharging cargo. The tank vehicle or tank car shall be positioned so that the operating controls and the discharging end of the hose or hoses are both in view of the operator or other competent person.

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Sec. 15.02.258 Amendment of Article 82, Section 8213, Containers Not In Service.

Subsection 8213.1 Item 4. Is amended by adding Item 4 as follows:

Tanks shall be considered permanently out of service 30 days after their last use.

Sec. 15.02.259 Amendment of Article 85, Section 8508, Power Taps.

Subsection 8508.4 Installation. Is amended to read as follows:

Power tap cords shall not extend through walls, ceilings, floors, under doors or floor coverings, or be subject to environmental or physical damage. Power taps shall not be used in series and shall be energized separately. Power taps shall be listed for heavy duty or continuous use within any non-residential occupancy.

Sec. 15.02.260 Amendment of Article 87, Section 8704, Fire Safety During Construction.

Subsection 8704.2 Access Roads. Is amended as follows:

Fire department access roads shall be established and maintained in accordance with Section 902 and shall meet minimum standards of the City of Sacramento Public Works Department.

Subsection 8704.3 Water supply. Is amended to read as follows:

Water mains and fire hydrants shall be installed and shall be operational prior to the storage of combustible materials on site and prior to beginning construction.

Subsection 8704.4.3.2 Temporary Standpipes. Is amended as follows:

1. Temporary standpipes are allowed to be provided in place of permanent systems if they are designed to furnish 500 gpm at 100 psi within the first ten floor levels and 150 psi with 500 gpm flowing thereafter. The standpipe diameter shall be not less than four inches.

2. All outlet diameters shall not be less than 2½ inches.

3. Pumping equipment sufficient to provide this pressure and volume shall be available at all times when a Class III standpipe system is required.

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Subsection 8704.18 On Site Storage of Combustible Construction Materials. Is amended by adding the following:

1. Lumber piles, shorts, scraps, wood, stickpiles and combustible construction materials shall be stored in a neat and orderly manner free from any condition that would cause or contribute to the rapid spread of fire.

2. Bulk storage of lumber and combustible construction materials shall be in accordance with Article 30.

3. Provisions shall be made for the proper disposal of waste material and rubbish.

Sec. 15.02.261 Amendment of Article 87, Section 8705, Alterations of Buildings.

Subsection 8705.2 Fire Protection Systems. Is amended to read as follows:

When the building is protected by fire-protection systems, such systems shall be maintained operational at all times during alteration. When alteration requires modification of a portion of a fire-protection system, the remainder of the system shall be kept in service. When it is necessary to shut down any portion of a fire protection system, the Fire Department shall be notified and the Fire Marshal shall determine if a firewatch shall be kept on site until the system is returned to service.

Sec. 15.02.262 Amendment of Article 90, Section 9002, UFC Standards.

Subsection Article 79, (79-6) Interior Lining of Underground Storage Tanks. Is amended to read as follows:

1. Standard 79-6, Section 79.602.6.1 Tank. An approved access opening shall exist to line a tank. Cutting of tanks is prohibited. Before opening the tank, testing for vapors shall be done by inserting the meter probe into the hole to verify that the vapor concentration does not exceed 10% of the lower flammable limit.

2. Standard 79-6, Section 79.603.2.1 Qualifications. Openings are not allowed to be cut in tanks for entry for inspection purposes.

3. For additional requirements for tank openings or recertification see Title 16 of the Sacramento City Code. All work must be coordinated with the Fire Prevention Division Hazardous Materials Inspector.

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Sec. 15.02.263 Amendment of Article 90, Section 9003, Recognized Standards.

Subsection n.2 National Fire Protection Association. Is amended by adding Subsection n2.5 as follows:

Subsection n.2.5 231D Standard for Storage of Rubber Tires (includes Appendix C).

Sec. 15.02.264 Amendment of Appendix I-A, Life Safety Requirements for Existing Buildings other than Highrise.

Subsection 6.3 Locations Within Dwelling Units. Is amended by adding the following at the end of the paragraph:

Smoke detectors shall be located in each sleeping room or sleeping area.

Section 8 Stairway Barriers. Is added to Appendix I-A as follows:

Where a basement stairway and a stairway to an upper story terminate in the same exit enclosure, an approved barrier shall be provided to prevent persons from continuing into the basement.

Sec. 15.02.265 Amendment of Appendix I-C, Stairway Identification.

Section 2 General. Is amended by adding a sentence at the end of the section to read as follows:

Buildings, two or more stories in height shall comply with this appendix as deemed necessary by the Fire Marshal.

Section 3 Sign Details. Is amended by adding **Subsection 3.7 Color Coding** as follows:

The sign background shall be color coded as required by the Fire Marshal.

Sec. 15.02.266 Amendment of Appendix II-C, Marinas.

Section 3 Permits. Is amended by adding the following:

A permit is required to operate a marina. See Section 105, Uniform Fire Code.

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Section 6 Fire Protection Equipment. Is amended by adding the following:

Subsection 6.1.1 Automatic Fire Sprinkler System. Is added as follows:

1. A fire sprinkler system shall be provided for all covered floats, marinas, piers, and any/all other covered floating structures commercially operated regardless of square footage.

2. Where the number of sprinklers exceeds 100, the fire sprinkler system shall be monitored at a listed and approved central station.

Subsection 6.3.1 Access Points. Marinas shall be accessible for firefighting purposes by not less than two approved access points. Access locations shall be in accordance with Uniform Building Code, 1994, Chapter 10, Section 1003.3.

Subsection 6.5 Testing. Is added as follows:

Testing and maintenance of water based fire protection systems at marinas shall be in accordance with National Fire Protection Association Standard 25 and Title 19 CCR.

Section 7 Transmission of Alarms. Is amended to read as follows:

Means shall be available for calling the Fire Department. Proprietary alarm systems, fire department alarm boxes and a telephone not requiring a coin to operate are acceptable means. A device shall be within 100 feet of marine motor vehicle fuel dispensing station premises.

Section 9 Exiting. Is added as follows:

Exiting for marinas and areas serving marinas shall be of an arrangement and dimension to accommodate the total occupant load of all occupancies located at or on marinas or wharves. Exiting shall be provided in accordance with the Uniform Building Code.

Sec. 15.02.267 Amendment of Appendix II-D, Rifle Ranges.

Section 7 Warnings. Is amended to read as follows:

Rifle ranges shall be posted with approved warning posters or signs to notify and protect the public from danger.

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Sec. 15.02.268 Amendment of Appendix II-F, Aboveground Tanks.

Section 1 Scope. Is amended to read as follows:

The storage and dispensing of motor fuels into the fuel tanks of motor vehicles from above ground tanks shall be for commercial fleet use and shall be in accordance with the policies and procedures of the Sacramento Fire Department and Appendix II-F.

Section 3 Permits and Plans. Is amended to read as follows:

See Section 105.8 for permits for the removal or installation of aboveground tanks.

Subsection 4.3 Size. Is amended to read as follows.

Primary tanks shall not exceed 1,000 gallons individual or aggregate unless approved by the Fire Marshal. For the purposes of this subsection individual tank capacity in Table A II-F 1, Individual Tank Capacity, shall not apply.

Subsection 5.3.1 Special Conditions. Is added as follows:

Additional site specific requirements may be imposed by the Fire Marshal, if deemed necessary. Special conditions include, but are not limited to, unusual topographical features. Tank installations near waterways, drainage canals, and/or underground drainage systems may require additional containment or diking as required by the Fire Marshal.

Subsection 6.2.1 Tank Opening Security. Is added as follows:

1. All openings including those for tanks, secondary containment, access, and openings for manual gauging shall be provided with a lockable liquid tight cap or cover.

2. Covers shall be kept locked 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.

3. The fill opening shall be equipped with a closure and locked for security.

Sec. 15.02.269 Amendment of Appendix II-G, Secondary Containment for Underground Tank Systems Containing Flammable or Combustible Liquids.

Section 1 Scope. Is amended by adding:

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Also see Title 16, Sacramento City Code for secondary containment.

Sec. 15.02.270 Amendment of Appendix III-A, Section 5, Fire-Flow Requirements for Buildings.

Subsection 5.2 Buildings Other than One and Two Family Dwellings. Is amended to read as follows:

The minimum fire flow for buildings other than one- and two-family dwellings shall not be less than that specified in Table No. A-III-A-1.

EXCEPTION: A reduction in required fire flow of up to 50 percent, as approved by the Fire Marshal, is allowed when the building is provided with an approved automatic sprinkler system. The resulting fire flow shall not be less than 1500 gallons per minute.

Sec. 15.02.271 Amendment of Appendix III-B, Fire Hydrant Location and Distribution.

Section 4 Consideration of Existing Fire Hydrants. Is amended to read as follows:

Subsection 4.1 Existing Fire Hydrants. Existing fire hydrants on public streets are allowed to be considered as available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads.

Subsection 4.2 Hydrant Upgrade. Existing single outlet 2½" hydrants shall be changed to an approved steamer style hydrant, when a lot split, consolidation of lots, change of building use, or construction may increase the required fire flow.

Subsection 4.3 Water Mains. Where water main improvements are required to meet GPM flow and the existing water main has an single 2½ inch outlet fire hydrant, an upgrade of hydrants is required.

Section 5 Distribution of Fire Hydrants and Table A-III-B-I. Is amended to read as follows:

1. The average spacing between fire hydrants shall not exceed that listed in Table A-III-B-I.

EXCEPTION: The Fire Marshal may accept a deficiency of up to 10 percent where existing fire hydrants provide all or a portion of the required fire hydrant service.

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2. Regardless of the average spacing, fire hydrants shall be located such that all points on streets and access roads adjacent to a building are within the distances listed in Table A-III-B-I.

TABLE NO. A-III-B-1
NUMBER AND DISTRIBUTION OF FIRE HYDRANTS

FIRE FLOW REQUIREMENT (gpm)	MINIMUM NO. OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS 1,3, & 4 (Ft.)	MAXIMUM DISTANCE FROM HYDRANT TO ANY POINT ON STREET OR ROADWAY FRONTAGE[3] (Ft.)
1750 or less	1	300	150
2000-2250	2	300	150
2500	3	300	150
3000	3	300	150
3500-4000	4	300	150
4500-5000	5	300	150
5500	6	300	150
6000	6	300	150
6500-7000	7	300	150
7500 or more	8 or more[2]	300	150

[1]Reduce by 150 feet for dead-end streets or roadways.

[2]One hydrant for each 1000 gpm or fraction thereof.

[3]Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants should be provided at not less than 1000-foot spacing to provide for transportation hazards. In addition, there shall be at least one hydrant at each intersection.

[4]Average spacing between hydrants may be extended to 500 feet on residential streets.

Section 6 Hydrant Type. Is added as follows:

Fire hydrants installed in public right of way or on private property shall be the type approved by the Fire Marshal.

Section 7 Hydrants-Both Sides of the Street. Is added as follows:

1. Hydrants shall be required on both sides of the street whenever one or more of the following condition exist:

   1.1 Streets have median center dividers that make access to hydrants difficult, cause time delay, creates undue hazard.

   1.2 When there are four or more lanes of traffic.

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1.3 Width of street in excess of 88 feet.

1.4 Possibility of existing street being widened or having a raised median center divider in the future.

Section 8 Private Fire Protection Systems for Rural Commercial and Industrial Development. Is added as follows:

1. Where the standards of this code cannot be met for industrial and commercial development in rural areas, alternate proposals which meet the intent of NFPA Standard 1231 may be submitted to the Fire Marshal for review and approval. Approved alternate materials and methods may be used only until public water becomes available. When public water becomes available the public water service shall be used in lieu of any alternate materials or methods. Proposals shall be subject to the following:

   1.1 The structure is beyond 3,000 feet of any existing adequately sized water supply/system.

   EXCEPTION: Structures within 3,000 feet but beyond a water purveyor service area will be reviewed on an individual basis.

Sec. 15.02.272 Amendment of Appendix III-C, Testing of Automatic Sprinkler and Standpipe Systems.

Subsection 2.4 Alarm Test. Is amended by modifying the second sentence of the subsection to read as follows:

When fully opened, the response shall occur within 90 seconds.

Subsection 3.2.4 Outlets. Is amended by modifying the last sentence of the paragraph to read as follows:

Each outlet in the system shall be flowed in a manner that will indicate the valves are fully operable and that there is the required water pressure at that outlet.

Sec. 15.02.273 Amendment of Appendix V-A, Nationally Recognized Standards of Good Practice.

Section 2 NFPA Fire Codes. Is amended by adopting all NFPA Standards except:

11C - Mobile Foam Apparatus (1990).

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13E - Fire Department Operations in Properties Protected by Sprinkler and Systems (1981).

296 - (This is a standard no longer printed).
297 - Telecommunications Systems - Principles and Practices for Rural and Forestry Services (1986).

402M - Aircraft Rescue and Firefighting Operations (1991).
403 - Aircraft Rescue and Firefighting Services at Airports (1988).
407 - Aircraft Fuel Servicing for Rooftop Fuel Systems.
412 - Evaluating Foam Firefighting Equipment on Aircraft Rescue and Firefighting Vehicles (1987).
422M - Aircraft Fire and Explosion Investigators Manual (1989).
472 - Professional Competence of Responders to Hazardous Materials Incidents (1989).

550 - Fire Safety Concepts Tree (1986).

902M - Fire Reporting Field Incident Manual (1990).
904M - (No longer listed).
908M - (No longer listed).

1001 - Firefighter Professional Qualifications (1987).
1002 - Fire Apparatus Driver/Operator Professional Qualifications (1988).
1003 - Airport Firefighter Professional Qualifications (1987).
1004 - (No longer listed).
1021 - Fire Officer Professional Qualifications (1987).
1031 - Professional Qualifications for Fire Inspector (1987).
1033 - Fire Investigator Professional Qualifications (1987).
1035 - Public Fire Educator Professional Qualifications (1987).
1041 - Fire Service Instructor Professional Qualifications (1987).

1201 - Developing Fire Protection Services for the Public (1989).
1221 - Installation, Maintenance and Use of Public Fire Service Communications Systems (1991).
1402 - Building Fire Service Training Centers (1992).
1404 - Fire Department Self Contained Breathing Apparatus Program (1989).
1405 - Land Based Firefighters Who Respond to Marine Vessel Fires (1990).
1410 - Training Standard on Initial Fire Attack (1988).

1500 - Fire Department Occupational Safety and Health Program (1987).
1501 - Fire Department Safety Officer (1987).
1561 - Fire Department Incident Management System (1990).

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1901 - Pumper Fire Apparatus (1991).
1902 - Initial Attack Fire Apparatus (1991).
1903 - Mobile Water Supply Fire Apparatus (1991).
1904 - Aerial Ladder and Elevating Platform Fire Apparatus (1991).
1911 - Service Test of Pumps on Fire Department Apparatus (1991).
1914 - Fire Department Aerial Devices Testing (1991).
1931 - Design and Design Verifications Tests For Fire Department Ground Ladders (1989).
1932 - Use Maintenance and Service Testing of Fire Department Ground Ladders (1989).
1971 - Protective Clothing for Structural Firefighting (1991).
1972 - Helmets for Structural Firefighting (1987).
1973 - Gloves for Structural Firefighting (1988).
1974 - Protective Footwear for Structural Firefighting (1987).
1975 - Station/Work Uniforms (1990).

1981 - Open Circuit Self Contained Breathing Apparatus for Firefighters (1987).
1982 - Personal Alert Safety Systems (PASS) for Firefighters (1988).
1983 - Fire Service Life Safety Rope (1990)

Sec. 15.02.274 Amendment of Appendix VI-C, Model Citation Program.

Figure A-VI-C-5 Bail Schedule. Is amended as follows:

BAIL SCHEDULE

SECTION	MISDEMEANOR OFFENSE	PC	BAIL	PA	TOTAL
103.4.3.1	Noncompliance with Orders of Notices	X	$1000.00	$1700.00	$2700.00
103.4.3.2	Noncompliance with Condemnation Tag	X	1000.00	1700.00	2700.00
103.4.3.3	Removal and Destruction of Tags & Signs	X	1000.00	1700.00	2700.00
103.4.4	Unlawful Continuance of Hazards	X	1000.00	1700.00	2700.00
104.1.2	Interference at Fire Scenes		1000.00	1700.00	2700.00
SECTION	**INFRACTION OFFENSE**	**PC**	**BAIL**	**PA**	**TOTAL**
902.2.4.1	Vehicle Blocking Fire Lane, Apparatus Access Road	X	$ 100.00	$170.00	$270.00
	Other Blocking Fire Lane, Apparatus Access Road	X	100.00	170.00	270.00
902.2.4.3	Unauthorized Installation of Gates and Barriers	X	100.00	170.00	270.00
902.3.1	Obstructed Fire Department Access to Building Openings	X	100.00	170.00	270.00
1001.7.1	Obstruction and Impairment of Fire Hydrant	X	100.00	170.00	270.00

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SECTION	INFRACTION OFFENSE	PC	BAIL	PA	TOTAL
1001.7.1	Obstruction and Impairment of Fire Protection Equipment	X	100.00	170.00	270.00
1001.7.1	Vehicle Blocking Fire Hydrant, Fire Protection Equipment	X	100.00	170.00	270.00
1302.3.2	False Alarm		100.00	170.00	270.00
1302.3.3.2	Failure to Perform Fire Drills		100.00	170.00	270.00
Other Infractions			100.00	170.00	270.00

PC - Eligible for Proof of Correction
PA - Penalty Assessment

Reference - 1994 Uniform Fire Code

Fines are forfeitable on first offense and mandatory appearance is required on second offense.

The Chief or his/her duly authorized representative, may issue citations for infractions or misdemeanor violations of the provisions of this ordinance pursuant to Section 13871 of the Health and Safety Code of the State of California and Chapter 5c (commencing with Section 853.6) of Title 3 of Part 2 of the Penal Code of the State of California.

The imposition of one penalty for any violation shall not excuse the violation or permit it to continue. All persons shall be required to correct or remedy such violations or defects within a reasonable time.

15.02.275 Amendment of Appendix VI-D, Reference Tables.

Table 3-A, Section 310.1 Description of Occupancies by Group and Division. Is amended by adding Boarding House to R-1 and R-3.

Table 3-G Required Detached Storage. Is adopted from the Uniform Building Code.

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95-070

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DATE PASSED FOR PUBLICATION: December 5, 1995

DATE ENACTED: December 12, 1995

DATE EFFECTIVE: January 11, 1996

ATTEST:

MAYOR

CITY CLERK

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DATE ADOPTED: DEC 12 1995

TABLE A-VI-E-5—AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS
As Revised and Approved by the Institute of Makers of Explosives—June 1991[14]

QUANTITY OF EXPLOSIVE MATERIALS[1,2,3,4,15]		DISTANCES IN FEET × 304.8 for mm							
		Inhabited Buildings[9]		Public Highways with Traffic Volume of less than 3,000 Vehicles per Day		Passenger Railways—Public Highways with Traffic Volume of more than 3,000 Vehicles/Day[10,11]		Separation of Magazines[5, 12]	
Pounds Over	Pounds Not Over								
× 0.454 for kg		Barricaded[6,7,8]	Unbarricaded	Barricaded[6,7,8]	Unbarricaded	Barricaded[6,7,8]	Unbarricaded	Barricaded[6,7,8]	Unbarricaded
0	5	70	140	30	60	51	102	6	12
5	10	90	180	35	70	64	128	8	16
10	20	110	220	45	90	81	162	10	20
20	30	125	250	50	100	93	186	11	22
30	40	140	280	55	110	103	206	12	24
40	50	150	300	60	120	110	220	14	28
50	75	170	340	70	140	127	254	15	30
75	100	190	380	75	150	139	278	16	32
100	125	200	400	80	160	150	300	18	36
125	150	215	430	85	170	159	318	19	38
150	200	235	470	95	190	175	350	21	42
200	250	255	510	105	210	189	378	23	46
250	300	270	540	110	220	201	402	24	48
300	400	295	590	120	240	221	442	27	54
400	500	320	640	130	260	238	476	29	58
500	600	340	680	135	270	253	506	31	62
600	700	355	710	145	290	266	522	32	64
700	800	375	750	150	300	278	556	33	66
800	900	390	780	155	310	289	578	34	70
900	1,000	400	800	160	320	300	600	36	72
1,000	1,200	425	850	165	330	318	636	39	78
1,200	1,400	450	900	170	340	336	672	41	82
1,400	1,600	470	940	175	350	351	702	43	86
1,600	1,800	490	980	180	360	366	732	44	88
1,800	2,000	505	1,010	185	370	378	756	45	90
2,000	2,500	545	1,090	190	380	408	816	49	98
2,500	3,000	580	1,160	195	390	432	864	52	104
3,000	4,000	635	1,270	210	420	474	949	58	116
4,000	5,000	685	1,370	225	450	513	1,026	61	122
5,000	6,000	730	1,460	235	470	546	1,092	65	130

(Continued)

TABLE A-VI-E-5—AMERICAN TABLE OF DISTANCES FOR STORAGE OF EXPLOSIVE MATERIALS—(Continued)
As Revised and Approved by the Institute of Makers of Explosives—June 1991[14]

6,000	7,000	770	1,540	245	490	573	1,146	68	136
7,000	8,000	800	1,600	250	500	600	1,200	72	144
8,000	9,000	835	1,670	255	510	624	1,248	75	150
9,000	10,000	865	1,730	260	520	645	1,290	78	156
10,000	12,000	875	1,750	270	520	687	1,374	82	164
12,000	14,000	885	1,770	275	550	723	1,446	87	174
14,000	16,000	900	1,800	280	560	756	1,512	90	180
16,000	18,000	940	1,880	285	570	786	1,572	94	188
18,000	20,000	975	1,950	290	580	813	1,626	98	196
20,000	25,000	1,055	2,000	315	630	876	1,752	105	210
25,000	30,000	1,130	2,000	340	680	933	1,866	112	224
30,000	35,000	1,205	2,000	360	720	981	1,962	119	238
35,000	40,000	1,275	2,000	380	760	1,026	2,000	124	248
40,000	45,000	1,340	2,000	400	800	1,068	2,000	129	258
45,000	50,000	1,400	2,000	420	840	1,104	2,000	135	270
50,000	55,000	1,460	2,000	440	880	1,140	2,000	140	280
55,000	60,000	1,515	2,000	455	910	1,173	2,000	145	290
60,000	65,000	1,565	2,000	470	940	1,206	2,000	150	300
65,000	70,000	1,610	2,000	485	970	1,236	2,000	155	310
70,000	75,000	1,655	2,000	500	1,000	1,263	2,000	160	320
75,000	80,000	1,695	2,000	510	1,020	1,293	2,000	165	330
80,000	85,000	1,730	2,000	520	1,040	1,317	2,000	170	340
85,000	90,000	1,760	2,000	530	1,060	1,344	2,000	175	350
90,000	95,000	1,790	2,000	540	1,080	1,368	2,000	180	360
95,000	100,000	1,815	2,000	545	1,090	1,392	2,000	185	370
100,000	110,000	1,835	2,000	550	1,100	1,437	2,000	195	390
110,000	120,000	1,855	2,000	555	1,110	1,479	2,000	205	410
120,000	130,000	1,875	2,000	560	1,120	1,521	2,000	215	430
130,000	140,000	1,890	2,000	565	1,130	1,557	2,000	225	450
140,000	150,000	1,900	2,000	570	1,140	1,593	2,000	235	470
150,000	160,000	1,935	2,000	580	1,160	1,629	2,000	245	490
160,000	170,000	1,990	2,000	590	1,180	1,662	2,000	255	510
170,000	180,000	2,010	2,000	600	1,200	1,695	2,000	265	530
180,000	190,000	2,030	2,010	605	1,210	1,725	2,000	275	550
190,000	200,000	2,055	2,030	610	1,220	1,755	2,000	285	570
200,000	210,000	2,055	2,055	620	1,240	1,762	2,000	295	590
210,000	230,000	2,100	2,100	635	1,270	1,836	2,000	315	630
230,000	250,000	2,155	2,155	650	1,300	1,890	2,000	335	670
250,000	275,000	2,215	2,215	670	1,340	1,950	2,000	360	720
275,000	300,000[13]	2,275	2,275	690	1,380	2,000	2,000	385	770

[1]"Explosive materials" means explosives, blasting agents and detonators.

[2]"Explosives" means any chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. A list of explosives determined to be within the coverage of 18 U.S.C. Chapter 40, Importation, Manufacturer, Distribution and Storage of Explosive Materials, is issued at least annually by the director of the Bureau of Alcohol, Tobacco and Firearms of the Department of the Treasury. For quantity and distance purposes, detonating cord of 50 grains per foot (10.7 g/m) should be calculated as equivalent to 8 pounds (3.6 kg) of high explosives per 1,000 feet (304.8 m). Heavier or lighter core loads should be rated proportionately.

[3]"Blasting agents" means any material or mixture, consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive, provided that the finished product, as mixed for use or shipment, cannot be detonated by means of a No. 8 test blasting cap when unconfined.

[4]"Detonator" means any device containing any initiating or primary explosive that is used for initiating detonation. A detonator may not contain more than 10 grams of total explosives by weight, excluding ignition or delay charges. The term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use within safety fuses, detonating cord delay connectors, and nonelectric instantaneous and delay blasting caps which use detonating cord, shock tube or any other replacement for electric leg wires. All types of detonators in strengths through No. 8 cap should be rated at $1\frac{1}{2}$ pounds (0.68 kg) of explosives per 1,000 caps. For strengths higher than No. 8 cap, consult the manufacturer.

[5]"Magazine" means any building, structure or container, other than an explosives manufacturing building, approved for the storage of explosive materials.

[6]"Natural barricade" means natural features of the ground such as hills, or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the magazine when the trees are bare of leaves.

[7]"Artificial barricade" means an artificial mound or revetted wall of earth of a minimum thickness of 3 feet (914.4 mm).

[8]"Barricaded" means the effective screening of a building containing explosive materials from the magazine or other building, railway or highway by a natural or an artificial barrier. A straight line from the top of any side wall of the building containing explosive materials to the eave line of any magazine or other building or to a point 12 feet (3657.6 mm) above the center of a railway or highway shall pass through such barrier.

[9]"Inhabited building" means a building regularly occupied in whole or part as a habitation for human beings, or any church, schoolhouse, railroad station, store or other structure where people are accustomed to assemble, except any building or structure occupied in connection with the manufacture, transportation, storage or use of explosive materials.

[10]"Railway" means any steam, electric or other railroad or railway which carries passengers for hire.

[11]"Highway" means any public street, public alley or public road.

[12]When two or more storage magazines are located on the same property, each magazine must comply with the minimum distances specified from inhabited buildings, railways and highways, and in addition, they should be separated from each other by not less than the distances shown for "Separation of Magazines," except that the quantity of explosive materials contained in detonator magazines shall govern in regard to the spacing of said detonator magazines from magazines containing other explosive materials. If any two or more magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such two or more magazines, as a group, must be considered as one magazine, and the total quantity of explosive materials stored in such group must be treated as if stored in a single magazine located on the site of any magazine of the group, and must comply with the minimum of distances specified from other magazines, inhabited buildings, railways and highways.

[13]Storage in excess of 300,000 pounds (136 077.6 kg) of explosive materials in one magazine is generally not required for commercial enterprises.

[14]This table applies only to the manufacture and permanent storage of commercial explosive materials. It is not applicable to transportation of explosives or any handling or temporary storage necessary or incidental thereto. It is not intended to apply to bombs, projectiles or other heavily encased explosives.

[15]When a manufacturing building on an explosive materials plant site is designed to contain explosive materials, such building shall be located from inhabited buildings, public highways and passenger railways in accordance with Table A-VI-E-5 based on the maximum quantity of explosive materials permitted to be in the building at one time.

NOTE: The American Table of Distances (Table A-VI-E-5) is reprinted by permission of the Institute of Makers of Explosives with the provision that the entire table, complete with all explanatory footnotes, be printed.

TABLE A-VI-E-6—TABLE OF RECOMMENDED SEPARATION DISTANCES OF AMMONIUM NITRATE AND BLASTING AGENTS FROM EXPLOSIVES OR BLASTING AGENTS[1,6]

DONOR WEIGHT		MINIMUM SEPARATION DISTANCE OF ACCEPTOR WHEN BARRICADED[2] (feet)		MINIMUM THICKNESS OF ARTIFICIAL BARRICADES[5] (inches)
Pounds Over	Pounds Not Over	× 304.8 for mm		
× 0.454 for kg		Ammonium Nitrate[3]	Blasting Agent[4]	× 25.4 for mm
	100	3	11	12
100	300	4	14	12
300	600	5	18	12
600	1,000	6	22	12
1,000	1,600	7	25	12
1,600	2,000	8	29	12
2,000	3,000	9	32	15
3,000	4,000	10	36	15
4,000	6,000	11	40	15
6,000	8,000	12	42	20
8,000	10,000	13	47	20
10,000	12,000	14	50	20
12,000	16,000	15	54	25
16,000	20,000	16	58	25
20,000	25,000	18	65	25
25,000	30,000	19	68	30
30,000	35,000	20	72	30
35,000	40,000	21	76	30
40,000	45,000	22	79	35
45,000	50,000	23	83	35
50,000	55,000	24	86	35
55,000	60,000	25	90	35
60,000	70,000	26	94	40
70,000	80,000	28	101	40
80,000	90,000	30	108	40
90,000	100,000	32	115	40
100,000	120,000	34	122	50
120,000	140,000	37	133	50
140,000	160,000	40	144	50
160,000	180,000	44	158	50
180,000	200,000	48	173	50
200,000	220,000	52	187	60
220,000	250,000	56	202	60
250,000	275,000	60	216	60
275,000	300,000	64	230	60

[1]Recommended separation distances to prevent explosion of ammonium nitrate and ammonium nitrate-based agents by propagation from nearby stores of high explosives or blasting agents referred to in Table A-VI-E-6 as the "donor." Ammonium nitrate, by itself, is not considered to be a donor when applying Table A-VI-E-6. Ammonium nitrate, ammonium nitrate-fuel oil or combination thereof are acceptors. If stores of ammonium nitrate are located within the sympathetic detonation distance of explosives or blasting agents, one-half the mass of the ammonium nitrate should be included in the mass of the donor.

[2]When the ammonium nitrate or blasting agent is not barricaded, the distances shown in Table A-VI-E-6 shall be multiplied by six. These distances allow for the possibility of high velocity metal fragments from mixers, hoppers, truck bodies, sheet metal structures, metal containers and the like which may enclose the "donor." Where storage is in bullet-resistant magazines recommended for explosives or where the storage is protected by a bullet-resistant wall, distances and barricade thicknesses in excess of those prescribed in Table A-VI-E-5, Footnote 7, are not required. For construction of bullet-resistant magazines, see Article 77.

[3]The distances in Table A-VI-E-6 apply to ammonium nitrate that passes the insensitivity test prescribed in the definition of ammonium nitrate fertilizer promulgated by the Fertilizer Institute (Definitions and Test Procedures for Ammonium Nitrate Fertilizer, Fertilizer Institute 1964); and ammonium nitrate failing to pass said test shall be stored at separation distances determined by competent persons and approved by the authority having jurisdiction.

[4]These distances apply to blasting agents which pass the insensitivity test prescribed in regulations of the United States Department of Transportation and the United States Department of the Treasury, Bureau of Alcohol, Tobacco and Firearms.

Footnotes to Table A-VI-E-6—(Continued)

[5]Earth, or sand dikes, or enclosures filled with the prescribed minimum thickness of earth or sand are acceptable artificial barricades. Natural barricades, such as hills or timber of sufficient density that the surrounding exposures which require protection cannot be seen from the "donor" when the trees are bare of leaves, are also acceptable.

[6]For determining the distances to be maintained from inhabited buildings, passenger railways and public highways, see Table A-VI-E-5 (High Explosives and Blasting Agents) or Table A-VI-E-7 (Low Explosives).

TABLE A-VI-E-7
TABLE OF DISTANCES FOR STORAGE OF LOW EXPLOSIVES

LOW EXPLOSIVES (pounds) × 0.454 for kg		FROM INHABITED BUILDING DISTANCE (feet)	FROM PUBLIC RAILROAD AND HIGHWAY DISTANCE (feet)	FROM ABOVEGROUND MAGAZINE (feet)
Over	Not Over	× 304.8 for mm		
0	1,000	75	75	60
1,000	5,000	115	115	75
5,000	10,000	130	130	100
10,000	20,000	180	180	225
20,000	30,000	215	215	145
30,000	40,000	235	235	155
40,000	50,000	250	250	165
50,000	60,000	260	260	175
60,000	70,000	270	270	185
70,000	80,000	300	300	190
80,000	90,000	325	325	195
90,000	100,000	350	350	200
100,000	200,000	375	375	250
200,000	300,000	400	400	300

TABLE A-VI-E-8—DISTANCES FOR THE OPEN BURNING OF EXPLOSIVES[1]

QUANTITY OF EXPLOSIVES[2,3,4,5] (Not Over)	MINIMUM DISTANCE IN FEET × 304.8 for mm						
	Inhabited Buildings[9]		Public Highways with Traffic Volume of less than 3,000 Vehicles per Day[10]		Passenger Railways and Public Highways with Traffic Volume more than 3,000 Vehicles per Day[10,11]		Separation From Other Open Burning Units
Pounds × 0.454 for kg	No Missile Hazard	Missile Hazard without Barricade[6,7,8]	No Missile Hazard	Missile Hazard without Barricade[6,7,8]	No Missile Hazard	Missile Hazard without Barricade[6,7,8]	
10	90	180	35	70	64	128	8
20	110	220	45	90	81	162	10
50	150	300	60	120	110	220	14
75	170	340	70	140	127	254	15
100	190	380	75	150	139	278	16
250	255	510	105	210	189	378	23
500	320	640	130	260	238	476	29
1,000	400	800	160	320	300	600	36
1,600	470	940	175	350	351	702	43
2,000	505	1,010	185	370	378	756	45
2,500	545	1,090	190	380	408	816	49
3,000	580	1,160	195	390	432	864	52
4,000	635	1,270	210	420	474	948	58
5,000	685	1,370	225	450	513	1,026	61
6,000	730	1,460	235	470	546	1,092	65
7,000	770	1,540	245	490	573	1,146	68
8,000	800	1,600	250	500	600	1,200	72
9,000	835	1,670	255	510	624	1,248	75
10,000	865	1,730	260	520	645	1,290	78

[1]This table is intended only for application of open burning of commercial explosive materials. The distances stated in this table should be measured from the center of the unit, except for separations from other open burning units, which are measured from the edge of the unit.

[2]"Explosive materials" means any explosive, slurry, emulsion, detonating cord, blasting agents and detonators.

[3]"Explosives" means any chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. A list of explosives determined to be within the coverage of 18 U.S.C. Chapter 40, Importation, Manufacture, Distribution and Storage of Explosive Material, is issued at least annually by the director of the Bureau of Alcohol, Tobacco and Firearms of the Department of the Treasury. For quantity and distance purposes, detonating cord of 50 grains per foot (10.7 g/m) should be calculated as equivalent to 8 pounds (3.6 kg) of high explosives per 1,000 feet (304.8 m). Heavier or lighter core loads should be rated proportionally.

[4]"Blasting agents" means any material or mixture, consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive, provided the finished product, as mixed for use or shipment, cannot be detonated by means of a No. 8 test blasting cap when unconfined.

[5]"Detonator" means any device containing any initiating or primary explosive that is used for initiating detonation. A detonator may not contain more than 10 grams of total explosives by weight, excluding ignition or delay charges. The term includes, but is not limited to, electric blasting caps of instantaneous and delay blasting caps which use detonating cord, shock tube or any other replacement for electric wires. All types of detonators in strengths through No. 8 cap should be rated at $1\frac{1}{2}$ pounds (0.68 kg) of explosives per 1,000 caps. For strengths higher than No. 8 cap, consult the manufacturer.

[6]"Natural barricade" means natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures that require protection cannot be seen from the magazine when the trees are bare of leaves.

[7]"Artificial barricade" means an artificial mound or revetted wall of earth of a minimum thickness of 3 feet (914.4 mm).

[8]"Barricaded" means the effective screening of a building containing explosive materials from the magazine or other building, OB/OD site, railway or highway by a natural or an artificial barrier. A straight line from the top of any sidewall of the building containing explosive materials to the eave line of any magazine or other building or to a point 12 feet (3657.6 mm) above the center of a railway or highway shall pass through such a barrier.

[9]"Inhabited building" means a building, regularly occupied in whole or part as a habitation for human beings, or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble. This does not mean any office, warehouse, production, laboratory or other buildings that are a part of the facility where the open burning or open detonation sites are located.

[10]"Highway" means any public street, public alley or public road.

[11]"Railway" means any steam, electric or other railroad or railway which carries passengers for hire.

TABLE A-VI-E-9—DISTANCES FOR THE OPEN DETONATION OF EXPLOSIVES[1]

QUANTITY OF EXPLOSIVES[2,3,4,5] (Not Over)	MINIMUM DISTANCE IN FEET × 304.8 for mm							
	Inhabited Building[9]		Public Highways with Traffic volume of less than 3,000 Vehicles per Day[10]		Passenger Railways and Public Highways with Traffic Volume of more than 3,000 Vehicles per Day[10,11]		Separation from Other Open Detonation Units	
Pounds × 0.454 for kg	No Missile Hazard	Missile Hazard without Barricade[6,7,8]	No Missile Hazard	Missile Hazard without Barricade[6,7,8]	No Missile Hazard	Missile Hazard without Barricade[6,7,8]	No Missile Hazard	Missile Hazard without Barricade[6,7,8]
1	730	730	325	325	480	480	6	12
2	920	920	410	410	600	600	6	12
5	1,250	1,250	550	550	820	820	6	12
10	1,600	1,600	695	695	1,030	1,030	8	16
20	1,990	1,990	875	875	1,295	1,295	10	20
50	2,700	2,700	1,190	1,190	1,760	1,760	14	28
75	3,080	3,080	1,360	1,360	2,015	2,015	15	30
100	3,400	3,400	1,500	1,500	2,220	2,220	16	32
150	3,900	3,900	1,715	1,715	2,535	2,535	19	38
200	4,275	4,275	1,890	1,890	2,795	2,795	21	42
300	4,900	4,900	2,160	2,160	3,200	3,200	24	48
400	5,400	5,400	2,380	2,380	3,520	3,520	27	54
500	5,800	5,800	2,560	2,560	3,790	3,790	29	58

[1]Table A-VI-E-9 is intended only for application of open detonation of commercial explosive materials. The distances stated in Table A-VI-E-9 should be measured form the center of the unit, except for separations from other open detonation units, which are measured from the edge of the unit.

[2]"Explosive materials" means any explosive, slurry, emulsion, detonating cord, blasting agents and detonators.

[3]"Explosives" means any chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. A list of explosives determined to be within the coverage of 18 U.S.C. Chapter 40, Importation, Manufacture, Distribution and Storage of Explosive Material, is issued at least annually by the director of the Bureau of Alcohol, Tobacco and Firearms of the Department of the Treasury. For quantity and distance purposes, detonating cord of 50 grains per foot (10.7 g/m) should be calculated as equivalent to 8 pounds (3.6 kg) of high explosives per 1,000 feet (304.8 m). Heavier or lighter core loads should be rated proportionally.

[4]"Blasting agents" means any material or mixture, consisting of fuel and oxidizer, intended for blasting, not otherwise defined as an explosive, provided the finished product, as mixed for use or shipment, cannot be detonated by means of a No. 8 test blasting cap when unconfined.

[5]"Detonator" means any device containing any initiating or primary explosive that is used for initiating detonation. A detonator may not contain more than 10 grams of total explosives by weight, excluding ignition or delay charges. The term includes, but is not limited to, electric blasting caps of instantaneous and delay blasting caps which use detonating cord, shock tube or any other replacement for electric wires. All types of detonators in strengths through No. 8 cap should be rated at $1\frac{1}{2}$ pounds (0.68 kg) of explosives per 1,000 caps. For strengths higher than No. 8 cap, consult the manufacturer.

[6]"Natural barricade" means natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures that require protection cannot be seen from the magazine when the trees are bare of leaves.

[7]"Artificial barricade" means an artificial mound or revetted wall of earth of a minimum thickness of 3 feet (914.4 mm).

[8]"Barricaded" means the effective screening of a building containing explosive materials from the magazine or other building, OB/OD site, railway or highway by a natural or an artificial barrier. A straight line from the top of any sidewall of the building containing explosive materials to the eave line of any magazine or other building or to a point 12 feet (3657.6 mm) above the center of a railway or highway shall pass through such a barrier.

[9]"Inhabited building" means a building, regularly occupied in whole or part as a habitation for human beings, or any church, schoolhouse, railroad station, store, or other structure where people are accustomed to assemble. This does not mean any office, warehouse, production, laboratory or other buildings that are a part of the facility where the open burning or open detonation sites are located.

[10]"Highway" means any public street, public alley or public road.

[11]"Railway" means any steam, electric or other railroad or railway which carries passengers for hire.

APPENDIX VI-F—REFRIGERANT GROUPS AND PROPERTIES

The following table is provided as reference information for application of Article 63.

(See Sections 6302 and 6303)

TABLE A-VI-F-1—REFRIGERANT GROUPS AND PROPERTIES

REFRIGERANT NUMBER	CHEMICAL FORMULA	CHEMICAL NAME (%)	CHEMICAL ABSTRACT SERVICE (CAS) NUMBER	MECHANICAL CODE SAFETY GROUP[1]
11	CCl_3F	trichlorofluoromethane	75-69-4	A1
12	CCl_2F_2	dichlorodifluoromethane	75-71-8	A1
22	$CHClF_2$	chlorodifluoromethane	75-45-6	A1
113	CCl_2FCClF_2	1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	A1
114	$CClF_2CClF_2$	1,2-dichloro-1,1,2,2-tetrafluoroethane	76-14-2	A1
123	$CHCl_2CF_3$	2,2-dichloro-1,1,1-trifluoroethane	306-83-2	B1
134a	CH_2FCF_3	1,1,1,2-tetrafluoroethane	811-97-2	A1
500	CCl_2F_2	dichlorodifluoroethane (73.8%)	75-71-8	A1
	CH_3CHF_2	1,1-difluoroethane (51.2%)	75-37-6	A1
502	$CHClF_2$	chlorodifluoromethane (48.8%)	75-45-6	A1
	$CClF_2CF_3$	chloropentalfluoroethane (51.2%)	76-15-3	A1
717	NH_3	ammonia	7664-41-7	B2
744	CO_2	carbon dioxide	124-38-9	A1

[1]**Toxicity Classification.** Refrigerants shall be assigned to one of two classes, A or B, based on allowable exposures.

1. Class A signifies refrigerants with a low degree of toxicity as indicated by a Permissible Exposure Limit (PEL) or measurement consistent therewith of 400 ppm or greater.

2. Class B signifies refrigerants with a PEL or measurement consistent therewith of less than 400 ppm.

Flammability Classification. Refrigerants shall be assigned to one of three classes, 1, 2 or 3, based on flammability. Tests shall be made in accordance with the Mechanical Code. (See U.M.C. Standard 11-1.)

1. Class 1 indicates refrigerants that do not show flame propagation when tested in air at 70°F. (18°C.) and 14.7 psia (101 kPa).

2. Class 2 indicates refrigerants having a lower flammability limit (LFL) of more than 0.00625 pound per cubic foot (0.10 kg/m^3) at 70°F. (18°C.) and 14.7 psia (101 kPa).

3. Class 3 indicates refrigerants that are highly flammable, as defined by an LFL of less than or equal to 0.00625 pound per cubic foot (0.10 kg/m^3) at 70°F. (18°C.) and 14.7 psia (101 kPa).

APPENDIX VI-G

UNIT CONVERSION TABLES

SI SYMBOLS AND PREFIXES

BASE UNITS		
Quantity	**Unit**	**Symbol**
Length	Meter	m
Mass	Kilogram	kg
Time	Second	s
Electric current	Ampere	A
Thermodynamic temperature	Kelvin	K
Amount of substance	Mole	mol
Luminous intensity	Candela	cd

SI SUPPLEMENTARY UNITS		
Quantity	**Unit**	**Symbol**
Plane angle	Radian	rad
Solid angle	Steradian	sr

SI PREFIXES		
Multiplication Factor	**Prefix**	**Symbol**
1 000 000 000 000 000 000 = 10^{18}	exa	E
1 000 000 000 000 000 = 10^{15}	peta	P
1 000 000 000 000 = 10^{12}	tera	T
1 000 000 000 = 10^{9}	giga	G
1 000 000 = 10^{6}	mega	M
1 000 = 10^{3}	kilo	k
100 = 10^{2}	hecto	h
10 = 10^{1}	deka	da
0.1 = 10^{-1}	deci	d
0.01 = 10^{-2}	centi	c
0.001 = 10^{-3}	milli	m
0.000 001 = 10^{-6}	micro	μ
0.000 000 001 = 10^{-9}	nano	n
0.000 000 000 001 = 10^{-12}	pico	p
0.000 000 000 000 001 = 10^{-15}	femto	f
0.000 000 000 000 000 001 = 10^{-18}	atto	a

(Continued)

SI SYMBOLS AND PREFIXES—(Continued)

SI DERIVED UNIT WITH SPECIAL NAMES			
Quantity	**Unit**	**Symbol**	**Formula**
Frequency (of a periodic phenomenon)	hertz	Hz	1/s
Force	newton	N	$kg \cdot m/s^2$
Pressure, stress	pascal	Pa	N/m^2
Energy, work, quantity of heat	joule	J	N·m
Power, radiant flux	watt	W	J/s
Quantity of electricity, electric charge	coulomb	C	A·s
Electric potential, potential difference, electromotive force	volt	V	W/A
Capacitance	farad	F	C/V
Electric resistance	ohm	Ω	V/A
Conductance	siemens	S	A/V
Magnetic flux	weber	Wb	V·s
Magnetic flux density	tesla	T	Wb/m^2
Inductance	henry	H	Wb/A
Luminous flux	lumen	lm	cd·sr
Illuminance	lux	lx	lm/m^2
Activity (of radionuclides)	becquerel	Bq	1/s
Absorbed dose	gray	Gy	J/kg

CONVERSION FACTORS

To convert	to	multiply by
LENGTH		
1 mile (U.S. statute)	km	1.609 344
1 yd	m	0.9144
1 ft	m	0.3048
	mm	304.8
1 in	mm	25.4
AREA		
1 $mile^2$ (U.S. statute)	km^2	2.589 998
1 acre (U.S. survey)	ha	0.404 6873
	m^2	4046.873
1 yd^2	m^2	0.836 1274
1 ft^2	m^2	0.092 903 04
1 in^2	mm^2	645.16
VOLUME, MODULUS OF SECTION		
1 acre ft	m^3	1233.489
1 yd^3	m^3	0.764 5549
100 board ft	m^3	0.235 9737
1 ft^3	m^3	0.028 316 85
	$L(dm^3)$	28.3168
1 in^3	mm^3	16 387.06
	$mL\ (cm^3)$	16.3871
1 barrel (42 U.S. gallons)	m^3	0.158 9873

(Continued)

CONVERSION FACTORS—(Continued)

To convert	to	multiply by
(FLUID) CAPACITY		
1 gal (U.S. liquid)*	L**	3.785 412
1 qt (U.S. liquid)	mL	946.3529
1 pt (U.S. liquid)	mL	473.1765
1 fl oz (U.S.)	mL	29.5735
1 gal (U.S. liquid)	m^3	0.003 785 412
*1 gallon (UK) approx. 1.2 gal (U.S.)		
**1 liter approx. 0.001 cubic meters		
SECOND MOMENT OF AREA		
1 in^4	mm^4	416 231 4
	m^4	416 231 4 × 10^{-7}
PLANE ANGLE		
1° (degree)	rad	0.017 453 29
	mrad	17.453 29
1′ (minute)	urad	290.8882
1″ (second)	urad	4.848 137
VELOCITY, SPEED		
1 ft/s	m/s	0.3048
1 mile/h	km/h	1.609 344
	m/s	0.447 04
VOLUME RATE OF FLOW		
1 ft^3/s	m^3/s	0.028 316 85
1 ft^3/min	L/s	0.471 9474
1 gal/min	L/s	0.063 0902
1 gal/min	m^3/min	0.0038
1 gal/h	mL/s	1.051 50
1 million gal/d	L/s	43.8126
1 acre ft/s	m^3/s	1233.49
TEMPERATURE INTERVAL		
1°F.	°C. or K	0.555 556 $^5/_9$°C. = $^5/_9$K
EQUIVALENT TEMPERATURE ($t_{°C.} = T_K - 273.15$)		
$t_{°F.}$	$t_{°C.}$	$t_{°F.} = {}^9/_5 t_{°C.} + 32$
MASS		
1 ton (short ***)	metric ton	0.907 185
	kg	907.1847
1 lb	kg	0.453 5924
1 oz	g	28.349 52
***1 long ton (2,240 lb)	kg	1016.047
MASS PER UNIT AREA		
1 lb/ft^2	kg/m^2	4.882 428
1 oz/yd^2	g/m^2	33.905 75
1 oz/ft^2	g/m^2	305.1517

(Continued)

CONVERSION FACTORS—(Continued)

To convert	to	multiply by
DENSITY (MASS PER UNIT VOLUME)		
1 lb/ft^3	kg/m^3	16.01846
1 lb/yd^3	kg/m^3	0.593 2764
1 ton/yd^3	t/m^3	1.186 553
FORCE		
1 tonf (ton-force)	kN	8.896 44
1 kip (1,000 lbf)	kN	4.448 22
1 lbf (pound-force)	N	4.448 22
MOMENT OF FORCE, TORQUE		
1 lbf·ft	N·m	1.355 818
1 lbf·in	N·m	0.112 9848
1 tonf·ft	kN·m	2.711 64
1 kip·ft	kN·m	1.355 82
FORCE PER UNIT LENGTH		
1 lbf/ft	N/m	14.5939
1 lbf/in	N/m	175.1268
1 tonf/ft	kN/m	29.1878
PRESSURE, STRESS, MODULUS OF ELASTICITY (FORCE PER UNIT AREA) (1 Pa = 1 N/m^2)		
1 tonf/in^2	MPa	13.7895
1 tonf/ft^2	kPa	95.7605
1 kip/in^2	MPa	6.894 757
1 lbf/in^2	kPa	6.894 757
1 lbf/ft^2	Pa	47.8803
Atmosphere	kPa	101.3250
1 inch mercury	kPa	3.376 85
1 foot (water column at 32°F.)	kPa	2.988 98
WORK, ENERGY, HEAT(1J = 1N·m = 1W·s)		
1 kWh (550 ft·lbf/s)	MJ	3.6
1 Btu (Int. Table)	kJ	1.055 056
	J	1055.056
1 ft·lbf	J	1.355 818
COEFFICIENT OF HEAT TRANSFER		
1 Btu/(ft^2·h·°F.)	W/(m^2·K)	5.678 263
THERMAL CONDUCTIVITY		
1 Btu/(ft·h·°F.)	W/(m·K)	1.730 735
ILLUMINANCE		
1 lm/ft^2 (footcandle)	lx (lux)	10.763 91
LUMINANCE		
1 cd/ft^2	cd/m^2	10.7639
1 foot lambert	cd/m^2	3.426 259
1 lambert	kcd/m^2	3.183 099

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FLAMMABLE AND COMBUSTIBLE LIQUIDS

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NO REFERENCE

Y

NO REFERENCE

Z

NO REFERENCE

8. **Shaft enclosure opening protection.** Openings other than those provided for elevator doors in new vertical shaft enclosures constructed of one-hour fire-resistive construction shall be equipped with approved fire assemblies having a fire-protection rating of not less than one hour. Openings other than those provided for elevator doors in existing vertical shaft enclosures shall be equipped with approved 20-minute-rated fire assemblies, $1^3/_4$-inch (44 mm) solid wood doors or the equivalent thereto. Doors shall be either self-closing or automatic closing and automatic latching.

All elevators on all floors shall open into elevator lobbies which are separated from the remainder of the building as is required for corridor construction in the Building Code, unless the building is protected throughout by a sprinkler system.

9. **Manual shutoff of HVAC systems.** Heating, ventilating and air conditioning systems shall be equipped with manual shutoff controls installed at an approved location when required by the fire department.

10. **Automatic elevator recall system.** Elevators shall be equipped with an approved automatic recall system as required by the Building Code (see U.B.C. Section 403.7, Item 2).

11. **Unlocked stairway doors.** Exit doors into exit stairway enclosures shall be maintained unlocked from the stairway side on at least every fifth floor level. All unlocked doors shall bear a sign stating ACCESS ONTO FLOOR THIS LEVEL.

Stairway doors may be locked, subject to the following conditions:

11.1 Stairway doors which are to be locked from the stairway side shall have the capability of being unlocked simultaneously without unlatching upon a signal from an approved location.

11.2 A telephone or other two-way communications system connected to an approved emergency service which operates continuously shall be provided at not less than every fifth floor in each required stairway.

12. **Stair shaft ventilation.** Stair shaft enclosures which extend to the roof shall be provided with an approved manually openable hatch to the exterior having an area not less than 16 square feet (1.486 m^2) with a minimum dimension of 2 feet (610 mm).

EXCEPTIONS: 1. Stair shaft enclosures complying with the requirements for pressurized enclosures.

2. Stair shaft enclosures pressurized as required for mechanically operated pressurized enclosures to a minimum of 0.15-inch (3.8 mm) and a maximum of 0.50-inch (12.7 mm) water column.

13. **Elevator shaft ventilation.** Elevator shaft enclosures which extend to the roof shall be vented to the outside with vents whose area shall not be less than $3^1/_2$ percent of the area of the elevator shaft, with a minimum of 3 square feet (0.278 m^2) per elevator.

EXCEPTION: Where energy conservation or hoistway pressurization requires that the vents be normally closed, automatic venting by actuation of an elevator lobby detector or power failure may be accepted.

14. **Posting of elevators.** A permanent sign shall be installed in each elevator cab adjacent to the floor status indicator and at each elevator call station on each floor reading IN FIRE EMERGENCY, DO NOT USE ELEVATOR—USE EXIT STAIRS, or similar wording approved by the chief.

EXCEPTION: Sign may be omitted at the main entrance floor-level call station.

15. **Exit stairways.** All buildings shall have a minimum of two approved exit stairways.

16. **Exit corridor construction.** Corridors serving as an exit for an occupant load of 30 or more shall have walls and ceilings of not less than one-hour fire-resistive construction as required by the Building Code. Existing walls may be surfaced with wood lath and plaster in good condition or $^1/_2$-inch (12.7 mm) gypsum wallboard for corridor walls and ceilings and occupancy separations when approved.

17. **Exit corridor openings.** Openings in corridor walls and ceilings shall be protected by not less than $1^3/_8$-inch (35 mm) solid-bonded wood-core doors, approved $^1/_4$-inch-thick (6.4 mm)

wired glass, approved fire dampers conforming to the Building Code (see U.B.C. Standard 7-7) or by equivalent protection in lieu of any of these items. Transoms shall be fixed closed and covered with $^1/_2$-inch (12.7 mm) Type X gypsum wallboard or equivalent material installed on both sides of the opening.

18. **Exit corridor door closers.** Exit doors into corridors shall be equipped with self-closing devices or shall be automatic closing by actuation of a smoke detector. When spring hinges are used as the closing device, not less than two such hinges shall be installed on each door leaf.

19. **Exit corridor dead ends.** The length of dead end corridors serving an occupant load of more than 30 shall not exceed 20 feet (6096 mm).

20. **Interior finish.** The interior finish in exit corridors, exit stairways and extensions thereof shall conform with the Building Code (see U.B.C. Chapter 8).

21. **Exit stairway illumination.** When the building is occupied, exit stairways shall be illuminated with lights having an intensity of not less than 1 footcandle (10.8 lux) at the floor level. Such lighting shall be equipped with an independent alternate source of power such as a battery pack or on-site generator.

22. **Exit corridor illumination.** When the building is occupied, exit corridors shall be illuminated with lights having an intensity of not less than 1 footcandle (10.8 lux) at the floor level. Such lighting shall be equipped with an independent alternate source of power such as a battery pack or on-site generator.

23. **Exit stairway exit signs.** The location of exit stairways shall be clearly indicated by illuminated exit signs. Such exit signs shall be equipped with an independent alternate source of power such as a battery pack or an on-site generator or shall be of an approved self-illuminating type.

24. **Exitway exit signs.** Illuminated exit signs shall be provided in all exitways and located in such a manner as to clearly indicate the direction of egress. Such exit signs shall be equipped with an independent alternate source of power such as a battery pack or an on-site generator or shall be of an approved self-illuminating type.

25. **Emergency plan.** The management for all buildings shall establish and maintain a written fire- and life-safety emergency plan which has been approved by the chief. The chief shall develop written criteria and guidelines upon which all plans shall be based.

26. **Posting of emergency plan and exit plans.** Copies of the emergency plan and exiting plans, including elevator and stairway placarding, shall be posted in locations approved by the chief.

27. **Fire drills.** The management of all buildings shall conduct fire drills for their staff and employees at least every 120 days. The fire department shall be advised of such drills at least 24 hours in advance. A written record of each drill shall be maintained in the building management office and made available to the fire department for review. See also Section 1301.

6.2 Sprinkler Alternatives. The requirements of Table A-I-B-1 may be modified as specified by the following for existing high-rise buildings of Type I, II-F.R., II One-hour, III One-hour, IV or V One-hour construction when an approved automatic sprinkler system is installed throughout the building in accordance with the Building Code (see U.B.C. Standard 9-1):

Section 6.1, Item 5—Manual fire alarm system shall not be required.

Section 6.1, Item 6—Occupant voice notification system shall not be required; however, if the building is equipped with a public address system, the public address system shall be available for use as an occupant voice notification system.

Section 6.1, Item 7—Vertical shaft enclosures may be of nonrated construction for required exit stairway enclosures. Vertical shaft enclosures of openings in floors provided for elevators, escalators and supplemental stairways shall not be required, provided such openings are protected by an approved curtain board and water curtain sprinkler system.

Section 6.1, Item 8—Protection of openings in vertical shaft enclosures may be nonrated but shall not be less than a $1^3/_4$-inch (44 mm) solid-wood door or the equivalent thereto. Closing and latching hardware shall be provided.

Section 6.1, Item 10—An automatic elevator recall system shall not be required.

Section 6.1, Item 12—Stair shaft ventilation shall not be required.

Section 6.1, Item 16—Existing corridor construction need not be altered.

Section 6.1, Item 17—Door openings into exit corridors may be protected by assemblies other than those specified in Section 6.1, provided an effective smoke barrier is maintained. Closing and latching hardware shall be provided. Protection of duct penetrations is not required.

Section 6.1, Item 19—The length of existing exit corridor dead ends shall not be limited.

Section 6.1, Item 20—Interior finish in exitways may be reduced by one classification but shall not be less than Class III.

Installation of meters or backflow preventers for the connection to the water works system need not be provided unless required by other regulations of the authority having jurisdiction.

TABLE A-I-B-1—OCCUPANCY CLASSIFICATION AND USE[1]

ITEM REQUIRED	GROUP R, DIVISION 1						GROUP B OFFICE		
	Apartment			Hotel					
	Height Zones[2]								
	1	2	3	1	2	3	1	2	3
1. Automatic sprinklers in buildings of Type II-N, III-N or V-N construction. See Section 6.1, Item 1.	R	R	—	R	R	—	R	R	—
2. Automatic sprinklers in corridors, stairways, elevator lobbies, public assembly areas, kitchens and at doors opening to corridors. See Section 6.1, Item 2.	R	R	R	R	R	R	R	R	R
3. Fire department communication system or radios. See Section 6.1, Item 3.	R	R	R	R	R	R	R	R	R
4. Single-station smoke detectors. See Section 6.1, Item 4.	R	R	R	R	R	R	NR	NR	NR
5. Manual fire alarm system. See Section 6.1, Item 5.	R	R	R	R	R	R	R	R	R
6. Occupant voice notification system. See Section 6.1, Item 6.	NR	R	R	NR	R	R	NR	NR	NR
7. Vertical shaft enclosure walls of one-hour fire resistance. See Section 6.1, Item 7.	R	R	R	R	R	R	R	R	R
8. Protection of openings in vertical shaft enclosures by 20-minute-rated assemblies. See Section 6.1, Item 8.	R	R	R	R	R	R	R	R	R
9. Manual shutoff of HVAC systems. See Section 6.1, Item 9.	R	R	R	R	R	R	R	R	R
10. Automatic elevator recall system. See Section 6.1, Item 10.	R	R	R	R	R	R	R	R	R
11. Unlocked stairway doors every fifth floor. See Section 6.1, Item 11.	R	R	R	R	R	R	NR	R	R
12. Stair shaft ventilation. See Section 6.1, Item 12.	R	R	R	R	R	R	R	R	R
13. Elevator shaft ventilation. See Section 6.1, Item 13.	R	R	R	R	R	R	R	R	R
14. Posting of elevators as not intended for exiting purposes. See Section 6.1, Item 14.	R	R	R	R	R	R	R	R	R
15. Minimum of two exit stairways. See Section 6.1, Item 15.	R	R	R	R	R	R	R	R	R
16. Exit corridor wall construction. See Section 6.1, Item 16.	R	R	R	R	R	R	R	R	R
17. Protected exit corridor openings with 20-minute-rated assemblies or $1^3/_4$-inch (44 mm) solid wood door. See Section 6.1, Item 17.	R	R	R	R	R	R	NR	NR	NR
18. Exit corridor doors equipped with self-closing devices. See Section 6.1, Item 18.	R	R	R	R	R	R	NR	NR	NR
19. Exit corridor dead ends limited to 20 feet (6096 mm) maximum. See Section 6.1, Item 19.	R	R	R	R	R	R	NR	NR	NR
20. Interior finish controlled in exit corridors, exit stairways and extensions thereof. See Section 6.1, Item 20.	R	R	R	R	R	R	R	R	R
21. Exit stairway illumination. See Section 6.1, Item 21.	R	R	R	R	R	R	R	R	R

22. Exit corridor illumination. See Section 6.1, Item 22.	R	R	R	R	R	R	NR	NR	NR
23. Exit stairway exit signs. See Section 6.1, Item 23.	R	R	R	R	R	R	R	R	R
24. Exitway exit signs. See Section 6.1, Item 24.	R	R	R	R	R	R	R	R	R
25. Emergency planning. See Section 6.1, Item 25.	R	R	R	R	R	R	R	R	R
26. Posting of emergency instructions. See Section 6.1, Item 26.	R	R	R	R	R	R	R	R	R
27. Fire drills. See Section 6.1, Item 27.	NR	NR	NR	R	R	R	NR	NR	NR

[1]R indicates provisions are required.

NR indicates provisions are not required.

[2]Height zones are established based on a building having a floor as measured to the top of the floor surface used for human occupancy located within the ranges of heights above the lowest level of the fire department vehicle access in accordance with the following:

Height Zone No. 1: More than 75 feet (22 860 mm) but not in excess of 149 feet (45 415 mm).

Height Zone No. 2: More than 149 feet (45 415 mm) but not in excess of 399 feet (121.6 m).

Height Zone No. 3: More than 399 feet (121.6 m).

APPENDIX I-C
STAIRWAY IDENTIFICATION
(See U.F.C. Section 1210.4)

SECTION 1 — SCOPE

Signs to provide information to the occupants and fire department personnel to minimize confusion during emergencies shall be in accordance with Appendix I-C.

SECTION 2 — GENERAL

Standardized signs shall be provided in new and existing buildings which are four or more stories in height. Such signs shall be installed in stairways to identify each stair landing and indicate the upper and lower termination of the stairway.

SECTION 3 — SIGN DETAILS

3.1 Size. Signs shall be a minimum 12 inches by 12 inches (305 mm by 305 mm).

3.2 Stairway Location. The stairway location, such as STAIR 1 or WEST STAIR, shall be placed at the top of the sign in 1-inch-high (25.4 mm) block lettering with $^1/_4$-inch (6.4 mm) stroke.

3.3 Upper Terminus. The stairway's upper terminus, such as ROOF ACCESS or NO ROOF ACCESS, shall be placed under the stairway identification in 1-inch-high (25.4 mm) block lettering with $^1/_4$-inch (6.4 mm) stroke.

3.4 Floor Level Number. The floor level number shall be placed in the middle of the sign in 5-inch-high (127 mm) lettering with $^3/_4$-inch (19.1 mm) stroke. The mezzanine levels shall have the letter "M" preceding the floor number. Basement levels shall have the letter "B" preceding the floor number.

3.5 Lower Terminus. The lower and upper terminus of the stairway shall be placed at the bottom of the sign in 1-inch-high (25.4 mm) block lettering with $^1/_4$-inch (6.4 mm) stroke.

3.6 Maintenance. Signs shall be maintained in an approved manner.

SECTION 4 — EXAMPLES

See Figures A-I-C-1 and A-I-C-2 for examples.

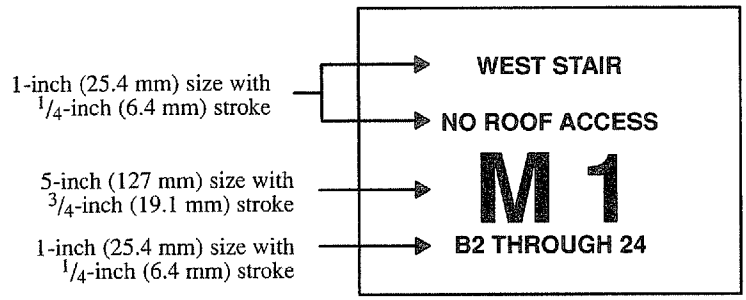


FIGURE A-I-C-1

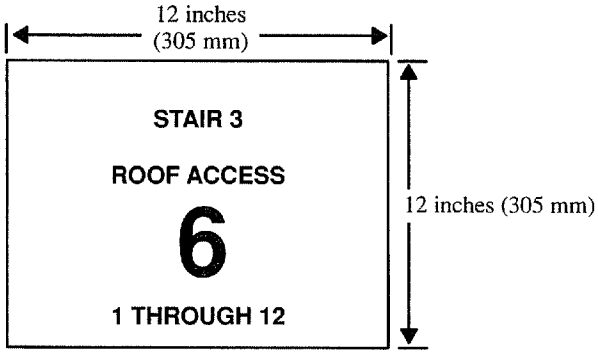

12 inches
(305 mm)
STAIR 3
ROOF ACCESS
6
1 THROUGH 12
12 inches (305 mm)

FIGURE A-I-C-2

Division II
SPECIAL HAZARDS
APPENDIX II-A
SUPPRESSION AND CONTROL OF HAZARDOUS FIRE AREAS
(See U.F.C. Section 1101)

SECTION 1 — SCOPE

The unrestricted use of grass-, grain-, brush- or forest-covered land in hazardous fire areas is a potential menace to life and property from fire and resulting erosion. Safeguards to prevent the occurrence of fires and to provide adequate fire-protection facilities to control the spread of fire which might be caused by recreational, residential, commercial, industrial or other activities conducted in hazardous fire areas shall be in accordance with Appendix II-A.

SECTION 2 — DEFINITIONS

For the purpose of Appendix II-A, certain terms are defined as follows:

TRACER is any bullet or projectile incorporating a feature which marks or traces the flight of said bullet or projectile by flame, smoke or other means which results in fire or heat.

TRACER CHARGE is any bullet or projectile incorporating a feature designed to create a visible or audible effect by means which result in fire or heat and shall include any incendiary bullets and projectiles.

SECTION 3 — PERMITS

The chief is authorized to stipulate conditions for permits. Permits shall not be issued when public safety would be at risk, as determined by the chief.

SECTION 4 — RESTRICTED ENTRY

The chief shall determine and publicly announce when hazardous fire areas shall be closed to entry and when such areas shall again be opened to entry. Entry on and occupation of hazardous fire areas, except public roadways, inhabited areas or established trails and camp sites which have not been closed during such time when the hazardous fire area is closed to entry, is prohibited.

EXCEPTIONS: 1. Residents and owners of private property within hazardous fire areas and their invitees and guests going to or being upon their lands.

2. Entry, in the course of duty, by peace or police officers, and other duly authorized public officers, members of a fire department and members of the United States Forest Service.

SECTION 5 — TRESPASSING ON POSTED PROPERTY

5.1 General. When the chief determines that a specific area within a hazardous fire area presents an exceptional and continuing fire danger because of the density of natural growth, difficulty of terrain, proximity to structures or accessibility to the public, such areas shall be closed until changed conditions warrant termination of closure. Such areas shall be posted as hereinafter provided.

5.2 Signs. Approved signs prohibiting entry by unauthorized persons and referring to Appendix II-A shall be placed on every closed area.

5.3 Trespassing. Entering and remaining within areas closed and posted is prohibited.

EXCEPTION: Owners and occupiers of private or public property within closed and posted areas, their guests or invitees, and local, state and federal public officers and their authorized agents acting in the course of duty.

SECTION 6 — SMOKING

Lighting, igniting or otherwise setting fire to or smoking tobacco, cigarettes, pipes or cigars in hazardous fire areas is prohibited.

EXCEPTION: Places of habitation or within the boundaries of established smoking areas or campsites as designated by the chief.

SECTION 7 — SPARK ARRESTERS

Chimneys used in conjunction with fireplaces, barbecues, incinerators or heating appliances in which solid or liquid fuel is used, upon buildings, structures or premises located within 200 feet (60 960 mm) of hazardous fire areas, shall be provided with a spark arrester constructed with heavy wire mesh or other noncombustible material with openings not to exceed $^1/_2$ inch (12.7 mm).

SECTION 8 — TRACER BULLETS, TRACER CHARGES, ROCKETS AND MODEL AIRCRAFT

Tracer bullets and tracer charges shall not be possessed, fired or caused to be fired into or across hazardous fire areas.

Rockets, model planes, gliders and balloons powered with an engine, propellant or other feature liable to start or cause fire shall not be fired or projected into or across hazardous fire areas.

SECTION 9 — EXPLOSIVES AND BLASTING

Explosives shall not be possessed, kept, stored, sold, offered for sale, given away, used, discharged, transported or disposed of within hazardous fire areas except by permit from the chief.

SECTION 10 — FIREWORKS

Fireworks shall not be used or possessed in hazardous fire areas.

The chief is authorized to seize, take, remove or cause to be removed fireworks in violation of Section 10.

SECTION 11 — APIARIES

Lighted and smoldering material shall not be used in connection with smoking bees in or upon hazardous fire areas except by permit from the chief.

SECTION 12 — OPEN-FLAME DEVICES

Welding torches, tar pots, decorative torches and other devices, machines or processes liable to start or cause fire shall not be operated or used in or upon hazardous fire areas, except by permit from the chief.

EXCEPTION: Use within habited premises or designated campsites which are a minimum of 30 feet (9144 mm) from grass-, grain-, brush- or forest-covered areas.

Flame-employing devices, such as lanterns or kerosene road flares shall not be operated or used as a signal or marker in or upon hazardous fire areas.

EXCEPTION: The proper use of fusees at the scenes of emergencies or as required by standard railroad operating procedures.

SECTION 13 — OUTDOOR FIRES

Outdoor fires shall not be built, ignited or maintained in or upon hazardous fire areas, except by permit from the chief.

EXCEPTION: Outdoor fires within habited premises or designated campsites where such fires are built in a permanent barbecue, portable barbecue, outdoor fireplace, incinerator or grill and are a minimum of 30 feet (9144 mm) from a grass-, grain-, brush- or forest-covered area.

Permits shall incorporate such terms and conditions which will reasonably safeguard public safety and property. Outdoor fires shall not be built, ignited or maintained in or upon hazardous fire areas under the following conditions:

1. When high winds are blowing,
2. When a person age 17 or over is not present at all times to watch and tend such fire, or
3. When public announcement is made that open burning is prohibited.

Permanent barbecues, portable barbecues, outdoor fireplaces or grills shall not be used for the disposal of rubbish, trash or combustible waste material.

SECTION 14 — INCINERATORS AND FIREPLACES

Incinerators, outdoor fireplaces, permanent barbecues and grills shall not be built, installed or maintained in hazardous fire areas without prior approval of the chief.

Incinerators, outdoor fireplaces, permanent barbecues and grills shall be maintained in good repair and in a safe condition at all times. Openings in such appliances shall be provided with an approved spark arrester, screen or door.

EXCEPTION: When approved by the chief, unprotected openings in barbecues and grills necessary for proper functioning.

SECTION 15 — CLEARANCE OF BRUSH AND VEGETATIVE GROWTH FROM ELECTRICAL TRANSMISSION LINES

15.1 General. Clearance of brush and vegetative growth from electrical transmission lines shall be in accordance with Section 15.

EXCEPTION: Section 15 does not authorize persons not having legal right of entry to enter upon or damage the property of others without consent of the owner.

15.2 Support Clearance. Persons owning, controlling, operating or maintaining electrical transmission lines upon hazardous fire areas shall, at all times, maintain around and adjacent to poles supporting a switch, fuse, transformer, lightning arrester, line junction, dead end, corner pole, towers or other poles or towers at which power company employees are likely to work most frequently an effective firebreak consisting of a clearing of not less than 10 feet (3048 mm) in each direction from the outer circumference of such pole or tower.

EXCEPTION: Lines used exclusively as telephone, telegraph, messenger call, alarm transmission or other lines classed as communication circuits by a public utility.

15.3 High Tension Line Clearance. Persons owning, controlling, operating or maintaining electrical transmission lines upon hazardous fire areas shall maintain the clearance specified in Section 15.3 in all directions between vegetation and conductors carrying electrical current:

1. For lines operating at 2,400 volts and less than 68,000 volts, 4 feet (1219 mm),
2. For lines operating at 68,000 volts and less than 110,000 volts, 6 feet (1829 mm), or

3. For lines operating at 110,000 volts and over, 10 feet (3048 mm).

Such distance shall be sufficiently great to furnish the required clearance from the particular wire or conductor to positions of such wire or conductor at temperatures of 120°F. (48.9°C.) or less. Forked, dead, old, decadent and rotten trees; trees weakened by catfaces, decay or disease; and trees leaning toward the line, which could contact the line from the side or fall on the line, shall be felled, cut or trimmed to remove the hazard.

15.4 Self-supporting Aerial Cable. Line clearance is not required for self-supporting aerial cable, except that forked trees, leaning trees and other growth which could fall across the cable and break it shall be removed.

SECTION 16 — CLEARANCE OF BRUSH OR VEGETATIVE GROWTH FROM STRUCTURES

16.1 General. Persons owning, leasing, controlling, operating or maintaining buildings or structures in, upon or adjoining hazardous fire areas, and persons owning, leasing or controlling land adjacent to such buildings or structures, shall at all times:

1. Maintain an effective firebreak by removing and clearing away flammable vegetation and combustible growth from areas within 30 feet (9144 mm) of such buildings or structures,

   EXCEPTION: Single specimens of trees, ornamental shrubbery or similar plants used as ground covers, provided that they do not form a means of rapidly transmitting fire from the native growth to any structure.

2. Maintain additional fire protection or firebreak by removing brush, flammable vegetation and combustible growth located from 30 feet to 100 feet (9144 mm to 30 480 mm) from such buildings or structures, when required by the chief because of extrahazardous conditions causing a firebreak of only 30 feet (9144 mm) to be insufficient to provide reasonable firesafety,

   EXCEPTION: Grass and other vegetation located more than 30 feet (9144 mm) from buildings or structures and less than 18 inches (457 mm) in height above the ground need not be removed where necessary to stabilize the soil and prevent erosion.

3. Remove portions of trees which extend within 10 feet (3048 mm) of the outlet of a chimney,
4. Maintain trees adjacent to or overhanging a building free of deadwood, and
5. Maintain the roof of a structure free of leaves, needles or other dead vegetative growth.

16.2 Corrective Actions. The executive body is authorized to instruct the chief to give notice to the owner of the property upon which conditions regulated by Section 16.1 exist to correct such conditions. If the owner fails to correct such conditions, the executive body is authorized to cause the same to be done and make the expense of such correction a lien upon the property where such condition exists.

SECTION 17 — CLEARANCE OF BRUSH OR VEGETATIVE GROWTH FROM ROADWAYS

The chief is authorized to cause areas within 10 feet (3048 mm) on each side of portions of highways and private streets which are improved, designed, or ordinarily used for vehicular traffic to be cleared of flammable vegetation and other combustible growth. The chief is authorized to enter upon private property to do so.

EXCEPTION: Single specimens of trees, ornamental shrubbery or cultivated ground cover such as green grass, ivy, succulents or similar plants used as ground covers, provided that they do not form a means of readily transmitting fire.

SECTION 18 — UNUSUAL CIRCUMSTANCES

If the chief determines that difficult terrain, danger of erosion or other unusual circumstances make strict compliance with the clearance of vegetation provisions of Sections 15, 16 or 17 of Appendix

II-A undesirable or impractical, enforcement thereof may be suspended and reasonable alternative measures shall be provided.

SECTION 19 — DUMPING

Garbage, cans, bottles, papers, ashes, refuse, trash, rubbish or combustible waste material shall not be placed, deposited or dumped in or upon hazardous fire areas, or in, upon or along trails, roadways or highways in hazardous fire areas.

EXCEPTION: Approved public and private dumping areas.

SECTION 20 — DISPOSAL OF ASHES

Ashes and coals shall not be placed, deposited or dumped in or upon hazardous fire areas.

EXCEPTIONS: 1. In the hearth of an established fire pit, camp stove or fireplace.

2. In a noncombustible container with a tightfitting lid, which is kept or maintained in a safe location not less than 10 feet (3048 mm) from combustible vegetation or structures.

3. Where such ashes or coals are buried and covered with 1 foot (304.8 mm) of mineral earth not less than 25 feet (7620 mm) from combustible vegetation or structures.

SECTION 21 — USE OF FIRE ROADS AND FIREBREAKS

Motorcycles, motor scooters and motor vehicles shall not be driven or parked upon, and trespassing is prohibited upon, fire roads or firebreaks beyond the point where travel is restricted by a cable, gate or sign, without the permission of the property owners. Vehicles shall not be parked in a manner which obstructs the entrance to a fire road or firebreak.

EXCEPTION: Public officers acting within their scope of duty.

Radio and television aerials, guy wires thereto, and other obstructions shall not be installed or maintained on fire roads or firebreaks, unless located 16 feet (4877 mm) or more above such fire road or firebreak.

SECTION 22 — USE OF MOTORCYCLES, MOTOR SCOOTERS AND MOTOR VEHICLES

Motorcycles, motor scooters and motor vehicles shall not be operated within hazardous fire areas, without a permit by the chief, except upon clearly established public or private roads. Permission from the property owner shall be presented when requesting a permit.

SECTION 23 — TAMPERING WITH FIRE DEPARTMENT LOCKS, BARRICADES AND SIGNS

Locks, barricades, seals, cables, signs and markers installed within hazardous fire areas, by or under the control of the chief, shall not be tampered with, mutilated, destroyed or removed.

Gates, doors, barriers and locks installed by or under the control of the chief shall not be unlocked.

SECTION 24 — LIABILITY FOR DAMAGE

The expenses of fighting fires which result from a violation of Appendix II-A shall be a charge against the person whose violation of Appendix II-A caused the fire. Damages caused by such fires shall constitute a debt of such person and are collectable by the chief in the same manner as in the case of an obligation under a contract, expressed or implied.

APPENDIX II-B

PROTECTION OF FLAMMABLE AND COMBUSTIBLE LIQUID TANKS IN LOCATIONS SUBJECT TO FLOODING

(See U.F.C. Sections 7902.1.8.2.4 and 7902.6.7)

SECTION 1 — PIPE CONNECTIONS

Pipe connections below the allowable liquid level in tanks shall be provided with valves or cocks located as close as practical to the tank shell. Such valves and their connections and fittings to the tank shall not be of cast iron.

SECTION 2 — ABOVEGROUND TANKS

2.1 Vertical Tanks. Vertical tanks shall be installed as follows:

1. Aboveground vertical storage tanks containing flammable or combustible liquid shall not be located such that the maximum allowable liquid level within the tank is below the established maximum flood stage, unless the tank is provided with a guiding structure, such as described in Section 5.

2. An ample and dependable public water supply shall be available at and below the established maximum flood stage, or facilities independent of a public water supply shall be provided for loading partially empty tanks with water.

3. In addition to the preceding requirements, tanks located such that more than 70 percent, but less than 100 percent, of the allowable liquid storage capacity will be submerged at the established maximum flood stage shall be safeguarded by one of the following methods:

3.1. Tank shall be raised or increased in height until the top extends above the maximum flood stage a distance equivalent to 30 percent or more of the allowable liquid storage capacity, provided, however, that the submerged part of the tank shall not exceed two and one-half times the diameter, or

3.2 Adequate noncombustible structural guides, designed to permit the tank to float vertically without loss of product, shall be provided.

2.2 Horizontal Tanks. Horizontal tanks shall be installed as follows:

1. Independent water supply facilities shall be provided at locations where an ample and dependable public water supply is not available for loading partially empty tanks with water.

2. Horizontal tanks located such that more than 70 percent of the storage capacity will be submerged at the established maximum flood stage shall be secured to a concrete or steel and concrete foundation of sufficient weight to produce adequate loading of tank when filled with flammable or combustible liquids.

3. Special provision shall be provided to equalize the internal and external pressures on the tank to prevent deformation of the tank and resultant expulsion of flammable or combustible liquid.

2.3 Other Types of Tanks. Spherical and spheroidal tanks shall be protected by applicable methods as specified for either vertical or horizontal tanks.

SECTION 3 — UNDERGROUND TANKS

3.1 Locations with a Water Supply. Underground tanks containing flammable or combustible liquids at locations where there is an ample and dependable water supply available at and below the maximum flood stage and installed such that more than 70 percent of storage capacity will be submerged at the maximum flood stage shall be loaded with concrete or other approved loading materi-

al sufficient to prevent movement of the tank when filled with flammable or combustible liquids and submerged by flood waters.

3.2 Locations without a Water Supply. At locations where there is not an ample or dependable water supply, the tank shall be loaded with concrete as required by Section 3.1, and, in addition, an emergency liquid supply sufficient to fill the tank during flood stages shall be provided.

3.3 Alternative Tank Loading. Where loading of underground tanks with liquids is impractical because of the character of the contents or the use, tanks shall be safeguarded against movement when empty and when submerged by flood waters by loading with concrete or other approved solid loading material. Each such tank shall be constructed and installed such that it will safely resist external pressures due to flood waters.

3.4 Capacity Limits. The capacity of newly installed tanks shall not exceed 3,000 gallons (11 356 L). When installed, but before backfilling, tanks and fittings shall be tested for tightness at not less than 5 pounds per square inch (34.5 kPa). Greater test pressures shall be used when required by the chief for tanks subject to submergence in excess of 30 feet (9144 mm).

3.5 Pressure Equipment. Where tanks are not designed to resist external pressure, special provisions shall be provided to equalize the internal and external pressures on the tank to prevent deformation and resultant expulsion of flammable or combustible liquids.

SECTION 4 — INDEPENDENT WATER SUPPLY FACILITIES

4.1 General. At locations where an independent water supply is required, the supply shall be entirely independent of public power and water supply. Independent sources of water shall be available when flood waters reach a level not less than 10 feet (3048 mm) below the bottom of the lowest tank on a property.

4.2 Location of Self-contained Power and Pumping Units. The self-contained power and pumping unit shall be located or designed such that pumping into tanks can be carried on continuously throughout the rise in flood waters from a level 10 feet (3048 mm) below the lowest tank to the level of the potential flood stage.

4.3 Pump Sizing. Capacity of the pumping unit shall be such that the rate of rise of water in tanks shall be equivalent to the established potential average rate of rise of flood waters at any stage.

4.4 Testing. Independent pumping units shall be tested periodically to ensure that they are in satisfactory operating condition.

SECTION 5 — STRUCTURAL GUIDES

5.1 General. Structural guides for holding floating tanks above their foundations shall be designed such that there will not be resistance to the free rise of a tank and shall be constructed of noncombustible material.

5.2 Minimum Design Strength. The strength of the structure shall be adequate to resist lateral movement of a tank subject to a horizontal force in any direction equivalent to not less than 25 pounds per square foot (1.2 kN/m^2) acting on the projected vertical cross-sectional area of the tank.

5.3 Additional Design Strength. Where tanks are situated on exposed points or bends in a shore line where swift currents in flood waters will be present, the structures shall be designed to withstand a unit force of not less than 50 pounds per square foot (2.4 kN/m^2).

SECTION 6 — SAFE PRACTICES

6.1 Water Loading. Water loading shall be as follows:

1. The filling of a tank to be protected by water loading shall be started as soon as flood waters reach a dangerous flood stage. The rate of filling shall be at least equal to the rate of rise of the flood waters, or the established average potential rate of rise.

2. Sufficient fuel to operate the water pumps shall be available at all times to ensure adequate power to fill all tanks with water.

3. Valves on connecting pipelines shall be closed and locked in closed position when water loading is completed.

6.2 Floating Tanks. Floating tanks shall be prepared for flooding as follows:

1. Where structural guides are provided for the protection of floating tanks, rigid connections between tanks and pipelines shall be disconnected before the flood waters reach the bottom of the tank, unless control valves and their connections to the tank are of an approved type of extra-heavy construction designed to prevent breakage between valve and tank.

2. Valves attached to tanks, other than those used in connection with water-loading operations, shall be closed and locked.

3. If a tank is equipped with a swing line, the swing pipe shall be raised to and secured at its highest position.

SECTION 7 — INSPECTIONS

Periodic inspections of plants where the storage of flammable or combustible liquids is regulated by Appendix II-B shall be conducted to ensure the following:

1. That flammable and combustible liquid storage tanks are maintained in compliance with Appendix II-B.

2. That detailed printed instructions of procedures to be followed during flood emergencies are properly posted.

3. That station operators and other employees depended upon to carry out such instructions are thoroughly informed as to the location and operation of valves and other equipment necessary to carry out provisions in Appendix II-B.

APPENDIX II-C
MARINAS
(See U.F.C. Sections 1001.1 and 1101.1)

SECTION 1 — SCOPE

Marina facilities shall be in accordance with Appendix II-C and all other applicable requirements of this code.

SECTION 2 — PLANS AND APPROVALS

Plans for marina fire-protection facilities shall be approved by the chief prior to installation. The work shall be subject to final inspection and approval after installation.

SECTION 3 — PERMITS

Permits are required to use open-flame devices for maintenance or repair on vessels, floats, piers or wharves.

Permits are also required to use portable barbecues, braziers or cooking devices on vessels, floats, piers or wharves.

SECTION 4 — DEFINITIONS

For the purpose of Appendix II-C, certain terms are defined as follows:

FLOAT is a floating structure normally used as a point of transfer for passengers and goods, or both, for mooring purposes.

MARINA is any portion of the ocean or inland water, either naturally or artificially protected, for the mooring, servicing or safety of vessels and shall include artificially protected works, the public or private lands ashore, and structures or facilities provided within the enclosed body of water and ashore for the mooring or servicing of vessels or the servicing of their crews or passengers.

PIER is a structure built over the water, supported by pillars or piles, and used as a landing place, pleasure pavilion or similar purpose.

VESSEL is watercraft of any type, other than seaplanes on the water, used or capable of being used as a means of transportation. Included in this definition are nontransportation vessels such as houseboats and boathouses.

WHARF is a structure or bulkhead constructed of wood, stone, concrete or similar material built at the shore of a harbor, lake or river for vessels to lie alongside of, and piers or floats to be anchored to.

SECTION 5 — FIRE PREVENTION

5.1 Combustible Debris. Combustible debris and rubbish shall not be deposited or accumulated on land beneath marina structures, piers or wharves.

5.2 Sources of Ignition. Open-flame devices used for lighting or decoration on the exterior of a vessel, float, pier or wharf shall be approved by the chief.

5.3 Flammable or Combustible Liquid Spills. Spills of flammable or combustible liquids at or upon the water shall be reported immediately to the fire department or jurisdictional authorities.

5.4 Rubbish Containers. Containers with tightfitting or self-closing lids shall be provided for the temporary storage of combustible trash or rubbish.

5.5 Electrical Equipment. Electrical equipment shall be installed and used in accordance with the Electrical Code as required for wet, damp and hazardous locations.

SECTION 6 — FIRE-PROTECTION EQUIPMENT

6.1 General. Piers, wharves, floats with facilities for mooring or servicing five or more vessels, and marine motor vehicle fuel-dispensing stations shall be equipped with fire-protection equipment in accordance with Section 6.

6.2 Standpipes.

6.2.1 General. Portions of floats more than 250 feet (76 200 mm) from fire apparatus access and marine motor vehicle fuel-dispensing stations shall be provided with an approved wet standpipe system installed in accordance with the Building Code (see U.B.C. Standard 9-2) and Section 1004.

6.2.2 Hose stations. Hose stations shall be spaced to provide protection to any portion of floats or floating vessels. Hoses shall be mounted on a reel or rack and enclosed within an approved cabinet. Hose stations shall be labeled FIRE HOSE—EMERGENCY USE ONLY. Equipment shall be approved by the chief.

6.2.3 Fire department inlet connection. At the shore end, the waterline shall be equipped with not less than a two-way $2^1/_2$-inch (63.5 mm) fire department inlet connection.

6.2.4 Areas subject to freezing. Waterlines shall normally be dry where subject to freezing temperatures.

6.3 Access and Water Supply. Piers and wharves shall be provided with fire apparatus access roads and water-supply systems with on-site fire hydrants when required by the chief. Such roads and water systems shall be provided and maintained in accordance with Sections 902.2 and 903.

6.4 Portable Fire Appliances. One fire extinguisher having a minimum rating of 2A, 20-B:C, shall be provided at each required hose station.

Additional fire appliances shall be installed and maintained as required by the chief.

SECTION 7 — TRANSMISSION OF ALARMS

Means shall be available for the immediate notification of the fire department.

SECTION 8 — MARINE MOTOR VEHICLE FUEL-DISPENSING STATIONS

Marine motor vehicle fuel-dispensing stations shall be in accordance with Article 52.

APPENDIX II-D
RIFLE RANGES
(See U.F.C. Section 1101.1)

SECTION 1 — PERMIT

A permit is required to establish, maintain or operate a rifle range. Applications for permits shall be referred to the chief law enforcement officer for approval.

SECTION 2 — SUPERVISION BY RANGE OFFICER

Rifle ranges shall not be operated or maintained without the supervision of a qualified range officer.

SECTION 3 — QUALIFICATIONS OF RANGE OFFICER

To qualify as a range officer, individuals shall demonstrate to the chief and chief law enforcement officer their knowledge of firearms and ammunition, including the general rules of safety and the provisions of this code relative thereto. Qualified range officers shall be issued a certificate of fitness upon completion of such qualification examination.

SECTION 4 — INSPECTION AND DISPOSAL OF AMMUNITION

Ammunition shall be inspected and approved by the range officer before permission to fire or discharge the same is granted. Ammunition that will not fire or discharge or which is otherwise defective shall be surrendered to the range officer for safe disposal.

SECTION 5 — PORTABLE FIRE APPLIANCES

Rifle ranges shall be equipped with portable fire appliances and other equipment required by the chief. Additional fire-prevention measures required by the chief shall be provided.

SECTION 6 — REMOVAL OF VEGETATION

Rifle ranges, including striking grounds, shall be completely clear of vegetation within a safe distance from the firing line.

SECTION 7 — WARNINGS

Rifle ranges which are not fenced shall be posted with approved warning posters or signs to notify and protect the public from danger.

APPENDIX II-E
HAZARDOUS MATERIALS MANAGEMENT PLANS AND HAZARDOUS MATERIALS INVENTORY STATEMENTS
(See U.F.C. Sections 8001.3.2 and 8001.3.3)

SECTION 1 — SCOPE

Hazardous materials inventory statements (HMIS) and hazardous materials management plans (HMMP) which are required by the chief pursuant to Article 80 shall be provided for hazardous materials in accordance with Appendix II-E.

EXCEPTIONS: 1. Materials which have been satisfactorily demonstrated not to present a potential danger to public health, safety or welfare, based upon the quantity or condition of storage, when approved by the chief.

2. Chromium, copper, lead, nickel and silver need not be considered hazardous materials for the purposes of Appendix II-E unless they are stored in a friable, powdered or finely divided state.

Proprietary and trade secret information shall be protected under the laws of the state or jurisdiction having authority.

SECTION 2 — HAZARDOUS MATERIALS INVENTORY STATEMENTS (HMIS)

2.1 When Required. A separate HMIS shall be provided for each building, including its appurtenant structures, and each exterior facility in which hazardous materials are stored.

EXCEPTION: Consumer products packaged for distribution to, and use by, the general public and commercial products used for janitorial or minor maintenance purposes such as paint thinner or wax strippers.

The hazardous materials inventory statement shall list by hazard class all hazardous materials stored. The hazardous materials inventory statement shall include the following information for each hazardous material listed:

1. Hazard class.
2. Common or trade name.
3. Chemical name, major constituents and concentrations if a mixture. If a waste, the waste category.
4. Chemical Abstract Service number (CAS number) found in 29 Code of Federal Regulations (C.F.R.).
5. Whether the material is pure or a mixture, and whether the material is a solid, liquid or gas.
6. Maximum aggregate quantity stored at any one time.
7. Storage conditions related to the storage type, temperature and pressure.

2.2 Changes to HMIS. An amended HMIS shall be provided within 30 days of the storage of any hazardous materials which changes or adds a hazard class or which is sufficient in quantity to cause an increase in the quantity which exceeds 5 percent for any hazard class.

SECTION 3 — HAZARDOUS MATERIALS MANAGEMENT PLAN (HMMP)

3.1 General. Applications for a permit to store hazardous materials shall include an HMMP standard form or short form in accordance with Section 3 and shall provide a narrative description of the operations and processes taking place at the facility. See Figure A-II-E-1.

3.2 Information Required. The HMMP standard form shall include the information detailed in Section 3.2.

3.2.1 General information. General information, including business name and address, emergency contacts, business activity, business owner or operator, SIC code, number of employees and hours, Dunn and Bradstreet number, and signature of owner, operator or designated representative.

3.2.2 General site plan. A general site plan drawn at a legible scale which shall include, but not be limited to, the location of buildings, exterior storage facilities, permanent access ways, evacuation routes, parking lots, internal roads, chemical loading areas, equipment cleaning areas, storm and sanitary sewer accesses, emergency equipment and adjacent property uses. The exterior storage areas shall be identified with the hazard class and the maximum quantities per hazard class of hazardous materials stored. When required by the chief, information regarding the location of wells, flood plains, earthquake faults, surface water bodies and general land uses within 1 mile (1.609 km) of the facility boundaries shall be included.

3.2.3 Building floor plan. A building floor plan drawn to a legible scale which shall include, but not be limited to, hazardous materials storage areas within the building and shall indicate rooms, doorways, corridors, exits and evacuation routes. Each hazardous materials storage facility shall be identified by a map key which lists the individual hazardous materials, their hazard class and quantity present for each area.

3.2.4 Hazardous materials handling. Information showing that activities involving the handling of hazardous materials between the storage areas and manufacturing processes on site are conducted in a manner to prevent the accidental release of such materials.

3.2.5 Chemical compatibility and separation. Information showing procedures, controls, signs or other methods used to ensure separation and protection of stored materials from factors which could cause accidental ignition or reaction of ignitable, reactive or incompatible materials in each area.

3.2.6 Monitoring program. Information including, but not limited to, the location, type, manufacturer's specifications, if applicable, and suitability of monitoring methods for each storage facility when required.

3.2.7 Inspection and record keeping. Schedules and procedures for inspecting safety and monitoring and emergency equipment. The permittee shall develop and follow a written inspection procedure acceptable to the chief for inspecting the facility for events or practices which could lead to unauthorized discharges of hazardous materials. Inspections shall be conducted at a frequency appropriate to detect problems prior to a discharge. An inspection check sheet shall be developed to be used in conjunction with routine inspections. The check sheet shall provide for the date, time and location of inspection; note problems and dates and times of corrective actions taken; and include the name of the inspector and the countersignature of the designated safety manager for the facility.

3.2.8 Employee training. A training program appropriate to the types and quantities of materials stored or used shall be conducted to prepare employees to safely handle hazardous materials on a daily basis and during emergencies. The training program shall include:

1. Instruction in safe storage and handling of hazardous materials, including maintenance of monitoring records,

2. Instruction in emergency procedures for leaks, spills, fires or explosions, including shutdown of operations and evacuation procedures, and

3. Record-keeping procedures for documenting training given to employees.

3.2.9 Emergency response. A description of facility emergency procedures is to be provided.

3.3 HMMP Short Form—(Minimal Storage Site). A facility shall qualify as a minimal storage site if the quantity of each hazardous material stored in one or more facilities in an aggregate quanti-

ty for the facility is 500 pounds (227 kg) or less for solids, 55 gallons (208.2 L) or less for liquids, or 200 cubic feet (5.7 m^3) or less at NTP for compressed gases and does not exceed the threshold planning quantity as listed in 40 C.F.R., Part 355, Sections 302 and 304. The applicant for a permit for a facility which qualifies as a minimal storage site is allowed to file the short form HMMP. Such plan shall include the following components:

1. General facility information,

2. A simple line drawing of the facility showing the location of storage facilities and indicating the hazard class or classes and physical state of the hazardous materials being stored,

3. Information describing that the hazardous materials will be stored and handled in a safe manner and will be appropriately contained, separated and monitored, and

4. Assurance that security precautions have been taken, employees have been appropriately trained to handle the hazardous materials and react to emergency situations, adequate labeling and warning signs are posted, adequate emergency equipment is maintained, and the disposal of hazardous materials will be in an appropriate manner.

SECTION 4 — MAINTENANCE OF RECORDS

Hazardous materials inventory statements and hazardous materials management plans shall be maintained by the permittee for a period of not less than three years after submittal of updated or revised versions. Such records shall be made available to the chief upon request.

FIGURE A-II-E-1

SAMPLE FORMAT

HAZARDOUS MATERIALS MANAGEMENT PLAN (HMMP) INSTRUCTIONS

SECTION I—FACILITY DESCRIPTION

1.1 **Part A**

1. Fill out Items 1 through 11 and sign the declaration.
2. Only Part A of this section is required to be updated and submitted annually, or within 30 days of a change.

1.2 **Part B—General Facility Description (Site Plan)**

1. Provide a site plan on $8\frac{1}{2}$- by 11-inch (215 mm by 279 mm) paper, using letters on the top and bottom margins and numbers on the right and left side margins, showing the location of all buildings, structures, chemical loading areas, parking lots, internal roads, storm and sanitary sewers, wells, and adjacent property uses. Indicate the approximate scale, northern direction and date the drawing was completed.
2. List all special land uses within 1 mile (1.609 km).

1.3 **Part C—Facility Storage Map (Confidential Information)**

1. Provide a floor plan of each building on $8\frac{1}{2}$- by 11-inch (215 mm by 279 mm) paper, using letters on the top and bottom margins and numbers on the right and left side margins, with approximate scale and northern direction, showing the location of each storage area. Mark map clearly "Confidential—Do not disclose" for trade secret information as specified by federal, state and local laws.
2. Identify each storage area with an identification number, letter, name or symbol.
3. Show the following:
   - 3.1 Accesses to each storage area.
   - 3.2 Location of emergency equipment.
   - 3.3 The general purpose of other areas within the facility.
   - 3.4 Location of all aboveground and underground tanks to include sumps, vaults, below-grade treatment systems, piping, etc.
4. **Map key.** Provide the following on the map or in a map key or legend for each storage area:
   - 4.1 A list of hazardous materials, including wastes.
   - 4.2 Hazard class of each hazardous waste.
   - 4.3 The maximum quantity for hazardous materials.
   - 4.4 Include the contents and capacity limit of all tanks at each area and indicate whether they are above or below ground.
   - 4.5 List separately any radioactives, cryogens and compressed gases for each facility.
   - 4.6 Trade-secret information shall be listed as specified by federal, state and local laws.

SECTION II—HAZARDOUS MATERIALS INVENTORY STATEMENT (HMIS)

2.1 **Part A—Declaration**

Fill out all appropriate information.

2.2 **Part B—Inventory Statement**

1. You must complete a separate inventory statement for all waste and nonwaste hazardous materials. List all hazardous materials in alphabetical order by hazard class.
2. **Inventory Statement Instructions**

Column	Information Required
1	Provide hazard class for each material.
2	**Nonwaste.** Provide the common or trade name of the regulated material. **Waste.** In lieu of trade names, you may provide the waste category.
3	Provide the chemical name and major constituents and concentrations, if a mixture.
4	Enter the chemical abstract service number (CAS number) found in 29 C.F.R. For mixtures, enter the CAS number of the mixture as a whole if it has been assigned a number distinct from its constituents. For a mixture that has no CAS number, leave this item blank or report the CAS numbers of as many constituent chemicals as possible.

5 Enter the following descriptive codes as they apply to each material. You may list more than one code, if applicable.

P = Pure
M = Mixture
S = Solid
L = Liquid
G = Gas

6 6.1 Provide the maximum aggregate quantity of each material handled at any one time by the business. For underground tanks, list the maximum volume [in gallons (liters)] of the tank.

6.2 Enter the estimated average daily amount on site during the past year.

7 Enter the units used in Column 6 as:

LB = Pounds
GA = Gallons
CF = Cubic Feet

8 Enter the number of days that the material was present on site (during the last year).

9 Enter the storage codes below for type, temperature and pressure.

Type

A = Aboveground Tank
B = Belowground Tank
C = Tank inside Building
D = Steel Drum
E = Plastic or Nonmetallic Drum
F = Can
G = Carboy
H = Silo
I = Fiber Drum
J = Bag
K = Box
L = Cylinder
M = Glass Bottle or Jug
N = Plastic Bottles or Jugs
O = Tote Bin
P = Tank Wagon
Q = Rail Car
R = Other

Temperature

4 = Ambient
5 = Greater than Ambient
6 = Less than Ambient, but not Cryogenic [less than –150°F. (–101.1°C.)]
7 = Cryogenic conditions [less than –150°F. (–101.1°C.)]

Pressure

1 = Ambient (Atmospheric)
2 = Greater than Ambient (Atmospheric)
3 = Less than Ambient (Atmospheric)

10 For each material listed, provide the SARA hazard class as listed below. You may list more than one class. These categories are defined in 40 C.F.R. 370.3.

Physical Hazards

F = Fire
P = Sudden Release of Pressure
R = Reactivity

Health Hazards

I = Immediate (Acute)
D = Delayed (Chronic)

11 **Waste Only.** For each waste, provide the total estimated amount of hazardous waste handled throughout the course of the year.

SECTION III—SEPARATION AND MONITORING

3.1 Part A—Aboveground

Fill out Items 1 through 6, or provide similar information for each storage area shown on the facility map. Use additional sheets as necessary.

3.2 Part B—Underground

1. Complete a separate page for each underground tank, sump, vault, below-grade treatment system, etc.
2. Check the type of tank and method(s) that applies to your tank(s) and piping, and answer the appropriate questions. Provide any additional information in the space provided or on a separate sheet.

SECTION IV—WASTE DISPOSAL

Check all that apply and list the associated wastes for each method checked.

SECTION V—RECORD KEEPING

Include a brief description of your inspection procedures. You are also required to keep an inspection log and recordable discharge log, which are designed to be used in conjunction with routine inspections for all storage facilities or areas. Sample forms are attached for your use. Place a check in each box that describes your forms. If you do not use the sample forms, provide copies of your forms for review and approval.

SECTION VI—EMERGENCY-RESPONSE PLAN

1. This plan should describe the personnel, procedures and equipment available for responding to a release or threatened release of hazardous materials that are stored, handled or used on site.
2. A check or a response under each item indicates that a specific procedure is followed at the facility, or that the equipment specified is maintained on site.
3. If the facility maintains a more detailed emergency-response plan on site, indicate this in Item 5. This plan shall be made available for review by the inspecting jurisdiction.

SECTION VII—EMERGENCY-RESPONSE TRAINING PLAN

1. This plan should describe the basic training plan used at the facility.
2. A check in the appropriate box indicates the training is provided or the records are maintained.
3. If the facility maintains a more detailed emergency-response training plan, indicate this in Item 4. This plan shall be made available for review by the inspecting jurisdiction.

FIGURE A-II-E-1—(Continued)
HAZARDOUS MATERIALS MANAGEMENT PLAN
SECTION I: FACILITY DESCRIPTION

PART A—GENERAL INFORMATION

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. Property Owner:

Name	Address	Phone

6. Principal Business Activity:_____
7. Number of Employees:_____
8. Number of Shifts:_____
9. Hours of Operation:_____
10. SIC Code:_____
11. Dunn and Bradstreet Number:_____
12. Declaration
    I certify that the information above and on the following parts is true and correct to the best of my knowledge.
    Signature:_____Date:_____
    Print Name:_____Title:_____
    (Must be signed by owner/operator or designated representative)

PART B—GENERAL FACILITY DESCRIPTION/SITE PLAN

(Use grid format below.)

Special land uses within 1 mile (1.609 km):_____

PART C—FACILITY MAP

(Use grid format below.)

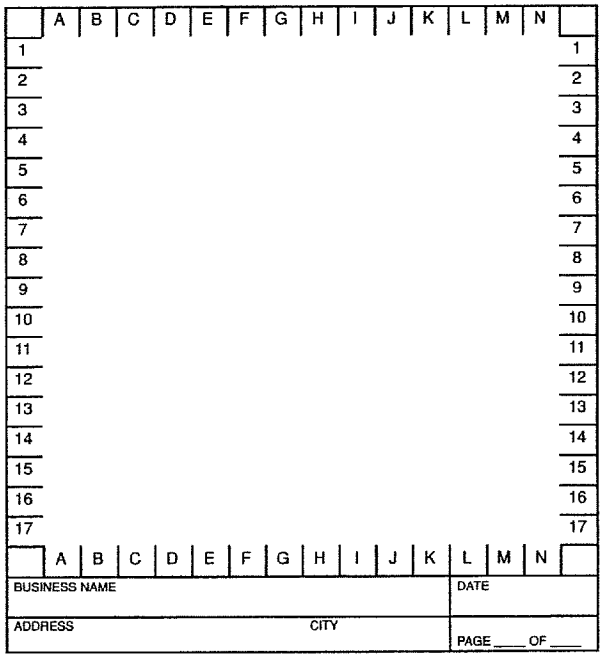


FIGURE A-II-E-1—(Continued)

SECTION II: HAZARDOUS MATERIALS INVENTORY STATEMENT

PART A—DECLARATION

1. Business Name:_____
2. Address:_____
3. Declaration:
   Under penalty of perjury, I declare the above and subsequent information, provided as part of the hazardous materials inventory statement, is true and correct.
   Signature:_____ Date:_____
   Print Name:_____ Title:_____
   (Must be signed by owner/operator or designated representative)

PART B—HAZARDOUS MATERIALS INVENTORY STATEMENT

(1) HAZARD CLASS	(2) COMMON/ TRADE NAME	(3) CHEMICAL NAME, COMPONENTS AND CONCENTRATION	(4) CHEMICAL ABSTRACT SERVICE NO.	(5) PHYSICAL STATE	(6) MAXIMUM QUANTITY ON HAND AT ANY TIME	(7) UNITS	(8) DAYS ON SITE	(9) STORAGE CODE (TYPE, PRES., TEMP.)	(10) SARA CLASS	(11) ANNUAL WASTE THROUGHPUT

FIGURE A-II-E-1—(Continued)

SECTION III: SEPARATION, SECONDARY CONTAINMENT AND MONITORING

PART A—ABOVEGROUND STORAGE AREAS

Storage Area Identification (as shown on facility map):_____

1. Storage Type:

_____	Original Containers	_____	Safety Cans
_____	Inside Machinery	_____	Bulk Tank
_____	55-gallon (208.2 L) Drums or Storage Shed	_____	Outside Barrels
_____	Pressurized Vessel		
_____	Other:_____		

2. Storage Location:

_____	Inside Building	_____	Outside Building
		_____	Secured

3. Separation:

_____	All Materials	_____	One-hour Separation Wall/Partition
_____	Compatible		
_____	Separated by 20 Feet (6096 mm)	_____	Approved Cabinets
_____	Other:_____		

4. Secondary Containment:

_____	Approved Cabinet	_____	Secondary Drums
_____	Tray	_____	Bermed, Coated Floor
_____	Vaulted Tank	_____	Double-wall Tank
_____	Other:_____		

5. Monitoring:

_____	Visual	_____	Continuous
_____	Other:_____		

(attach specifications if necessary)

6. Monitoring Frequency:

_____	Daily	_____	Weekly
_____	Other:_____		

Attach additional sheets as necessary

SECTION III: SEPARATION, CONTAINMENT AND MONITORING

PART B—UNDERGROUND

SINGLE-WALL TANKS AND PIPING

Tank Area Identification (as shown on facility map):_____

1. _____ Backfill Vapor Wells—
   Model and Manufacturer:_____
   Continuous or Monthly Testing:_____
2. _____ Groundwater Monitoring Wells
3. _____ Monthly Precision Tank Test
4. _____ Piping—
   Monitoring Method:_____
   Frequency:_____
5. _____ Other:_____

DOUBLE-WALL TANKS AND PIPING

Tank area identification (as shown on facility map):

1. Method of monitoring the annular space:_____

2. Frequency:
   _____ Continuous _____ Daily _____ Weekly
   _____ Other: _____
3. List the type of secondary containment for piping: _____
   _____
4. List the method of monitoring the secondary containment for piping: _____
   _____
5. Are there incompatible materials within the same vault?
   _____ Yes _____ No
   If yes, how is separate secondary containment provided?
   _____

Note: If you have continuous monitoring equipment, you shall maintain copies of all service and maintenance work. Such reports shall be made available for review on site, and shall be submitted to the fire prevention bureau upon request.

Attach additional sheets as necessary

SECTION IV: WASTE DISPOSAL

_____ Discharge to the Sanitary Sewer—Wastes: _____
_____
_____

_____ Pretreatment—Wastes: _____
_____
_____

_____ Licensed Waste Hauler—Wastes: _____
_____
_____

_____ Recycle—Wastes: _____
_____
_____

_____ Other—
Describe Method: _____
Wastes: _____
_____
_____

_____ No Waste

SECTION V: RECORD KEEPING

Description of our inspection program: _____
_____
_____

_____ We will use the attached sample forms in our inspection program.
_____ We will not use the sample forms. We have attached a copy of our own forms.

SECTION VI: EMERGENCY-RESPONSE PLAN

1. In the event of an emergency, the following shall be notified:

   A. On-site Responders:

Name	Title	Phone
_____	_____	_____
_____	_____	_____

   B. Method of Notification to Responder:
   _____ Automatic Alarm _____ Phone
   _____ Manual Alarm _____ Verbal
   _____ Other: _____
   _____

C. **Agency** **Phone Number**

Fire Department:
State Office of Emergency:
Services:
Other:

2. Designated Local Emergency Medical Facility:

Name	Address	Phone (24 hours)

3. Mitigation Equipment:

A. Monitoring Devices:

_____ Toxic or flammable gas detection
_____ Fluid detection
_____ Other:

B. Spill Containment:

_____ Absorbants
_____ Other:

C. Spill Control and Treatment

_____ Vapor Scrubber
_____ Pumps/vacuums
_____ Neutralizer
_____ Mechanical Ventilation
_____ Secondary Containment
_____ Other:

4. Evacuation:

_____ Immediate area evacuation routes posted
_____ Entire building evacuation procedures developed
_____ Assembly areas preplanned
_____ Evacuation maps posted
_____ Other:

5. _____ Supplemental hazardous materials emergency response plan on site.

Location:
Responsible Person:
Phone:

SECTION VII: EMERGENCY-RESPONSE TRAINING PLAN

1. Person responsible for the emergency-response training plan:

Name	Title	Phone

2. Training Requirements:

A. All employees trained in the following as indicated:

_____ Procedures for internal alarm/notification
_____ Procedures for notification of external emergency-response organizations
_____ Location and content of the emergency-response plan

B. Chemical handlers are trained in the following as indicated:

_____ Safe methods for handling and storage of hazardous materials
_____ Proper use of personal protective equipment
_____ Locations and proper use of fire- and spill-control equipment
_____ Specific hazards of each chemical to which they may be exposed

C. Emergency-response team members are trained in the following:

_____ Procedures for shutdown of operations
_____ Procedures for using, maintaining and replacing facility emergency and monitoring equipment

3. The following records are maintained for all employees:
   _____ Verification that training was completed by the employee
   _____ Description of the type and amount of introductory and continuing training
   _____ Documentation on and description of emergency-response drills conducted at the facility

4. A more comprehensive and detailed emergency-response training plan is maintained on site.
   Location:_____
   Responsible Person:_____
   Phone:_____

APPENDIX II-F

PROTECTED ABOVEGROUND TANKS FOR MOTOR VEHICLE FUEL-DISPENSING STATIONS OUTSIDE BUILDINGS

(See U.F.C. Sections 5202.3.1 and 5202.4.1)

SECTION 1 — SCOPE

Storage and dispensing of motor fuels into the fuel tanks of motor vehicles from protected aboveground tanks located outside buildings shall be in accordance with Appendix II-F.

SECTION 2 — DEFINITIONS

For the purpose of Appendix II-F, certain terms are defined as follows:

FUEL-DELIVERY SYSTEM is a system which consists of a tank vehicle containing a pump, fill hose with appropriate connections, and a person who performs the tank filling operation of transferring fuel from the tank vehicle to an aboveground tank. The two types of fuel-delivery systems for aboveground tanks are as follows:

2.1 **PRECONNECTED FLEXIBLE HOSE SYSTEM** is a fuel-delivery system containing a reel-mounted preconnected flexible hose having a maximum nominal diameter of 2 inches (50.8 mm) and a manually controlled fuel-delivery nozzle at the downstream end of the hose.

2.2 **RIGID HOSE SYSTEM** is a fuel-delivery system utilizing one or more sections of large diameter rigid hose [usually 3 to 4 inches (76.2 to 101.6 mm) in nominal diameter] which does not contain a nozzle but which contains interlocking connections for manually connecting the hose from the tank vehicle to the tank.

PRIMARY TANK is a listed aboveground atmospheric tank used to store liquid. See definition of PRIMARY CONTAINMENT in Section 217.

PROTECTED ABOVEGROUND TANK is a listed tank system consisting of a primary tank provided with protection from physical damage, and fire-resistive protection from a high-intensity liquid pool fire exposure. The tank system is allowed to provide these protection elements as a unit or is allowed to be an assembly of components, or a combination thereof.

SECTION 3 — PERMITS AND PLANS

A permit is required to install, operate, repair or modify protected aboveground tanks used for storage and dispensing of flammable or combustible liquid motor fuels.

The installation plans shall be submitted with permit applications. The plans shall include the design, details, and specifications of the following:

3.1 Quantities and types of liquids to be stored;

3.2 Distances from tanks and dispensers to property lines and buildings;

3.3 Vehicle access;

3.4 Fire appliances;

3.5 Vehicle impact protection;

3.6 Protected aboveground tanks and their supports;

3.7 Method of storage and dispensing;

3.8 Overfill prevention, spill containment, vents, vapor recovery, dispensers, and other equipment and accessories;

3.9 Seismic design in accordance with the Building Code;

3.10 Secondary containment;

3.11 Venting;

3.12 Piping;

3.13 Electrical systems;

3.14 Emergency controls; and

3.15 Other information as required by the chief.

SECTION 4 — TANK DESIGN

4.1 General. Protected aboveground tanks shall be listed and shall meet the requirements of U.F.C. Standard A-II-F-1.

4.2 Primary Tanks. Primary tanks shall be designed in accordance with Section 7902.1.8.2.1.

4.3 Size. Primary tanks shall not exceed a 10,000-gallon (37 854 L) individual or 40,000-gallon (151 416 L) aggregate capacity.

4.4 Vents.

4.4.1 Capacity. The vent capacity reduction factor as provided for in Section 7902.2.6.3.4 shall not be allowed.

4.4.2 Flame arresters. Approved flame arresters shall be installed in normal vents.

4.5 Projectile Protection. When a projectile test is required by the chief, the protected tank shall be tested in accordance with the requirements for bullet resistance as specified in Section 7702.3.4.3.

SECTION 5 — INSTALLATION OF TANKS

The installation of protected aboveground tanks shall be in accordance with the following:

5.1 Separation Distances. A protected aboveground tank shall be separated from property lines, important buildings, public ways and other tanks in accordance with Table A-II-F-1.

TABLE A-II-F-1—MINIMUM SEPARATION REQUIREMENTS FOR PROTECTED ABOVEGROUND TANKS

INDIVIDUAL TANK CAPACITY gallons (liters)	MINIMUM DISTANCE FROM PROPERTY LINE WHICH IS OR CAN BE BUILT UPON, INCLUDING THE OPPOSITE SIDE OF A PUBLIC WAY feet (mm)	MINIMUM DISTANCE FROM THE NEAREST SIDE OF ANY PUBLIC WAY OR FROM THE NEAREST IMPORTANT BUILDING ON THE SAME PROPERTY feet (mm)	MINIMUM DISTANCE BETWEEN TANKS feet (mm)
Less than or equal to 6,000 (22 712)	15 (4572)	5 (1524)	3 (914)
Greater than 6,000 (22 712)	50 (15 240)	25 (7620)	3 (914)

5.2 Total Quantity. Protected aboveground tank installations shall not exceed 40,000 gallons (151 416 L) aggregate capacity of primary tanks. Tank installations having the maximum allowable aggregate capacity shall be separated from other installations of protected aboveground tanks by not less than 100 feet (3048 mm).

5.3 Secondary Containment. Protected aboveground tanks shall be provided with drainage control or diking in accordance with Sections 7901.8 and 7902.2.8 or with secondary containment that is a component of the listed protected tank system. Secondary containment systems shall be monitored either visually or automatically. Enclosed secondary containment systems shall be provided with emergency venting.

5.4 Vehicle Impact Protection. Guard posts or other approved barrier protection shall be separately provided for each protected aboveground tank and for connected piping subject to vehicle impact. The design of guard posts shall be in accordance with Section 8001.9.3. Also see U.F.C. Standard A-II-F-1, Section 2.7.2.

5.5 Overfill Prevention. Protected aboveground tanks shall not be filled in excess of 90 percent of their capacity. An overfill prevention system shall be provided for each tank. During tank filling operation, the system shall:

1. Provide an independent means of notifying the person filling the tank that the fluid level has reached 85 percent of tank capacity by providing an audible or visual alarm signal, providing a tank level gage marked at 85 percent of tank capacity, or other approved means, and

2. Automatically shut off the flow of fuel to the tank when the quantity of liquid in the tank reaches 90 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.

A permanent sign shall be provided at the fill point for the tank documenting the filling procedure and the tank calibration chart. The filling procedure shall require the person filling the tank to determine the gallonage required to fill it to 90 percent of capacity before commencing the fill operation.

5.6 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. When 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 (304.8 mm) from the fill hose connection. See Section 7901.11.4 for tank valves.

5.7 Spill Containers. A spill container having a capacity of not less than 5 gallons (18.9 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 which drains into the primary tank. For tanks with a remote fill connection, a portable spill container shall be provided.

5.8 Signs. Warning signs and identification signs shall be installed to clearly identify hazards. The design of such signs shall be in accordance with Sections 5201.8 and 7901.9. Conspicuous signs prohibiting simultaneous tank filling and fuel dispensing shall be posted.

SECTION 6 — INSTALLATION OF DISPENSING AND PIPING SYSTEMS

6.1 General. Dispensing and piping systems and electrical controls shall be installed in accordance with Section 7901.11 and Article 52, except as provided in Appendix Sections 6.2, 6.3 and 6.4.

6.2 Tank Openings. Tank openings in protected aboveground tanks shall be through the top only.

6.3 Dispensing Devices. Dispensing devices are allowed to be installed on top of or immediately adjacent to protected aboveground tanks.

6.4 Antisiphon Devices. Approved antisiphon devices shall be installed in each external pipe connected to the tank when the pipe extends below the level of the top of the tank.

SECTION 7 — PARKING OF TANK VEHICLES

Tank vehicles shall not be parked within 25 feet (7620 mm) of a protected aboveground tank.

EXCEPTION: When the tank is being filled from the tank vehicle.

SECTION 8 — MAINTENANCE

Protected aboveground tanks, piping and dispensing systems shall be maintained in a safe operating condition. Protected aboveground tanks and components of dispensing systems shall be maintained in accordance with their listings.

Damage to protected aboveground tanks shall be repaired using materials having equal or greater strength and fire resistance.

APPENDIX II-G

SECONDARY CONTAINMENT FOR UNDERGROUND TANK SYSTEMS CONTAINING FLAMMABLE OR COMBUSTIBLE LIQUIDS

(See U.F.C. Section 7902.6.11)

SECTION 1 — SCOPE

Secondary containment shall be provided for underground tank systems containing flammable and combustible liquids when required by the chief in accordance with Section 7902.6.11. Specific circumstances warranting secondary containment shall include, but not be limited to, those specified in Appendix II-G.

See C.F.R. Title 40, Part 280, and U.F.C. Section 8001.4.5.1 for additional requirements related to secondary containment for tanks containing hazardous materials other than flammable and combustible liquids.

SECTION 2 — CIRCUMSTANCES WARRANTING SECONDARY CONTAINMENT

Sites selected for the installation of underground storage tank systems shall be carefully evaluated for the potential fire or explosion hazards that would be present if a release of product occurred. Such analysis shall include the tank's size, location, product stored and potential receptors that could be impacted.

Secondary containment shall be provided for tank systems in the following circumstances. Such circumstances are representative, but not all inclusive, of cases where a leak would constitute an immediate hazard to persons or property for the purpose of applying Section 7902.6.11.

1. Tank systems that are located totally or partially under buildings as allowed in Section 7902.6.3.

2. Tank systems that are located closer than 5 feet (1524 mm) from a building without subgrade areas or the property line of a property that can be built upon.

3. Tank systems that are located closer than 10 feet (3048 mm) from any subgrade structure, including basements, crawlspaces, utility vaults, trainways, subways or other confined spaces in which vapors could accumulate should a leak occur.

4. Tank systems located within or below the water table and within 50 feet (15 240 mm) of a known active well.

5. Tank systems located within or below the water table and within 50 feet (15 240 mm) upgradient of a location where the table intercepts the surface.

SECTION 3 — APPROVED METHODS OF SECONDARY CONTAINMENT

For methods of secondary containment for tank systems, see Article 90, Standard u.3.2.

APPENDIX II-H

SITE ASSESSMENTS FOR DETERMINING POTENTIAL FIRE AND EXPLOSION RISKS FROM UNDERGROUND FLAMMABLE OR COMBUSTIBLE LIQUID TANK LEAKS

(See U.F.C. Section 7901.7.4)

SECTION 1 — SCOPE

Site assessments for determining the potential fire or explosion risk from a leak, spill or discharge from an underground flammable or combustible liquid storage tank shall be in accordance with Appendix II-H. For required site assessments, see Section 7901.7.4.

Based on information available, the chief is authorized to determine what level of site assessment to require after evaluating the extent of the spill, potential receptors, nature of product stored and any other pertinent information.

SECTION 2 — SITE ASSESSMENT CRITERIA

2.1 Level I Site Assessment.

2.1.1 General. A Level I site assessment shall be provided when a minor leak is indicated through monitoring or other means or when a surface spill occurs. A Level I site assessment shall be submitted to the fire department within 10 days after being required by the chief.

2.1.2 Components. A Level I site assessment shall include:

1. The reason that a leak or release occurred or is suspected,
2. The results of equipment tests or analyses done,
3. The estimated extent of leaks, releases or spills found, and
4. Mitigation actions taken.

2.2 Level II Site Assessment.

2.2.1 General. A Level II site assessment shall be provided when there is evidence of a large leak or spill, or when deemed appropriate after a review of a Level I site assessment. A Level II site assessment shall be submitted to the fire department within 60 days after being required by the chief. Periodic updates shall be provided when required by the chief during the time a Level II site assessment is being conducted.

2.2.2 Components. A Level II site assessment shall include:

1. The type and known or estimated quantity of product leaked,
2. The geology and hydrology of the leak site and surrounding area,
3. Buildings, underground structures, utilities and water sources which could be impacted,
4. A prediction of plume movement, speed and direction,
5. The extent and severity of current contamination,
6. Other possible sources of contamination,
7. Current and potential degree of fire and explosion hazards, and
8. Mitigation plans for current and potential fire and explosion hazards.

SECTION 3 — SITE ASSESSMENT RECORDS

Level I and Level II site assessments submitted to the fire department shall become the property of the department and shall be maintained as public records for such a period as deemed necessary by the department.

APPENDIX II-I
OZONE GAS-GENERATING EQUIPMENT

SECTION 1 — SCOPE

Equipment having a maximum ozone-generating capacity of $^1/_2$ pound (0.23 kg) or more over a 24-hour period shall be in accordance with Appendix II-I.

EXCEPTION: Ozone-generating equipment used in Group R, Division 3 Occupancies.

SECTION 2 — DEFINITIONS

For the purpose of Appendix II-I, certain terms are defined as follows:

OZONE GENERATOR is equipment which causes the production of ozone.

SECTION 3 — STANDARDS

The following standard is intended for use as a guide in the design, fabrication, testing and use of equipment regulated by Appendix II-I:

National Electric Manufacturers Association
2101 L Street, N.W.
Suite 300
Washington, DC 20037
Standard 250, Enclosures for Electrical Equipment

SECTION 4 — LOCATION

4.1 General. Ozone generators shall be located in approved cabinets or ozone-generator rooms in accordance with Section 4.

EXCEPTION: A generator within an approved pressure vessel need not be in a cabinet or ozone-generator room when located outside of buildings.

4.2 Cabinets. Ozone cabinets shall be constructed of approved materials compatible with ozone in accordance with nationally recognized standards. Cabinets shall display an approved sign stating, OZONE GAS GENERATOR—HIGHLY TOXIC—OXIDIZER. See Section 3.

Cabinets shall be braced for seismic activity in accordance with the Building Code.

Cabinets shall be mechanically ventilated with a minimum of six air changes per hour. Exhausted air shall be directed to a treatment system designed to reduce the discharge concentration of the gas to one half of the IDLH value at the point of discharge to the atmosphere.

The average velocity of ventilation at makeup air openings with cabinet doors closed shall not be less than 200 feet per minute (1.02 m/s).

4.3 Ozone-generator Rooms. Ozone-generator rooms shall be mechanically ventilated with a minimum of six air changes per hour. Exhausted air shall be directed to a treatment system designed to reduce the discharge concentration of gas to one half of the IDLH value at the point of discharge to the atmosphere or ozone-generator rooms shall be equipped with a continuous gas-detection system which will shut off the generator and sound a local alarm when concentrations above the permissible exposure limit occur.

Ozone-generator rooms shall not be normally occupied, and such rooms shall be kept free of combustible and hazardous material storage. Room access doors shall display an approved sign stating, OZONE GAS GENERATOR—HIGHLY TOXIC—OXIDIZER.

SECTION 5 — PIPING VALVES AND FITTINGS

5.1 General. Piping, valves, fittings and related components used to convey ozone shall be in accordance with Section 5.

5.2 Secondary Containment. Secondary containment, such as double-walled piping or exhausted enclosures, shall be provided for piping, valves, fittings and related components. Secondary containment shall be capable of directing a sudden release to an approved treatment system.

EXCEPTION: Welded stainless steel piping and tubing.

5.3 Materials. Materials shall be compatible with ozone and shall be rated for the design operating pressures.

5.4 Identification. Piping shall be identified "Ozone Gas—Highly Toxic—Oxidizer."

SECTION 6 — AUTOMATIC SHUTDOWN

Ozone generators shall be designed to automatically shut down under the following conditions:

1. When the dissolved ozone concentration in the water being treated is above saturation when measured at the point where the water is exposed to the atmosphere,
2. When the process using generated ozone is shut down,
3. Failure of the ventilation system for the cabinet or ozone-generator room, or
4. Failure of the gas-detection system.

SECTION 7 — MANUAL SHUTDOWN

Manual shutdown controls shall be provided at the generator and, if in a room, within 10 feet (3048 mm) of the main exit door.

Division III
FIRE PROTECTION
APPENDIX III-A
FIRE-FLOW REQUIREMENTS FOR BUILDINGS
(See U.F.C. Section 903.3)

SECTION 1 — SCOPE

The procedure determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with Appendix III-A. Appendix III-A does not apply to structures other than buildings.

SECTION 2 — DEFINITIONS

For the purpose of Appendix III-A, certain terms are defined as follows:

FIRE AREA is the floor area, in square feet, used to determine the required fire flow.

FIRE FLOW is the flow rate of a water supply, measured at 20 psi (137.9 kPa) residual pressure, that is available for firefighting.

SECTION 3 — MODIFICATIONS

3.1 Decreases. Fire-flow requirements may be modified downward by the chief for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

3.2 Increases. Fire flow may be modified upward by the chief where conditions indicate an unusual susceptibility to group fires or conflagrations. An upward modification shall not be more than twice that required for the building under consideration.

SECTION 4 — FIRE AREA

4.1 General. The fire area shall be the total floor area of all floor levels within the exterior walls, and under the horizontal projections of the roof of a building, except as modified in Section 4.

4.2 Area Separation. Portions of buildings which are separated by one or more four-hour area separation walls constructed in accordance with the Building Code, without openings and provided with a 30-inch (762 mm) parapet, are allowed to be considered as separate fire areas.

4.3 Type I and Type II-F.R. Construction. The fire area of buildings constructed of Type I and Type II-F.R. construction shall be the area of the three largest successive floors.

SECTION 5 — FIRE-FLOW REQUIREMENTS FOR BUILDINGS

5.1 One- and Two-Family Dwellings. The minimum fire flow and flow duration requirements for one- and two-family dwellings having a fire area which does not exceed 3,600 square feet (344.5 m^2) shall be 1,000 gallons per minute (3785.4 L/min.). Fire flow and flow duration for dwellings having a fire area in excess of 3,600 square feet (344.5 m^2) shall not be less than that specified in Table A-III-A-1.

EXCEPTION: A reduction in required fire flow of 50 percent, as approved by the chief, is allowed when the building is provided with an approved automatic sprinkler system.

5.2 Buildings other than One- and Two-Family Dwellings. The minimum fire flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table A-III-A-1.

EXCEPTION: A reduction in required fire flow of up to 75 percent, as approved by the chief, is allowed when the building is provided with an approved automatic sprinkler system. The resulting fire flow shall not be less than 1,500 gallons per minute (5677.5 L/min.).

TABLE A-III-A-1—MINIMUM REQUIRED FIRE FLOW AND FLOW DURATION FOR BUILDINGS

FIRE AREA (square feet) × 0.0929 for m^2					FIRE FLOW (gallons per minute)[2]	FLOW DURATION (hours)
Type I-F.R. II-F.R.[1]	Type II One-HR. III One-HR.[1]	Type IV-H.T. V-One-HR.[1]	Type II-N III-N[1]	Type V-N[1]	× 3.785 for L/min.	
Up to 22,700	Up to 12,700	Up to 8,200	Up to 5,900	Up to 3,600	1,500	
30,200	17,000	10,900	7,900	4,800	1,750	
38,700	21,800	12,900	9,800	6,200	2,000	2
48,300	24,200	17,400	12,600	7,700	2,250	
59,000	33,200	21,300	15,400	9,400	2,500	
70,900	39,700	25,500	18,400	11,300	2,750	
83,700	47,100	30,100	21,800	13,400	3,000	
97,700	54,900	35,200	25,900	15,600	3,250	3
112,700	63,400	40,600	29,300	18,000	3,500	
128,700	72,400	46,400	33,500	20,600	3,750	
145,900	82,100	52,500	37,900	23,300	4,000	
164,200	92,400	59,100	42,700	26,300	4,250	
183,400	103,100	66,000	47,700	29,300	4,500	
203,700	114,600	73,300	53,000	32,600	4,750	
225,200	126,700	81,100	58,600	36,000	5,000	
247,700	139,400	89,200	65,400	39,600	5,250	
271,200	152,600	97,700	70,600	43,400	5,500	
295,900	166,500	106,500	77,000	47,400	5,750	
Greater	Greater	115,800	83,700	51,500	6,000	4
"	"	125,500	90,600	55,700	6,250	
"	"	135,500	97,900	60,200	6,500	
"	"	145,800	106,800	64,800	6,750	
"	"	156,700	113,200	69,600	7,000	
"	"	167,900	121,300	74,600	7,250	
"	"	179,400	129,600	79,800	7,500	
"	"	191,400	138,300	85,100	7,750	
"	"	Greater	Greater	Greater	8,000	

[1]Types of construction are based upon the Building Code.

[2]Measured at 20 psi (137.9 kPa). See Appendix III-A, Section 2.

APPENDIX III-B
FIRE HYDRANT LOCATIONS AND DISTRIBUTION
(See U.F.C. Section 903.4.2)

SECTION 1 — SCOPE

Fire hydrants shall be provided in accordance with Appendix III-B for the protection of buildings, or portions of buildings, hereafter constructed.

SECTION 2 — LOCATION

Fire hydrants shall be provided along required fire apparatus access roads and adjacent public streets.

SECTION 3 — NUMBER OF FIRE HYDRANTS

The minimum number of fire hydrants available to a building shall not be less than that listed in Table A-III-B-1. The number of fire hydrants available to a complex or subdivision shall not be less than that determined by spacing requirements listed in Table A-III-B-1 when applied to fire apparatus access roads and perimeter public streets from which fire operations could be conducted.

SECTION 4 — CONSIDERATION OF EXISTING FIRE HYDRANTS

Existing fire hydrants on public streets are allowed to be considered as available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads.

SECTION 5 — DISTRIBUTION OF FIRE HYDRANTS

The average spacing between fire hydrants shall not exceed that listed in Table A-III-B-1.

EXCEPTION: The chief may accept a deficiency of up to 10 percent where existing fire hydrants provide all or a portion of the required fire hydrant service.

Regardless of the average spacing, fire hydrants shall be located such that all points on streets and access roads adjacent to a building are within the distances listed in Table A-III-B-1.

TABLE A-III-B-1—NUMBER AND DISTRIBUTION OF FIRE HYDRANTS

FIRE-FLOW REQUIREMENT (gpm)	MINIMUM NO. OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS[1,2,3] (feet)	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT[4]
× 3.785 for L/min.		× 304.8 for mm	
1,750 or less	1	500	250
2,000-2,250	2	450	225
2,500	3	450	225
3,000	3	400	225
3,500-4,000	4	350	210
4,500-5,000	5	300	180
5,500	6	300	180
6,000	6	250	150
6,500-7,000	7	250	150
7,500 or more	8 or more[5]	200	120

[1]Reduce by 100 feet (30 480 mm) for dead-end streets or roads.

[2]Where streets are provided with median dividers which can be crossed by firefighters pulling hose lines, or arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet (152.4 m) on each side of the street and be arranged on an alternating basis up to a fire-flow requirement of 7,000 gallons per minute (26 495 L/min.) and 400 feet (122 m) for higher fire-flow requirements.

[3]Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at not less than 1,000-foot (305 m) spacing to provide for transportation hazards.

[4]Reduce by 50 feet (15 240 mm) for dead-end streets or roads.

[5]One hydrant for each 1,000 gallons per minute (3785 L/min.) or fraction thereof.

APPENDIX III-C
TESTING AUTOMATIC SPRINKLER AND STANDPIPE SYSTEMS
(See U.F.C. Section 1001.4)

SECTION 1 — GENERAL

1.1 Intervals. Tests of systems or devices regulated herein shall be conducted at least every five years or when an inspection by the chief indicates that there is reason to believe that the system or device would fail to operate properly in an emergency.

1.2 Testing Personnel. The tests established by Appendix III-C shall be conducted by a person qualified to perform the full testing procedure for the particular system or device being tested.

1.3 Witness. The chief shall be notified at least one working day in advance of the performance of required tests to allow a representative of the fire department to witness the test.

1.4 Notification of Inoperative Systems. At the conclusion of each test, the chief shall be notified of fire-protection equipment that was determined to be inoperative.

1.5 Certification of Operative Systems. When the fire-protection equipment is operative, the owner or the owner's agent shall certify its condition to the chief in writing.

1.6 Plugs and Caps. Fire department inlet connections and outlets shall be equipped with approved plugs or caps.

SECTION 2 — TEST PROCEDURES FOR AUTOMATIC SPRINKLER SYSTEMS

2.1 Notification. The concerned agency shall be notified before supervised systems are tested.

2.2 Backflow. Inlet connections shall be backflowed from the check valve to the inlet by disassembling the check valve or blocking the check valve open so that water will backflow out of the fire department inlet connections.

2.3 Control Valves. Control valves shall be closed and reopened to assure their ability to operate.

2.4 Alarm Test. For wet systems only, the inspector's test valve shall be opened to test the alarm bell response. When fully opened, the response shall occur within five minutes. When conducting such a test on a dry-pipe, preaction or deluge system, use the alarm test line.

2.5 Gage Test. An approved test gage shall be connected at the test gage opening to test the reliability of the existing gages.

2.6 Flow Test. Pressures shall be observed with the main drain valve closed, and wide open. Upon closing the main drain valve, an observation shall be made to determine how quickly pressure is restored to indicate if there are closed valves or obstructions in water supply lines.

2.7 Trip Test. Dry-pipe, preaction and deluge systems shall be trip tested annually in accordance with nationally recognized standards.

SECTION 3 — TEST PROCEDURE FOR STANDPIPE SYSTEMS

3.1 Class I Systems.

3.1.1 Air test. Class I systems shall be air tested at 25 psi (172.3 kPa) to determine if the system leaks and to avoid water damage to the building in the event that piping has been broken or disconnected.

3.1.2 Hydrostatic test. Class I systems shall be filled completely with water and the static pressure (head) on the test gage installed on the lowest inlet connection shall be noted. Class I systems shall be hydrostatically tested at a pressure 50 psi (344.7 kPa) greater than the head pressure, but not less than 150 psi (1034.2 kPa).

3.1.3 Flow test. Class I systems shall be flow tested with 500 gpm (1892.7 L/min.) of water through the standpipe system to the roof outlet. A separate flow test shall be conducted through each inlet. A test gage shall be installed at the inlet being used to measure the inlet pressure. The maximum allowable pressure lost within the system due to friction shall be 15 psi (103.4 kPa). Friction loss shall be determined by subtracting the static pressure (head) and outlet pressure from the inlet pressure while 500 gpm (1892.5 L/min.) is flowing.

3.1.4 Valve testing. Each outlet valve in the system shall be operated to determine that it will function properly.

3.1.5 Thread testing. Using approved fittings, inlets and outlets shall be tested to verify compliance with Section 1.6.

3.2 Class II Systems.

3.2.1 Flow test. Class II systems shall be flow tested to the requirements in effect at time of installation or at 100 gpm (378 L/min.) at 65 psi (448 kPa). The required water flow shall be maintained for at least 30 seconds from systems supplied by street mains or gravity tanks and at least 2 minutes from systems supplied by booster pumps or pressure tanks.

3.2.2 Gravity tank supply. The operation of the automatic filling system shall be verified if the system is supplied by gravity tank.

3.2.3 Pressure tank supply. The operation of the automatic filling system for pressure tank supplies shall be verified when a flow test is conducted. Air-pressure and water supply apparatus shall be checked, when installed.

3.2.4 Outlets. Outlets shall be checked for signs of corrosion, leakage and for the installation of an approved pressure-reducing device at outlets where the pressure will exceed 100 psi (689.5 kPa). Each outlet in the system shall be flowed in a manner that will indicate the valves are fully operable and that there is water pressure at that outlet.

3.2.5 Hose. The full length of hose sections shall be examined for mildew, cuts, abrasions and other deterioration. When required by the chief, the hose shall be replaced with listed lined hose. Hose couplings, gaskets and nozzles shall be checked for damage and obstructions.

3.3 Class III Systems.

3.3.1 Flow test. Class III systems shall be flow tested with 500 gpm (1892.5 L/min.) through each riser from the uppermost outlets. The system shall maintain a residual pressure of 65 psi (448 kPa) at the level of that outlet.

3.3.2 Pump test. Fire pumps shall be tested. If the pump performance characteristics when tested are more than 10 percent below the manufacturer's certified shop test characteristic curve or as specified on the pump housing, the pump shall be repaired and restored to its original condition. Caution shall be used when drawing residual pressure below 20 psi (137.9 kPa) on public service mains during testing, since such low pressure could cause damage to the mains. Pump supervisory devices shall be tested for proper functioning and to assure that the alarm is transmitting to the proper location.

3.3.3 Outlets. Each outlet in the system shall be flowed in a manner that will indicate the valves are fully operable and that there is water pressure at that outlet. Outlets shall be checked for signs of corrosion and leakage. Installation of an approved pressure-reducing device at outlets where the pressure will exceed 100 psi (689.5 kPa) shall be verified.

3.3.4 Fire department inlet connections. Inlet connections shall be backflowed so that water will backflow out of the fire department inlet connections.

3.3.5 Hose. The full length of hose sections shall be examined for mildew, cuts, abrasions and other deterioration. When required by the chief, the hose shall be replaced with listed lined hose. Hose couplings, gaskets and nozzle shall be checked for damage and obstructions.

APPENDIX III-D
BASEMENT PIPE INLETS
(See U.F.C. Section 1005)

SECTION 1 — SCOPE

Basement pipe inlets shall be installed in accordance with Appendix III-D.

SECTION 2 — LOCATION

Basement pipe inlets shall be installed in the first floor of stores, warehouses and factories having basements.

EXCEPTIONS: 1. Basements equipped with an automatic fire-extinguishing system.

2. Basements used for the storage of permanent archives or valuables such as safe deposit vaults or similar uses adversely affected by water.

The location of basement pipe inlets shall be as required by the fire department.

SECTION 3 — SPECIFICATIONS

Basement pipe inlets shall be of cast iron, steel, brass or bronze with lids of cast brass or bronze.

A basement pipe inlet shall consist of a sleeve of not less than 8-inch (203 mm) inside diameter extending through the floor and terminating flush with or through the basement ceiling and shall have a top flange recessed with an inside shoulder to receive the lid. The top flange shall be installed flush with finished floor surface. The lid shall be a solid casting and have a lift recessed in the top. This lid shall be provided with a cast-in sign reading FIRE DEPARTMENT ONLY—DO NOT COVER. The lid shall be installed in a manner which allows its easy removal from the flange shoulder.

Division IV
SPECIAL COMBUSTION HAZARDS
APPENDIX IV-A
INTERIOR FLOOR FINISH
(See U.F.C. Section 1101.1)

SECTION 1 — SCOPE

Exposed floor surfaces of buildings, including coverings which are applied over a previously finished floor, shall be in accordance with Appendix IV-A.

EXCEPTION: Interior floor finish materials of a traditional type, such as wood, vinyl, linoleum, terrazzo and other resilient floor-covering materials.

SECTION 2 — GENERAL

Interior floor finish materials determined by the chief to represent an unusual hazard shall meet the classification prescribed for the occupancy groups listed in Table A-IV-A-1 when tested in accordance with Section 3.

EXCEPTION: When an approved automatic sprinkler system is installed, Class 2 materials are allowed to be used in areas where Class 1 materials are required and the materials need not be classified in areas where Class 2 materials are required.

SECTION 3 — TESTING AND CLASSIFICATION OF MATERIALS

3.1 Testing. Critical radiant flux values of interior floor finishes shall be established by tests conducted by an approved testing agency in accordance with procedures specified within nationally recognized standards. NFPA Standard 253 is an example of such standards.

3.2 Classification.

3.2.1 General. Interior floor finish materials shall be classified in accordance with the following:

1. **Class 1 interior floor finish.** Materials having a minimum critical radiant flux of 0.45 watt per square centimeter.

2. **Class 2 interior floor finish.** Materials having a minimum critical radiant flux of 0.22 watt per square centimeter.

3.3 Test Report Availability. A copy of the test report identifying and representing the style to be installed shall be provided to the chief upon request. The test report shall identify the interior floor finish by manufacturer or supplier and the style name. The test report shall be representative of the current construction of the material to be installed.

3.4 Identification. The interior floor finish material shall be identified by a hang tag or other suitable method as to manufacturer or supplier, and style, and shall indicate the classification of the material based upon the limits specified within Section 2.

TABLE A-IV-A-1—INTERIOR FLOOR FINISH REQUIREMENTS

OCCUPANCY	CLASS	
	Required Exits and Passageways[1]	Corridors Providing Exit Access
Group A	2	2
Group B	2	2
Group E	2	2
Group F	2	2
Group I[2]	1	1
Group M	2	2
Group R, Division 1	2	2
Group S	2	2

[1]Combustible floor finish shall not be used on stairs in Types I and II construction, or other types of construction for buildings exceeding three stories in height.

[2]Combustible floor finish shall not be used in rooms occupied by inmates or patients whose personal liberties are restrained.

APPENDIX IV-B
CHRISTMAS TREES
(See U.F.C. Section 1101.1)

SECTION 1 — SCOPE

The use of natural or resin-bearing cut trees in public buildings shall be in accordance with Appendix IV-B.

SECTION 2 — PERMITS

A permit is required prior to placement of the tree in a public building.

SECTION 3 — FLAME RETARDANCE

Trees shall be properly treated with a flame retardant approved by the chief.

SECTION 4 — TAGS

Trees shall bear a tag stating date of placement in the public building, type of flame-retardant treatment used, name of the person who applied the flame retardant and the name of the person affixing the tag.

SECTION 5 — SUPPORT DEVICE

The support device that holds a tree in an upright position shall be of a type that is stable and that:

1. Does not damage or require removal of the tree stem base,
2. Holds the tree securely and is of adequate size to avoid tipping over of the tree, and
3. Is capable of containing a two-day minimum supply of water, covering the stem at least 2 inches (50.8 mm), and the quantity specified in Table A-IV-B-1.

SECTION 6 — BUTT CUT

Prior to setting up a tree, the trunk shall have a fresh butt cut on a diagonal at least 1 inch (25.4 mm) above the original cut.

SECTION 7 — WATERING

Hot tap water shall be used when first filling a support stand, and the stand shall not be allowed to become dry of water. If a stand becomes dry, the tree shall be removed immediately.

SECTION 8 — DRYNESS

Trees shall be checked for dryness by the following method: stand in front of a branch, grasp it with reasonably firm pressure and pull your hand toward you, allowing the branch to slip through your grasp. If the needles fall off readily, the tree does not have adequate moisture content, and it shall be removed immediately.

SECTION 9 — OPEN FLAMES

Candles and open flames shall not be used on or near a tree within a distance equal to the height of the tree.

SECTION 10 — ELECTRIC LIGHTS

Electrical decorations used on trees shall be listed.

TABLE A-IV-B-1—SUPPORT STAND WATER CAPACITY

TREE HEIGHT (feet)	MINIMUM SUPPORT STAND WATER CAPACITY (gallons)	TYPICAL DAILY WATER EVAPORATION AMOUNT (gallons)
× 304.8 for mm	× 3.785 for L	
Up to 6 1/2	1/2	1/8 to 1/4
6 1/2 to 10	1	1/4 to 1/2
Over 10	3	1/2 to 1 1/2

Division V
STANDARDS
APPENDIX V-A
NATIONALLY RECOGNIZED STANDARDS OF GOOD PRACTICE

SECTION 1 — SCOPE

The following standards and publications are intended for use as a guide to attain a reasonable level of safety where specific requirements are not stated or specific standards are not adopted or referenced in this code.

SECTION 2 — STANDARDS

AMERICAN GAS ASSOCIATION LABORATORIES
8501 East Pleasant Road, Cleveland, OH 44131
1425 Grande Vista Avenue, Los Angeles, CA 90023
DIRECTORY OF CERTIFIED APPLIANCES AND ACCESSORIES

AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS
1791 Tullie Circle, N.E.
Altanta, Georgia 30329

ANSI/ASHRAE Standards
15 Safety Code for Mechanical Refrigeration
34 Number Designation and Safety Classification of Refrigerants

COMPRESSED GAS ASSOCIATION, INC.
1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202

CGA PAMPHLETS

C-6	Standard for Visual Inspection of Compressed Gas Cylinders
C-6.1	Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders
C-6.2	Guidelines for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders
C-10	Recommendations for Changes for Service for Compressed Gas Cylinders Including Procedures for Inspection and Container Removal
G-1	Acetylene
G-2	Anhydrous Ammonia
G-3	Sulphur Dioxide
G-4	Oxygen
G-5	Hydrogen
P-1	Safe Handling of Compressed Gases
P-2	Characteristics and Safe Handling of Medical Gases
S-1.1	Cylinders for Compressed Gas
V-5	Diameter-Index Safety System

FACTORY MUTUAL ENGINEERING AND RESEARCH
1151 Boston-Providence Turnpike, Norwood, MA 02062

INSTITUTE OF MAKERS OF EXPLOSIVES
1120 19th Street, N.W., Suite 310, Washington, DC 20036-3605

IME PAMPHLETS

1 Construction Guide for Storage Magazines

20 Radio Frequency Radiation Hazard in Use of Electric Blasting Caps

NATIONAL FIRE PROTECTION ASSOCIATION
One Batterymarch Park, Quincy, MA 02269

NFPA NATIONAL FIRE CODES

UNDERWRITERS LABORATORIES INC.
333 Pfingsten Road, Northbrook, IL 60062
1655 Scott Boulevard, Santa Clara, CA 95050

UL DIRECTORIES

Automotive, Burglary Protection and Mechanical Equipment

Building Materials

Electrical Appliance and Utilization Equipment

Electrical Construction Materials

Fire Protection Equipment

Fire Resistance

Gas and Oil Equipment

General Information from Electrical Construction Materials and Hazardous Location Equipment Directories

Hazardous Location Equipment

Marine Products

Recognized Component

UNITED STATES GOVERNMENT AGENCIES
Code of Federal Regulations, Titles 1-50, Superintendent of Documents
United States Government Printing Office, Washington, DC 20402

Division VI
INFORMATIONAL
APPENDIX VI-A
HAZARDOUS MATERIALS CLASSIFICATIONS
(See U.F.C. Sections 8001.1.2 and 8002.3)

SECTION 1 — SCOPE

Appendix VI-A provides information, explanations and examples to illustrate and clarify the hazard categories contained in Article 80. The hazard categories are based upon the Code of Federal Regulations, Title 29. Where numerical classifications are included, they are in accordance with nationally recognized standards.

Appendix VI-A should not be used as the sole means of hazardous materials classification.

SECTION 2 — HAZARD CATEGORIES

2.1 Physical Hazards.

2.1.1 Explosives and blasting agents.

2.1.1.1 High explosives. Can be detonated by means of blasting cap when unconfined. Examples: dynamite, TNT, nitroglycerine, C-3, C-4.

2.1.1.2 Low explosives. Can be deflagrated when confined. Examples: black powder, smokeless powder, propellant explosives, display fireworks.

2.1.1.3 Blasting agents. Oxidizer and liquid fuel slurry mixtures. Examples: ammonium nitrate combined with fuel oil.

2.1.2 Compressed gases.

2.1.2.1 Flammable. Examples: acetylene, carbon monoxide, ethane, ethylene, hydrogen, methane.

2.1.2.2 Oxidizing. Examples: oxygen, ozone, oxides of nitrogen, chlorine and fluorine. Chlorine and fluorine do not contain oxygen but reaction with flammables is similar to that of oxygen.

2.1.2.3 Corrosive. Examples: ammonia, hydrogen chloride and fluorine.

2.1.2.4 Highly toxic. Examples: arsine, cyanogen, fluorine, germane, hydrogen cyanide, hydrogen selenide, nitric oxide, phosphine and stibene.

2.1.2.5 Toxic. Examples: chlorine, hydrogen fluoride, hydrogen sulfide, silicon tetrafluoride, phosgene.

2.1.2.6 Inert (chemically unreactive). Examples: argon, helium, krypton, neon, nitrogen and xenon.

2.1.2.7 Pyrophoric. Examples: diborane, dichloroborane, phosphine and silane.

2.1.2.8 Unstable (reactive). Examples: butadiene (unstabilized), ethylene oxide and vinyl chloride.

2.1.3 Flammable and combustible liquids.

2.1.3.1 Flammable liquids.

CLASS I-A liquids include those having flash points below 73°F. (22.8°C.) and having a boiling point below 100°F. (37.8°C.).

CLASS I-B liquids include those having flash points below 73°F. (22.8°C.) and having a boiling point at or above 100°F. (37.8°C.).

CLASS I-C liquids include those having flash points at or above 73°F. (22.8°C.) and below 100°F. (37.8°C.).

2.1.3.2 Combustible liquids.

CLASS II liquids include those having flash points at or above 100°F. (37.8°C.) and below 140°F. (60°C.).

CLASS III-A liquids include those having flash points at or above 140°F. (60°C.) and below 200°F. (93.3°C.).

CLASS III-B liquids include those liquids having flash points at or above 200°F. (93.3°C.).

2.1.4 Flammable solids.

2.1.4.1 Organic solids. Examples: camphor, cellulose nitrate and napthalene.

2.1.4.2 Inorganic solids. Examples: decaborane, lithium amide, phosphorous heptasulfide, phosphorous sesquisulfide, potassium sulfide, anhydrous sodium sulfide and sulfur.

2.1.4.3 Combustible metals (except dusts and powders). Examples: cesium, magnesium and zirconium.

2.1.4.4 Combustible dusts and powders (including metals). Finely divided flammable solids which may be dispersed in air as a dust cloud. Examples: wood sawdust, plastics, coal, flour and powdered metals (few exceptions).

2.1.5 Oxidizers.

2.1.5.1 Gases. Examples: oxygen, ozone, oxides of nitrogen fluorine and chlorine (reaction with flammables is similar to that of oxygen).

2.1.5.2 Liquids. Examples: bromine, hydrogen peroxide, nitric acid, perchloric acid and sulfuric acid.

2.1.5.3 Solids. Examples: chlorates, chromates, chromic acid, iodine, nitrates, perchlorates and peroxides.

Classification of liquid and solid oxidizers according to hazard:

Class 4—An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock. In addition, the oxidizer will enhance the burning rate and may cause spontaneous ignition of combustibles. Examples: ammonium perchlorate (particle size greater than 15 microns), ammonium permanganate, guanidine nitrate, hydrogen peroxide solutions (greater than 91 percent) and tetranitromethane.

Class 3—An oxidizer that will cause a severe increase in the burning rate of combustible materials with which it comes in contact or that will undergo vigorous self-sustained decomposition due to contamination or exposure to heat. Examples: ammonium dichromate, calcium hypochlorite (over 50 percent by weight), chloric acid (10 percent maximum concentration), hydrogen peroxide solutions (greater than 52 percent up to 91 percent), mono-(trichloro)-tetra-(monopotassium dichloro)-penta-s-triazinetrione, nitric acid, fuming (more than 86 percent concentration), perchloric acid solutions (60 percent to 72 percent by weight), potassium bromate, potassium chlorate, potassium dichloro-s-triazinetrione (potassium dichloroisocyanurate), sodium bromate, sodium chlorate, sodium chlorite (over 40 percent by weight) and sodium dichloro-s-triazinetrione (sodium dichloroisocyanurate).

Class 2—An oxidizer that will cause a moderate increase in the burning rate or that may cause spontaneous ignition of combustible materials with which it comes in contact. Examples: barium bro-

mate, barium chlorate, barium hypochlorite, barium perchlorate, barium permanganate, 1-bromo-3-chloro-5, 5-dimethylhydantoin, calcium chlorate, calcium chlorite, calcium hypochlorite (50 percent or less by weight), calcium perchlorate, calcium permanganate, chromium trioxide (chromic acid), copper chlorate, halane (1, 3-dichloro-5, 5-dimethylhydantoin), hydrogen peroxide (greater than 27.5 percent up to 52 percent), lead perchlorate, lithium chlorate, lithium hypochlorite (more than 39 percent available chlorine), lithium perchlorate, magnesium bromate, magnesium chlorate, magnesium perchlorate, mercurous chlorate, nitric acid (more than 40 percent but less than 86 percent), perchloric acid solutions (more than 50 percent but less than 60 percent), potassium perchlorate, potassium permanganate, potassium peroxide, potassium superoxide, silver peroxide, sodium chlorite (40 percent or less by weight), sodium perchlorate, sodium perchlorate monohydrate, sodium permanganate, sodium peroxide, strontium chlorate, strontium perchlorate, thallium chlorate, trichloro-s-triazinetrione (trichloroisocyanuric acid), urea hydrogen peroxide, zinc bromate, zinc chlorate and zinc permanganate.

Class 1—An oxidizer whose primary hazard is that it slightly increases the burning rate but does not cause spontaneous ignition when it comes in contact with combustible materials. Examples: all inorganic nitrates (unless otherwise classified), all inorganic nitrites (unless otherwise classified), ammonium persulfate, barium peroxide, calcium peroxide, hydrogen peroxide solutions (greater than 8 percent up to 27.5 percent), lead dioxide, lithium hypochlorite (39 percent or less available chlorine), lithium peroxide, magnesium peroxide, manganese dioxide, nitric acid (40 percent concentration or less), perchloric acid solutions (less than 50 percent by weight), potassium dichromate, potassium percarbonate, potassium persulfate, sodium carbonate peroxide, sodium dichloro-s-triazinetrione dihydrate, sodium dichromate, sodium perborate (anhydrous), sodium perborate monohydrate, sodium perborate tetrahydrate, sodium percarbonate, sodium persulfate, strontium peroxide and zinc peroxide.

2.1.6 Organic peroxides.

Organic peroxides are flammable compounds which contain the double oxygen or peroxy (-O-O-) group and are subject to explosive decomposition. They are available as:

1. Liquids.
2. Pastes.
3. Solids (usually finely divided powders).

Classification of organic peroxides according to hazard:

UNCLASSIFIED: Peroxides which are capable of detonation. These peroxides present an extremely high explosion hazard through rapid explosive decomposition and are regulated in accordance with Article 77.

CLASS I: Class I peroxides are capable of deflagration, but not detonation. These peroxides present a high explosion hazard through rapid decomposition. Examples: 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 peroxydi-carbonate 85 percent.

CLASS II: Class II peroxides burn very rapidly and present a severe reactivity hazard. Examples: acetyl peroxide, 25 percent, t-butyl hydroperoxide 70 percent, t-butyl peroxybenzoate 98 percent, t-butyl peroxy-2-ethylhex-anoate 97 percent, t-butyl peroxyisobutyrate 75 percent, t-butyl peroxyisopropyl-carbonate 75 percent, t-butyl peroxypivalate 75 percent, dybenz-oyl peroxydicarbonate 85 percent, di-sec-butyl peroxydicarbonate 98 percent, di-sec-butyl 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: Class III peroxides burn rapidly and present a moderate reactivity hazard. Examples: 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-ethytehexanoate 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, diisopropyl peroxydi-carbonate 30 percent, 2,-5-dimethyl-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: Class IV peroxides burn in the same manner as ordinary combustibles and present a minimum reactivity hazard. Examples: 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, 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: Class V peroxides do not burn or present a decomposition hazard. Examples: 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.

2.1.7 Pyrophoric materials.

2.1.7.1 Gases. Examples: diborane, phosphine and silane.

2.1.7.2 Liquids. Examples: diethyl aluminum chloride, diethyl beryllium, diethyl phosphine, diethyl zinc, dimethyl arsine, triethyl aluminum etherate, thriethyl bismuthine, thriethyl boron, trimethyl aluminum and trimethyl gallium.

2.1.7.3 Solids. Examples: cesium, hafnium, lithium, white or yellow phosphorus, plutonium, potassium, rubidium, sodium and thorium.

2.1.8 Unstable (reactive) materials.

CLASS 4: Materials which in themselves are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. This class should include materials which are sensitive to mechanical or localized thermal shock at normal temperatures and pressures. Examples: acetyl peroxide, dibutyl peroxide, dinitrobenzene, ethyl nitrate, peroxyacetic acid and picric acid (dry) trinitrobenzene.

CLASS 3: Materials which 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 degree should include materials which are sensitive to thermal or mechanical shock at elevated temperatures and pressures. Examples: hydrogen peroxide (greater than 52 percent), hydroxylamine, nitromethane, paranitroaniline, perchloric acid and tetrafluoroethylene monomer.

CLASS 2: Materials which in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This degree should include materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures and which can undergo violent chemical change at elevated temperatures and pressures. Examples: acrolein, acrylic acid, hydrazine, methacrylic acid, sodium perchlorate, styrene and vinyl acetate.

CLASS 1: Materials which in themselves are normally stable but which can become unstable at elevated temperatures and pressures. Examples: acetic acid, hydrogen peroxide 35 percent to 52 percent, paraldehyde and tetrahydrofuran.

Classification by degree of hazard shall be in accordance with U.F.C. Standard 79-3.

2.1.9 Water-reactive materials.

CLASS 3: Materials which react explosively with water without requiring heat or confinement. Examples: aluminum alkyls such as triethylaluminum, isobutylaluminum and trimethylaluminum; bromine pentafluoride, bromine trifluoride, chlorodiethylaluminium and diethylzinc.

CLASS 2: Materials which may form potentially explosive mixtures with water. Examples: calcium carbide, calcium metal, cyanogen bromide, lithium hydride, methyldichlorosilane, potassium metal, potassium peroxide, sodium metal, sodium peroxide, sulfuric acid and trichlorosilane.

CLASS 1: Materials which may react with water with some release of energy but not violently. Examples: acetic anhydride, sodium hydroxide, sulfur monochloride and titanium tetrachloride.

Classification by degree of hazard shall be in accordance with U.F.C. Standard 79-3.

2.1.10 Cryogenic fluids.

2.1.10.1 Flammable. Examples: carbon monoxide, deuterium (heavy hydrogen), ethylene, hydrogen and methane.

2.1.10.2 Oxidizing. Examples: fluorine, nitric oxide and oxygen.

2.1.10.3 Corrosive. Examples: fluorine and nitric oxide.

2.1.10.4 Inert (chemically unreactive). Examples: argon, helium, krypton, neon, nitrogen and xenon.

2.1.10.5 Highly toxic. Examples: fluorine and nitric oxide.

All of the cryogenics listed will exist as compressed gases when they are stored at ambient temperatures.

2.2 Health Hazards.

2.2.1 Highly toxic and toxic materials.

2.2.1.1 Highly toxic materials. Examples:

Gases—arsine, chlorine trifluoride, cyanogen, diborane, fluorine, germane, hydrogen cyanide, nitric oxide, nitrogen dioxide, ozone, phosphine, hydrogen selenide and stibene.

Liquids—acrolein, acrylic acid, 2-chloroethanol (ethylene chlorohydrin), hydazine, hydrocyanic acid, 2-methylaziridine (propylenimine), 2-methyllactonitrile (acetone cyanohydrin), methyl ester isocyanic acid (methyl isocyanate), nicotine, tetranitromethane, and tetraethylstannane (tetraethyltin).

Solids—(acetato) phenylmercury (phenyl mercuric acetate), 4-aminopyridine, arsenic pentoxide, arsenic trioxide, calcium cyanide, 2-choloroacetophenone, aflatoxin B, decaborane (14), mercury (II) bromide (mercuric bromide), mercury (II) chloride (corrosive mercury chloride), pentachlorophenol, methyl parathion, phosphorus (white), and sodium azide.

2.2.1.2 Toxic materials. Examples:

Gases—boron trichloride, boron trifluoride, chlorine, hydrogen fluoride, hydrogen sulfide, phosgene, silicon tetrafluoride.

Liquids—acrylonitrile, allyl alcohol, alpha-chlorotoluene, aniline, 1-chloro-2, 3-epoxypropane, chloroformic acid (allyl ester), 3-chloropropene (allyl chloride), o-cresol, crotonaldehyde, dibromomethane, diisopropylamine, diethyl ester sulfuric acid, dimethyl ester sulfuric acid, 2-furaldehyde (furfural), furfuryl alcohol, phorphorus chloride, phosphoryl chloride (phosphorus oxychloride), and thionyl chloride.

Solids—acrylamide, barium chloride, barium (II) nitrate, benzidine, p-benzoquinone, beryllium chloride, cadmium chloride, cadmium oxide, chloroacetic acid, chlorophenylmercury (phenyl

mercuric chloride), chromium (VI) oxide (chromic acid, solid), 2,4-dinitrotoluene, hydroquinone, mercury chloride (calomel), mercury (II) sulfate (mercuric sulfate), osmium tetroxide, oxalic acid, phenol, P-phenylenediamine, phenylhydrazine, 4-phenylmorpholine, phosphorus sulfide, potassium fluoride, potassium hydroxide, selenium (IV) disulfide, and sodium fluoride.

2.2.2 Radioactive materials.

2.2.2.1 Common radiation source materials. More than 100 radioisotopes are in common usage in various medical, academic and industrial test and measuring situations. Most emit beta and gamma radiation. Some emit alpha radiation also. Some emit beta or gamma radiation exclusively.

Table VI-A-2.2 indicates the types of radiation each isotope emits.

TABLE A-VI-A-2.2—RADIATION EMITTED FROM ISOTOPES[1]

Americium-241 α, γ	Gold-198 β, γ
Antimony-122 β, γ	Gold-199 β, γ
Antimony-124 β	Hafnium-181 β, γ
Antimony-125 β, γ	Holmium-166 β, γ
Arsenic-73 γ	Hydrogen-3 β
Arsenic-74 β, γ	Indium-111 γ
Arsenic-76 β, γ	Indium-113m γ
Arsenic-77 β, γ	Indium-114m γ
Barium-131 γ	Indium-115m β, γ
Barium-133 γ	Iodine-123 γ
Barium-140 β, γ	Iodine-125 γ
Beryllium-7, γ	Iodine-126 β, γ
Bismuth-210 α, β, γ	Iodine-129 β, γ
Bromine-82 β, γ	Iodine-131 β, γ
Cadmium-109 γ	Iodine-132 β, γ
Cadmium-115m β, γ	Iodine-133 β, γ
Cadmium-115 β, γ	Iodine-134 β, γ
Calcium-45 β	Iodine-135 β, γ
Calcium-47 β, γ	Iridium-192 β, γ
Carbon-14 β	Iridium-194 β, γ
Cerium-141 β, γ	Iron-52 β, γ
Cerium-143 β, γ	Iron-55 γ
Cerium-144 β, γ	Iron-59 β, γ
Cesium-131 β	Krypton-85 β, γ
Cesium-134m β, γ	Krypton-87 β, γ
Cesium-134 β, γ	Lanthanum-140 β, γ
Cesium-135 β	Lead-210 α, β, γ,
Cesium-136 β, γ	Lutetium-177 β, γ
Cesium-137 β, γ	Manganese-52 β, γ
Chlorine-36 β, γ	Manganese-54 γ
Chlorine-38 β, γ	Manganese-56 β, γ
Chromium-51 γ	Mercury-197m γ
Cobalt-57 γ	Mercury-197 γ
Cobalt-58m γ	Mercury-203 β, γ
Cobalt-58 β, γ	Molybdenum-99 β, γ
Cobalt-60 β, γ	Neodymium-147 β, γ
Copper-64 β, γ	Neodymium-149 β, γ
Dysprosium-165 β, γ	Nickel-59 γ
Dysprosium-166 β, γ	Nickel-63 γ
Erbium-169 β, γ	Nickel-65 β, γ
Erbium-171 β, γ	Niobium-93m γ
Europium-152 9.2h β, γ	Niobium-95 β, γ
Europium-152m β, γ	Niobium-97 β, γ
Europium-154 β, γ	Osmium-185 γ
Europium-155 β, γ	Osmium-191m γ
Fluorine-18 β, γ	Osmium-191 β, γ
Gadolinium-153 γ	Osmium-193 β, γ
Gadolinium-159 β, γ	Palladium-103 γ
Gallium-67 γ	Palladium-109 β, γ
Gallium-72 β, γ	Phosphorus-32 β
Germanium-71 γ	Platinum-191 γ

(Continued)

TABLE A-VI-A-2.2—RADIATION EMITTED FROM ISOTOPES[1]—(Continued)

Platinum-193m γ	Sulphur-35 β
Platinum-193 γ	Tantalum-182 β, γ
Platinum-197m β, γ	Technetium-96 γ
Platinum-197 β, γ	Technetium-97m γ
Plutonium-239 β, γ	Technetium-97 γ
Polonium-210 β, γ	Technetium-99m γ
Potassium-42 β, γ	Technetium-99 β
Potassium-43 β, γ	Tellurium-125m γ
Praseodymium-142 β, γ	Tellurium-127m β, γ
Praseodymium-143 β	Tellurium-127 β, γ
Promethium-147 β	Tellurium-129m β, γ
Promethium-149 β, γ	Tellurium-129 β, γ
Radium-226 α, γ	Tellurium-131m β, γ
Rhenium-185 β, γ	Tellurium-132 β, γ
Rhenium-188 β, γ	Terbium-160 β, γ
Rhodium-103m γ	Thallium-200 γ
Rhodium-105 β, γ	Thallium-201 γ
Rubidium-81 β, γ	Thallium-202 γ
Rubidium-86 β, γ	Thallium-204 β, γ
Rubidium-87 β	Thorium (natural) α, γ
Ruthenium-97 γ	Thulium-170 β, γ
Ruthenium-103 β, γ	Thulium-171 β, γ
Ruthenium-105 β, γ	Tin-113 γ
Ruthenium-106 β	Tin-125 β, γ
Samarium-151 β, γ	Tungsten-181 γ
Samarium-153 β, γ	Tungsten-185 β
Scandium-46 β, γ	Tungsten-187 β, γ
Scandium-47 β, γ	Uranium (natural or depleted) α, γ
Scandium-48 β, γ	Uranium-233 α, γ
Selenium-75 γ	Uranium-234 α, γ
Silicon-31 β, γ	Uranium-235 α, γ
Silver-105 γ	Vanadium 48 β, γ
Silver-110m β, γ	Xenon-131m γ
Silver-111 β, γ	Xenon-133 β, γ
Sodium-22 β, γ	Xenon-135 β, γ
Sodium-24 β, γ	Ytterbium-175 β, γ
Strontium-85 γ	Yttrium-90 β, γ
Strontium-89 β, γ	Yttrium-91 β, γ
Strontium-90 β	Yttrium-92 β, γ
Strontium-91 β, γ	Yttrium-93 β, γ
Strontium-92 β, γ	

[1] α = alpha radiation
β = beta radiation
γ = gamma radiation

2.2.2.2 Fissile materials. Fissile materials are materials which may undergo a fission reaction, and are usually found only at reactor sites, or as part of a nuclear weapon. Fissile materials may emit alpha, beta, gamma and neutron radiation. Examples: plutonium-238, plutonium-239, plutonium-241, uranium-233 and uranium-235.

Note: Uranium (and certain other radioactive metals) are combustible in solid and finely divided form, as well as chemically toxic. When radioactive materials burn, the products of combustion (other than heat) will be radioactive as well.

2.2.3 Corrosives.

2.2.3.1 Acids. Examples: chromic, formic, hydrochloric (muriatic greater than 15 percent), hydrofluoric, nitric (greater than 6 percent), perchloric and sulfuric (4 percent or more).

2.2.3.2 Bases (alkalis). Examples: hydroxides—ammonium (greater than 10 percent), calcium, potassium (greater than 1 percent), sodium (greater than 1 percent) and certain carbonates—potassium.

2.2.3.3 Other corrosives. Examples: bromine, chlorine, fluorine, iodine and ammonia.

Note: Corrosives which are oxidizers, e.g., nitric acid, chlorine, fluorine; or are compressed gases, e.g., ammonia, chlorine, fluorine; or are water-reactive, e.g., concentrated sulfuric acid, sodium hydroxide, are physical hazards in addition to being health hazards.

2.2.4 Carcinogens, irritants, sensitizers and other health hazard materials.

2.2.4.1 Carcinogens or suspect carcinogens. Substances which produce or are suspected of producing or inciting cancer (see definitions, Article 2). Examples: asbestos, benzene, beryllium, carbon tetrachloride, chloroform, diazomethane, P-dioxane, ethylene dichloride, polychlorinated biphenyls (PCBs) and vinyl chloride.

2.2.4.2 Other health hazard materials. Substances which cause damage to particular organs or systems (see definition, Article 2). Examples:

Hepatoxins (chemicals which produce liver damage): carbon tetrachloride and nitrosamines.

Nephrotoxins (chemicals which produce kidney damage): halogenated hydrocarbons and uranium.

Neurotoxins (chemicals which produce their primary toxic effects on the nervous system): mercury and carbon disulfide.

Blood or hematopoistic system toxins (chemicals which decrease hemoglobin function, deprive the body tissues of oxygen): carbon monoxide and cyanides.

Pulmonary damage agents (chemicals which irritate or damage the lungs): silica and asbestos.

Reproductive toxins (chemicals which affect the reproductive capabilities, including chromosomal damage [mutations] and effects on fetuses [tersiogenesis]): lead and DBCP.

2.2.4.3 Irritants. Substances other than corrosives which cause a reversible inflammatory effect on living tissue by chemical action at the site of contact. Examples: diphenylaminechloroarsine, xylyl bromide and chloracetophene.

2.2.4.4 Sensitizers. Substances which cause an allergic reaction in normal tissue after repeated exposure.

SECTION 3 — EVALUATION OF HAZARDS

3.1 Degree of Hazard. The degree of hazard present depends upon many variables which should be considered individually and in combination. Some of the variables are:

1. **Chemical properties of the material.** Chemical properties of the material determine self-reactions and reactions which may occur with other materials. Generally, materials within subdivisions of hazard categories will exhibit similar chemical properties. However, materials with similar chemical properties may present very different hazards. Each individual material should be researched to determine its hazardous properties and then considered in relation to other materials that it might contact and the surrounding environment.

2. **Physical properties of the material.** Physical properties, such as whether a material is a solid, liquid or gas at ordinary temperatures and pressures, considered along with chemical properties will determine requirements for containment of the material. Specific gravity (weight of a liquid compared to water) and vapor density (weight of a gas compared to air) are both physical properties which are important in evaluating the hazards of a material.

3. **Amount and concentration of the material.** The amount of material present and its concentration must be considered along with physical and chemical properties to determine the magnitude of the hazard. Hydrogen peroxide, for example, is used as an antiseptic and a hair bleach in low concentrations (approximately 8 percent in water solution). Over 8 percent, hydrogen peroxide, is classed as an oxidizer and is toxic. Above 90 percent, it is a Class 4 oxidizer "that can undergo an explosive reaction when catalyzed or exposed to heat, shock or friction," a definition which inci-

dentally also places hydrogen peroxide over 90 percent concentration in the unstable (reactive) category. Small amounts at high concentrations may present a greater hazard than large amounts at low concentrations.

4. **Actual use, activity or process involving the material.** The definition of handling, storage and use in closed systems refers to materials in packages or containers. Dispensing and use in open containers or systems describes situations where a material is exposed to ambient conditions or vapors are liberated to the atmosphere. Dispensing and use in open systems, then, are generally more hazardous situations than handling, storage or use in closed systems. The actual use or process may include heating, electric or other sparks, catalytic or reactive materials and many other factors which could affect the hazard and must therefore be thoroughly analyzed.

5. **Surrounding conditions.** Conditions such as other materials or processes in the area, type of construction of the structure, fire-protection features (e.g., fire walls, sprinkler systems, alarms, etc.), occupancy (use) of adjoining areas, normal temperatures, exposure to weather, etc., must be taken into account in evaluating the hazard.

3.2 Evaluation Questions. The following are sample evaluation questions:

1. What is the material? Correct identification is important; exact spelling is vital. Check labels, MSDS, ask responsible persons, etc.

2. What are the concentration and strength?

3. What is the physical form of the material? Liquids, gases and finely divided solids have differing requirements for spill and leak control, containment.

4. How much material is present? Consider in relation to permit amounts, exempt amounts (from Group H Occupancy requirements), amounts which require detached storage and overall magnitude of the hazard.

5. What other materials (including furniture, equipment and building components) are close enough to interact with the material?

6. What are the likely reactions?

7. What is the activity involving the material?

8. How does the activity impact the hazardous characteristics of the material? Consider vapors released or hazards otherwise exposed.

9. What must the material be protected from? Consider other materials, temperature, shock, pressure, etc.

10. What effects of the material must people and the environment be protected from?

11. How can protection be accomplished? Consider:

11.1 Proper containers and equipment.

11.2 Separation by distance or construction.

11.3 Enclosure in cabinets or rooms.

11.4 Spill control, drainage and containment.

11.5 Control systems—ventilation, special electrical, detection and alarm, extinguishment, explosion venting, limit controls, exhaust scrubbers and excess flow control.

11.6 Administrative (operational) controls—signs, ignition source control, security, personnel training, established procedures, storage plans and emergency plans.

Evaluation of the hazard is a strongly subjective process; therefore, the person charged with this responsibility must gather as much relevant data as possible so that the decision will be objective and within the limits prescribed in laws, policies and standards.

It may be necessary to cause the responsible persons in charge to have tests made by qualified persons or testing laboratories to support contentions that a particular material or process is or is not hazardous. See Section 103.1.2.

SECTION 4 — REFERENCE PUBLICATIONS

4.1 General. See Appendix V-A.

4.2 Specific.

4.2.1 CHLORINE INSTITUTE
2001 L Street, N.W., Washington, DC 20036

Chlorine Institute Publications

Chlorine Manual, 5th edition, 1986
Maintenance Manual for Chlorine Institute Standard Excess
Flow Valves, Pamphlet 42
Piping Systems for Dry Chlorine, Pamphlet 6
Emergency Control Planning Checklist for Chlorine Facilities, Pamphlet 64
Atmospheric Monitoring for Chlorine, Pamphlet 73
Calculating the Area Affected by Chlorine Releases, Pamphlet 74
Instruction Booklet, Chlorine Institute Emergency Kit "B" for Chlorine Ton
Containers Instruction Booklet, Chlorine Institute Emergency Kit "C" for Chlorine Tank Cars and Trucks
Chlorine Institute Drawing 188, Chlorine Cylinder Salvage Vessel

4.2.2 COMPRESSED GAS ASSOCIATION, INC. (CGA)
1235 Jefferson Davis Highway
Arlington, VA 22202

CGA Pamphlets

G-1 Acetylene
G-2 Anhydrous Ammonia
G-3 Sulphur Dioxide
G-4 Oxygen
G-5 Hydrogen
P-1 Safe Handling of Compressed Gases
P-2 Characteristics and Safe Handling of Medical Gases

4.2.3 FACTORY MUTUAL ENGINEERING AND RESEARCH
1151 Boston-Providence Turnpike
Norwood, MA 02062

Data Sheets

	ELECTRICAL
5-1	Electrical Equipment in Hazardous Locations
5-8	Static Electricity
	HAZARDS
7-7	Semiconductor Plants
7-13S/12-61S	Ammonia Refrigeration Systems
7-14	Protection for Flammable Liquid/Flammable Gas-processing Equipment
7-19N	Fire Hazard Properties of Flammable Liquids, Gases, Solids
7-19S	Fire Hazard Properties of Flammable Liquids, Gases, Solids
7-22	Hydrazine and its Derivatives

7-23N	Hazardous Chemicals Data
7-28	Explosive Materials
7-28N	Explosive Materials
7-29	Flammable Liquids in Drums and Small Containers
7-34	Electrolytic Chlorine Process
7-43	Loss Prevention in Chemical Plants
7-44	Spacing of Facilities in Outdoor Chemical Plants
7-45	Chemical Process Control and Control Rooms
7-45S	Process Control Houses Subject to External Explosion
7-46/17-11	Chemical Reactors and Reactions
7-47	Physical Operations in Chemical Plants
7-49/12-65	Emergency Venting of Vessels
7-50	Compressed Gases in Cylinders
7-51/17-12	Acetylene
7-52/17-13	Oxygen
7-53	Liquefied Natural Gas (LNG)
7-54	Natural Gas and Gas Piping
7-55/12-28	Liquefied Petroleum Gas
7-56	MAPP Industrial Gas
7-58	Chlorine Dioxide
7-60/16-1	Fundamentals of Atomic Energy
7-61/16-2	Radioactive Materials
7-70	Fumigation
7-72/12-10	Catalytic Steam/Hydrocarbon Reformers
7-75	Grain Storage and Milling
7-76	Combustible Dusts
7-80	Organic Peroxides
7-81	Organic Peroxides—Hazard Classification
7-82N	Storage of Liquid/Solid Oxidizing Materials
7-83	Drainage for Flammable Liquids
7-84/12-48	Hydrogen Peroxide
7-86	Cellulose Nitrate
7-88	Storage Tanks for Flammable Liquids
7-89	Ammonium Nitrate
7-91	Hydrogen
7-92	Ethylene Oxide
7-94/12-22	Ammonia Synthesis Units
	STORAGE
8-0S	Commodity Classification
8-9	Storage of Plastics and Elastomers
8-10	Coal and Charcoal Storage
	BOILERS AND PRESSURE VESSELS
12-22/7-94	Ammonia Synthesis Units
12-23	Aqueous Nitrogen in Fertilizer Plants
12-27	Liquid Chlorine Storage Tanks and Systems
12-28/7-55	Liquefied Petroleum Gas
12-48/7-84	Hydrogen Peroxide

16-6 Reactor Fuel Elements

4.2.4 NATIONAL FIRE PROTECTION ASSOCIATION

One Batterymarch Park
Quincy, MA 02269

Fire Protection Handbook
Industrial Fire Hazards Handbook
National Fire Codes, specifically the following codes and standards:

35	Manufacture of Organic Coatings
40	Cellulose Nitrate Motion Picture Film
43A	Storage of Liquid and Solid Oxidizing Materials
43B	Storage of Organic Peroxide Formulations
43C	Storage of Gaseous Oxidizing Materials
45	Laboratories Using Chemicals
48	Storage, Handling and Processing Magnesium
49	Hazardous Chemicals Data
56A	Use of Inhalation Anesthetics
56C	Laboratories in Health-Related Institutions
58	Storage and Handling of Liquefied Petroleum Gases
61B	Prevention of Fires and Explosions in Grain Elevators and Facilities Handling Bulk Raw Agricultural Commodities
61C	Prevention of Fire and Dust Explosions in Feed Mills
321	Basic Classification of Flammable and Combustible Liquids
325M	Fire Hazard Properties of Flammable Liquids, Gases and Volatile Solids
481	Production, Processing, Handling and Storage of Titanium
482	Production, Processing, Handling and Storage of Zirconium
490	Storage of Ammonium Nitrate
491M	Manual of Hazardous Chemical Reactions
495	Manufacture, Transportation, Storage and Use of Explosive Materials
651	Manufacture of Aluminum and Magnesium Powder
654	Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical and Plastics Industries
655	Prevention of Sulfur Fires and Explosions
704	Recommended System for the Identification of the Fire Hazards of Materials
801	Recommended Fire Protection Practice for Facilities Handling Radioactive Materials

4.2.5 NATIONAL TECHNICAL INFORMATION SERVICE

Springfield, VA 22161

A Method for Determining the Compatibility of Hazardous Wastes, EPA-600/2-80-076

4.2.6 UNITED STATES GOVERNMENT AGENCIES

U.S. Government Printing Office
Washington, DC 20402
Code of Federal Regulations, Title 29
Code of Federal Regulations, Title 49

APPENDIX VI-B
EMERGENCY RELIEF VENTING FOR FIRE EXPOSURE FOR ABOVEGROUND TANKS
(See U.F.C. Section 7902.2.6.3.1)

The requirements for emergency venting given in Table 7902.2-H and the modification factors in Section 7902.2.6.3.4 are derived from a consideration of:

1. Probable maximum rate of heat transfer per unit area,
2. Size of tank and the percentage of total area likely to be exposed,
3. Time required to bring tank contents to boil,
4. Time required to heat unwet portions of the tank shell or roof to a temperature where the metal will lose strength, and
5. Effect of drainage, insulation and the application of water in reducing fire exposure and heat transfer.

Table 7902.2-H is based on a composite curve which is considered to be composed of three straight lines when plotted on log-log paper. The curve may be defined in the following manner:

The first straight line is drawn on log-log paper between the point 400,000 Btu/h, at 20 square feet (117 200 W at 18.6 m^2) exposed surface area and the point 4,000,000 Btu/h at 200 square feet (1 172 000 W at 186 m^2) exposed surface area. The equation for this portion of the curve is $Q = 20{,}000A$. (For **SI:** $Q = 63{,}100A$).

The second straight line is drawn on log-log graph paper between the points 4,000,000 Btu/h at 200 square feet (1 172 000 W at 186 m^2) exposed surface area and 9,950,000 Btu/h at 1,000 square feet (2 915 350 W at 93 m^2) exposed surface area. The equation for this portion of the curve is $Q = 199{,}300A^{0.566}$ (For **SI:** $Q = 224{,}195A^{0.566}$).

The third straight line is plotted on log-log graph paper between the points 9,950,000 Btu/h at 1,000 square feet (2 915 350 W at 93 m^2) exposed surface area and 14,090,000 Btu/h, at 2,800 square feet (4 128 370 W at 260.4 m^2) exposed surface area. The equation for this portion of the curve is $Q = 963{,}400A^{0.338}$ (For **SI:** $Q = 630{,}425A^{0.338}$).

$Q = 20{,}000A$		$Q = 199{,}300A^{0.566}$		$Q = 963{,}400A^{0.338}$	
A	*Q*	*A*	*Q*	*A*	*Q*
× 0.093 for m^2	× 0.293 for W	× 0.093 for m^2	× 0.293 for W	× 0.093 for m^2	× 0.293 for W
20	400,000	200	4,000,000	1,000	10,000,000
30	600,000	250	4,539,000	1,200	10,593,000
40	800,000	300	5,032,000	1,400	11,122,000
50	1,000,000	350	5,491,000	1,600	11,601,000
60	1,200,000	400	5,922,000	1,800	12,040,000
70	1,400,000	500	6,719,000	2,000	12,449,000
80	1,600,000	600	7,450,000	2,400	13,188,000
90	1,800,000	700	8,129,000	2,800	14,000,000
100	2,000,000	800	8,768,000	and over	
120	2,400,000	900	9,372,000		
140	2,800,000	1,000	10,000,000		
160	3,200,000				
180	3,600,000				
200	4,000,000				

For areas exceeding 2,800 square feet (260.4 m^2), it has been concluded that complete fire involvement is unlikely, and loss of metal strength from overheating will cause failure in the vapor space before development of maximum possible vapor evolution rate. Therefore, additional venting capacity beyond the vapor equivalent of 14,090,000 Btu/h (4 128 370 W) will not be effective or required.

For tanks and storage vessels designed for pressures over 1 psig (6.89 kPa), additional venting for exposed surfaces beyond 2,800 square feet (260.4 m^2) is believed to be desirable because, under these storage conditions, liquids are stored close to their boiling points. Therefore, the time to bring the container contents to boiling conditions may not be significant. For these situations, a heat input value should be determined on the basis of

$$Q = 21{,}000\,A^{0.82}$$

For **SI:**

$$Q = 43{,}198A^{0.82}$$

The flow capacities are based on the assumption that the stored liquid will have the characteristics of hexane, and the vapor liberated has been transposed to equivalent free at 60°F. (15.6°C.) and 14.7 psia (101.3 kPa) by using appropriate factors in:

$$CFH = \frac{70.5Q}{L\sqrt{M}}$$

For **SI:**

$$CMH = \frac{15.84Q}{L\sqrt{M}}$$

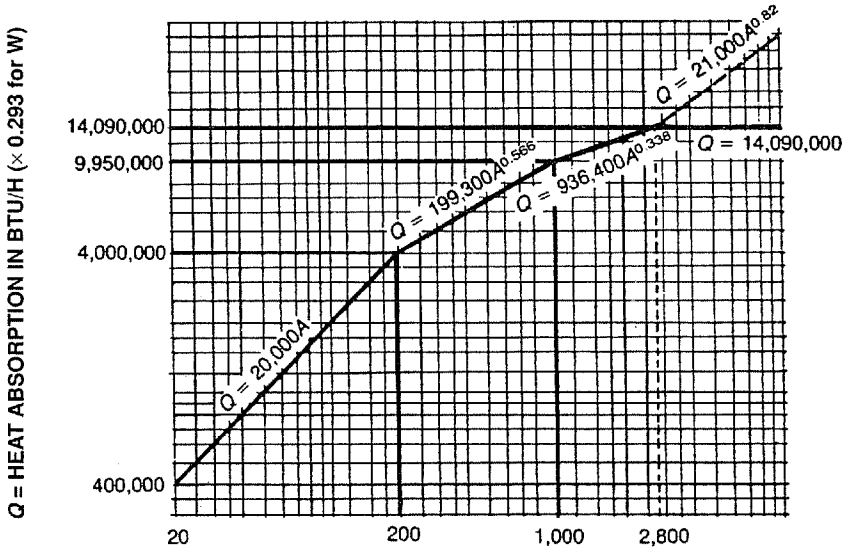
WHERE:

70.5 = the factor for converting pounds of gas to cubic feet (15.84 = the conversion factor to m^3) of air.

Q = total heat input per hour expressed in Btu (for **SI:** Btu/h × 0.293 = W).

L = latent heat of vaporization.

M = molecular weight.



Consideration has not been given to possible expansion from the heating of the vapor above the boiling point of the liquid, its specific heat, or the difference in density between the discharge temperature and 60°F. (15.6°C.), since some of these changes are compensating.

Since tank vent valves are ordinarily rated in *CFH* standard air, the figures derived from Table 7902.2-H may be used with the appropriate tank pressure as a basis for valve selection.

The table below gives for a variety of chemicals the constants which can be used to compute the vapor generated and equivalent free air for liquids other than hexane, where greater exactness is desired. Inspections of the table will show that the use of hexane in deriving Table 7902.2-H provides results which are within an acceptable degree of accuracy for the listed liquids.

CHEMICAL	$L\sqrt{M}$ × 2.326 for kJ/kg	MOLECULAR WEIGHT	HEAT OF VAPORIZATION BTU PER LB. AT BOILING POINT × 2.326 for kJ/kg
Acetaldehyde	1,673	44.05	252
Acetic acid	1,350	60.05	174
Acetic anhydride	1,792	102.09	177
Acetone	1,708	58.08	224
Acetonitrile	2,000	41.05	312
Acrylonitrile	1,930	53.05	265
n-Amyl alcohol	2,025	88.15	216
Aniline	1,795	93.12	186
Benzene	1,493	78.11	169
n-Butyl acetate	1,432	116.16	133
n-Butyl alcohol	2,185	74.12	254
Carbon disulfide	1,310	76.13	150
Chlorobenzene	1,422	112.56	134
Cyclohexane	1,414	84.16	154
Cyclohexanol	1,953	100.16	195
Cyclohexanone	1,625	98.14	164
o-Dichlorobenzene	1,455	147.01	120
cis-Dichloroethylene	1,350	96.95	137
Diethyl amine	1,403	73.14	164
Dimethyl acetamide	1,997	87.12	214
Dimethyl amine	1,676	45.08	250
Dimethyl formamide	2,120	73.09	248
Dioxane (diethylene ether)	1,665	88.10	177
Ethyl acetate	1,477	88.10	157
Ethyl alcohol	2,500	46.07	368
Ethyl chloride	1,340	64.52	167
Ethylene dichloride	1,363	98.97	137
Ethyl ether	1,310	74.12	152
Furan	1,362	68.07	165
Furfural	1,962	96.08	200
Gasoline	1,370-1,470	96.00	140-150
n-Heptane	1,383	100.20	138
n-Hexane	1,337	86.17	144
Hydrogen cyanide	2,290	27.03	430
Isoamyl alcohol	1,990	88.15	212
Isobutyl alcohol	2,135	74.12	248
Isopropyl alcohol	2,225	60.09	287
Methyl alcohol	2,680	32.04	474
Methyl ethyl ketone	1,623	72.10	191
Methyl methacrylate	1,432	100.14	143
n-Octane	1,412	114.22	132
n-Pentane	1,300	72.15	153
N-Propyl acetate	1,468	102.13	145
n-Propyl alcohol	2,295	60.09	296
Tetrahydro furan	1,428	72.10	168
Toluene	1,500	92.13	156
Vinyl acetate	1,532	86.09	165
o-Xylene	1,538	106.16	149

Note: For data on other chemicals, see chemistry handbook.

APPROXIMATE WETTED AREAS FOR HORIZONTAL TANKS WITH FLAT HEADS (Sq. Ft.)
(Wetted Area Equals 75 Percent Total Area)

TANK LENGTH (Feet)	TANK DIAMETER (Feet) × 0.093 for m^2									
	3	4	5	6	7	8	9	10	11	12
× 305 for mm	APPROXIMATE WETTED AREA (Sq. Ft.) — × 0.093 for m^2									
3	32									
4	39	55								
5	46	65	88							
6	53	74	100	128						
7	60	84	112	142	173					
8	67	93	124	156	190	226				
9	74	102	136	170	206	245	286			
10	81	112	147	184	223	264	308	353		
11	88	121	159	198	239	283	329	377	428	
12	95	131	171	213	256	301	350	400	454	509
13	102	140	183	227	272	320	371	424	480	537
14	109	150	194	241	289	339	393	447	506	565
15	116	159	206	255	305	358	414	471	532	594
16	123	169	218	269	322	377	435	495	558	622
17	130	178	230	283	338	395	456	518	584	650
18	137	188	242	298	355	414	477	542	610	678
19		197	253	312	371	433	499	565	636	707
20		206	265	326	388	452	520	589	662	735
21		216	277	340	404	471	541	612	688	763
22		225	289	354	421	490	562	636	714	792
23		235	300	368	437	508	584	659	740	820
24		244	312	383	454	527	605	683	765	848
25			324	397	470	546	626	706	791	876
26			336	411	487	565	647	730	817	905
27			347	425	503	584	668	754	843	933
28			359	440	520	603	690	777	869	961
29			371	454	536	621	711	801	895	989
30			383	468	553	640	732	824	921	1,018
31			395	482	569	659	753	848	947	1,046
32				496	586	678	775	871	973	1,074
33				510	602	697	796	895	999	1,103
34				524	619	715	817	918	1,025	1,131
35				539	635	734	838	942	1,051	1,159
36				553	652	753	860	966	1,077	1,187
37				567	668	772	881	989	1,103	1,216
38					685	791	902	1,013	1,129	1,244
39					701	810	923	1,036	1,155	1,272
40					718	828	944	1,060	1,181	1,301
41					734	847	966	1,083	1,207	1,329
42					751	866	987	1,107	1,233	1,357
43					767	885	1,008	1,130	1,259	1,385
44						904	1,029	1,154	1,284	1,414
45						923	1,051	1,178	1,310	1,442
46						941	1,072	1,201	1,336	1,470
47						960	1,093	1,225	1,362	1,498
48						979	1,114	1,248	1,388	1,527
49						998	1,135	1,272	1,414	1,555
50							1,157	1,295	1,440	1,583

(Continued)

APPROXIMATE WETTED AREAS FOR HORIZONTAL TANKS WITH FLAT HEADS (Sq. Ft.) (Wetted Area Equals 75 Percent Total Area)—(Continued)

TANK LENGTH (Feet)	TANK DIAMETER (Feet) × 0.093 for m^2									
	3	4	5	6	7	8	9	10	11	12
× 305 for mm	APPROXIMATE WETTED AREA (Sq. Ft.) — × 0.093 for m^2									
51							1,178	1,319	1,466	1,612
52							1,199	1,342	1,492	1,640
53							1,220	1,366	1,518	1,668
54							1,246	1,389	1,544	1,696
55							1,263	1,413	1,570	1,725
56								1,437	1,593	1,753
57								1,460	1,622	1,781
58								1,484	1,648	1,809
59								1,507	1,674	1,839
60								1,531	1,700	1,866
61									1,726	1,894
62									1,752	1,923
63									1,778	1,951
64									1,803	1,979
65									1,829	2,007
66									1,855	2,036
67										2,064
68										2,092
69										2,120
70										2,149
71										2,177
72										2,205

APPENDIX VI-C
MODEL CITATION PROGRAM
(See U.F.C. Section 103.4.1.1)

SECTION 1 — GENERAL

1.1 Scope. Many agencies charged with the responsibility of enforcing the *Uniform Fire Code* have determined that the issuance of citations is necessary for gaining compliance in some circumstances. Therefore, the following outline and examples have been drawn up to assist jurisdictions in the formulation of a citation program.

1.2 Initiating Correspondence. (See Figure A-VI-C-1.) The first step in establishing a citation program is to write a letter to the appropriate legal officer of the jurisdiction stating the need, legal basis and intent to establish a program of this type. This letter should prompt a reply from the legal officer advising the enforcing agency of the action necessary to implement the program.

1.3 Citation Ordinance. (See Figure A-VI-C-2.) In a few jurisdictions, the legal officer has advised the enforcing agency that a municipal ordinance must be passed to allow for the issuance of citations. In such cases, a model ordinance is provided as an example.

1.4 Citation Program. In the majority of cases, the legal officer has required the enforcing agency to submit the complete program to the legal officer's office for review and approval.

1.5 Components. The necessary components of a complete citation program include the following:

1. **Operating procedure and policy.** See Section 2.
2. **Sample forms.** See Figures A-VI-C-3 and A-VI-C-4.
3. **Bail schedule.** See Figure A-VI-C-5.

SECTION 2 — OPERATING PROCEDURE CITATION PROGRAM

2.1 Department Policy. The fire prevention bureau shall be responsible for the enforcement of laws and regulations for the safeguarding, to a reasonable degree, of life and property from the hazards of fire and explosion and from conditions hazardous to life and property in the use or occupancy of buildings or premises and their contents.

It is the intent of the department to achieve compliance by traditional means of inspection, notification, granting of reasonable time to comply and reinspection. The citation shall be used only after all reasonable means to gain compliance have failed or, with proper justification, at the discretion of the fire chief.

By department policy, only those members of the fire department specifically designated by the fire chief may issue citations.

The adoption of the *Uniform Fire Code* is contained in the _____ Ordinance, Division _____, Article _____, Section _____, and establishes the procedures for handling violations of said code and applicable city ordinances.

2.2 Purpose.

1. To gain compliance with the state and local codes, ordinances and regulations, when all reasonable efforts have been unsuccessful.

2. A course of action to be taken when a condition exists that causes an immediate or extreme threat to life or property from fire and explosion.

2.3 Authority.

1. _____ Ordinance, Section _____, grants authority to use citations for violations of "any ordinance of the _____."

2. *Uniform Fire Code* Section 103.4.1 states that the "chief is authorized to issue such orders as may be necessary for the enforcement of the fire prevention laws and ordinances."

3. Pursuant to state law (*section*), citations for misdemeanors, any local or state code applicable to fire and life safety may be cited.

2.4 Penalty. _____ Ordinances: Not more than $500.00 fine; imprisonment not more than six months; or both. A misdemeanor. Each day is a separate offense.

2.5 Materials Helpful in Writing a Citation.

1. *Uniform Fire Code.*
2. List of court holidays.
3. List of common codes and sections violated.

2.6 Officer's Demeanor. The manner in which the officer conducts a relationship with the violator is of paramount importance. It has an effect on the violator's attitude throughout the duration of the citing period and a strong bearing on public opinion concerning this department. A courteous and businesslike demeanor must be displayed, and officers should never enter into an argument. Remember, most violators blame the officer, not themselves. An alert, confident manner and a reasonable attitude may affect the violator, creating a more favorable atmosphere for the issuance of the citation.

2.7 Salutation or Introduction. It is very important for officers to adequately introduce themselves, establish their identity and the purpose of their presence to the person in charge of the premises.

2.8 Reason to Issue Citation. Citations will not normally be issued on the first visit. When routine violations of the applicable fire code are encountered, citations will generally be issued following the third visit or second reinspection.

If code compliance has not been obtained on the second visit or the first reinspection, the inspector should mention the possibility of a citation and the need to issue one. In all cases, adequate time shall be provided between inspections. This will vary with the seriousness of the violation and the complexity of the work to be done.

In those instances where the time limit for compliance has expired but the violator is making a reasonable effort to comply and no immediate fire or life hazard exists, the decision not to issue a citation can be made by the inspector.

2.9 Issuance of Citation. The citation (Notice to Appear) must be signed by the person responsible for the premises. This may be the owner, lessee or manager, but the citation must be issued to the responsible person.

2.10 Making the Arrest (Issue Citation). A citation for a misdemeanor offense is an arrest. The violator's signature is a promise to appear as instructed and the violator is released upon the violator's signing. Refusal to sign would require physical arrest. (See Refusal to Sign Citation, below.)

After the officer has made a decision to arrest, the officer should make the arrest by notifying the violator that the violator is arrested, the cause for the arrest and the authority to make the arrest (enabling state or local law).

2.11 Refusal to Sign Citation. The citation is a release stating that the defendant will appear in court or post bail in lieu of physical arrest. In extreme cases, one may encounter an individual who will refuse to sign the citation. After all reasonable efforts have been pursued and a signature is not obtainable, the fire prevention officer will summon a police officer or sheriff, explain the situation to such officer, and request a physical arrest (per state law).

2.12 Accountability. Each citation is numbered and accounted for. A list of all citations will be maintained in the headquarters fire prevention office according to the area office of issuance.

If a mistake is made while a citation is being written, it shall be voided and the office copy given to the fire department citation clerk for filing.

2.13 Procedures.

2.13.1 Routine violations. A written notice shall be issued whenever a code violation is encountered. The notice shall be issued to the persons responsible for the premises or their authorized representative.

The time established for reinspection may vary depending on circumstances, but generally, within 15-30 days, one of the following should occur:

1. Compliance with all requirements.
2. Partial compliance with a designated reinspection date.
3. A satisfactory proposal for compliance with an agreed-upon time for completion.
4. A final notice issued with a warning of pending legal action.

The amount of time permitted for compliance shall be dependent upon the hazard and danger created by the violation. Excessive time for compliance may weaken the fire department's position in the event legal action is required.

When deemed necessary by the enforcing agency, a courtesy pre-citation letter may be issued to warn of a pending citation (see Figure A-VI-C-3). Such letters may be sent by certified mail if the violator is not available.

2.13.2 Imminent hazards. Order hazard abated, and

1. If the hazard is abated as requested, follow with a pre-citation letter advising of a citation procedure for future or similar violations. Citation may be issued if it is a repeat violation.
2. If the hazard is not abated, inspector takes action necessary to abate the hazard and citation is issued immediately.

2.13.3 Transient violations (violations not occurring at a permanent place of business).

1. Violations involving persons who are transient are handled by a citation or by arrest if the violation is committed in the inspector's presence.
2. When a physical arrest is necessary, a local law enforcement officer (sheriff or police) shall be requested to take the violator into custody and to ensure proper procedures are followed.

2.13.4 Citation procedures. The citation procedures are:

1. Adults being cited (19 years or older) must be able to be reached in the event a bench warrant is issued.
2. Adults cited shall be cited in the local judicial court.
3. Juveniles shall be cited in the juvenile court.
4. Citation books shall be issued by citation number to the assigned inspector. The inspector is accountable for each citation by number.
5. The citation shall be filled out completely and correctly and all pertinent information entered.
6. When the citation is written and completed, copies will be distributed as follows:
   - 6.1 Cited person's copy—give to violator.
   - 6.2 Court copy (original)—attach copies of inspection notices and a summary sheet and deliver to the district attorney or the city attorney.
   - 6.3 File copy (fire department's copy)—forward to the fire chief's office; a duplicate will be returned to the field office for the occupancy file.
7. The fire department shall keep a citation log entering each citation and final disposition.

2.14 Restrictions. Restrictions are as follows:

1. Citations shall be issued only after all responsible means to gain voluntary compliance have been exhausted as supported by documentation.

   EXCEPTION: Citations issued for violations which present imminent life hazards such as trespassing in a closed area, smoking in closed or restricted areas, failure to obey lawful orders of a fire inspector, faulty equipment or procedures, and violations of a similar nature will not require prior justification.

2. Citations shall be issued only by qualified officers as designated by the fire chief.

2.15 Use of Citation. Uses of citations are as follows:

1. Citations shall be used only where a violation of a specific section of the appropriate code or ordinance has occurred.

2. Documentation establishing prior efforts to gain compliance shall be in evidence.

   EXCEPTION: Citations issued for violations which present imminent life hazards such as trespassing in a closed area, smoking in closed or restricted areas, failure to obey lawful orders of a fire inspector, faulty equipment or procedures, and violations of similar nature will not require prior justification.

3. Issuing person shall be qualified as required by state law.

4. The offense for which the citation is issued shall be a misdemeanor and not a felony.

5. The date to appear as shown on the citation shall be as set forth by the local municipal court from the date of issuance.

6. Whenever the issuing person questions the uncertainty of releasing the violator upon signing the citation on his promise to appear, the assistance of a sheriff or police officer should be requested.

7. All violations shall be indicated on the citation with reference to the appropriate code or regulations, including the specific section number.

8. All violations as shown on the citation shall be explained to the violator prior to his signing.

FIGURE A-VI-C-1—MODEL CITATION INITIATION CORRESPONDENCE

Address correspondence to the appropriate legal officer in the municipality or district (i.e., city attorney or district attorney).

Dear _____:

The _____ Fire Department is proposing to initiate a citation program. This department has determined that there is a need for this type of action and, in some applications, would appropriately serve the legal process. To date, where we have been unable to gain compliance through routine inspection, notifications, reinspections, granting of time, explanations and extensions, we have had to file formal complaints. This process has consistently resulted in extended delays, continuing violations and added work for legal departments. Also, in special situations where immediate action must be taken, citations could be issued to individuals violating the law.

This department is currently required by law to enforce laws pertaining to fire and life safety. Section 103.2.1.2 of the *Uniform Fire Code* reads as follows:

> **103.2.1.2. Authority of Fire Personnel to Exercise Powers of Police Officers.** The chief and members of the fire prevention bureau shall have the powers of a police officer in performing their duties under this code. . .

This provision of the *Uniform Fire Code* makes it clear that firefighters have the powers of police officers to enforce the *Uniform Fire Code*.

It would be our intent to continue to follow the normal notice procedure presently being used and to issue citations only in those situations where it is deemed applicable. Citations would not be issued at the time of first contact except in unusual circumstances.

The proposed program would eliminate the clerical and legal work of many cases which currently must go through the complaint process.

Please review the program as submitted and contact _____ for your response to the proposed program.

FIGURE A-VI-C-2—MODEL CITATION ORDINANCE

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY OF _____ ADDING SECTION _____ TO THE _____ MUNICIPAL CODE, PROVIDING FOR CITY COUNCIL DESIGNATION OF EMPLOYEES AND OFFICERS AUTHORIZED TO ISSUE ARREST CITATIONS.

THE CITY COUNCIL OF THE CITY OF _____ DOES ORDAIN AS FOLLOWS:

SECTION 1. Chapter _____ of the _____ Municipal Code is hereby amended by the addition thereto of a new section, to be numbered _____ and reading as follows:

_____ **Issuance of Citations by Designated Officers and Employees.** Officers and employees of the city who have the discretionary duty to enforce a statute or ordinance may, pursuant to Section _____ of (*state law*) and subject to the provisions hereof, arrest a person without a warrant whenever any such officer or employee has reasonable cause to believe that the person to be arrested has committed a misdemeanor in the officer's or employee's presence which he or she has the discretionary duty to enforce, and to issue a notice to appear and to release such person on the person's written promise to appear in court, pursuant to Section _____ of the (*state law*). Officers and employees shall not be allowed by their superior to exercise the arrest and citation authority herein conferred, unless such officer or employee is within a classification of city officers and employees designated by resolution of the city council to exercise such arrest and citation authority as to specified misdemeanor violations. The city manager shall establish and cause to be administered a special enforcement training program designed to instruct each officer or employee who will exercise such arrest and citation authority, regarding the provisions of the statutes and ordinances to be enforced, the evidentiary prerequisites to proper prosecution for violations thereof, the appropriate procedures for making arrests or otherwise prudently exercising such arrest and citation authority, and the legal and practical ramifications and limitations attendant thereto. Any such officers or employees shall be appropriately instructed to deposit executed citations or notices within the (*appropriate agency*) for filing with the court after review for legal sufficiency.

SECTION 2. Effective Date. This ordinance shall be in full force and effect thirty (30) days after passage.

SECTION 3. Publication. The city clerk is hereby ordered and directed to certify to the passage of this ordinance and to cause same to be published once in _____ , a daily newspaper of general circulation, printed, published and circulated in the City of _____ , _____ .

ADOPTED this _____ day of _____ , 19_____.

FIGURE A-VI-C-3—PRE-CITATION LETTER

_____Date

_____Certified Mail—Return receipt requested

_____Delivered in person

Dear _____:

The _____ Fire Department conducted a firesafety inspection at the following:

Name_____

Address_____

on (date)_____

At that time a notice was issued indicating the corrections required to provide compliance with the applicable codes, regulations and ordinances. Compliance is required by *Uniform Fire Code* Section 103.4.3.

Reinspections were made on (*date of reinspection*) in an attempt to gain compliance with the above-mentioned Fire Code regulations. We were unsuccessful in obtaining compliance.

This letter is to inform you that a fire inspector for the _____ Fire Department will make a reinspection at the above-mentioned establishment on _____ to determine if the necessary corrections have been made. If the necessary corrections have not been completed by _____, a citation will be issued which will require an appearance by you in court.

This letter is written as a courtesy to you in order to avoid future litigation.

Name_____

Title_____

FIGURE A-VI-C-4

FORMS APPROVED BY JUDICIAL COUNCIL
[Form for Uniform Misdemeanor Citation]
FACE SIDE OF THE FORM

CITY OF

NOTICE TO APPEAR NO. 0001

DATE 19	TIME M	DAY OF WEEK

NAME (FIRST, MIDDLE, LAST)

RESIDENCE ADDRESS CITY

BUSINESS ADDRESS CITY

DRIVER'S LICENSE NO.	STATE	CLASS	BIRTHDATE

SEX M F	HAIR	EYES	HEIGHT	WEIGHT	OTHER DES.

EMPLOYED BY OCCUPATION

BIRTHPLACE	SOCIAL SECURITY NO.

VEHICLE LICENSE NO. STATE

YEAR OF VEHICLE	MAKE	MODEL	BODY STYLE	COLOR

OFFENSE(S) CODE SECTION DESCRIPTION

EVIDENCE SEIZED	BOOKING REQUIRED ☐

LOCATION OF OFFENSE(S) COMMITTED

☐ OFFENSE(S) NOT COMMITTED IN MY PRESENCE. CERTIFIED ON INFORMATION AND BELIEF, I CERTIFY UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT. EXECUTED ON THE DATE SHOWN ABOVE AT

ISSUING OFFICER _____ CALIF. (PLACE) SERIAL NO.

NAME OF ARRESTING OFFICER—IF DIFFERENT FROM ABOVE	SERIAL NO.	VACATION DATED TO

WITHOUT ADMITTING GUILT, I PROMISE TO APPEAR AT THE TIME AND PLACE CHECKED BELOW.

X SIGNATURE

BEFORE A JUDGE OR A CLERK OF THE MUNICIPAL OR JUSTICE COURT
(ADDRESS)

DATE 19	TIME M	WITHIN 5 DAYS

FORM APPROVED BY THE JUDICIAL COUNCIL OF

SEE REVERSE SIDE

Grey areas indicate spaces subject to local or agency requirements.

(Continued)

FIGURE A-VI-C-4—(Continued)

RULES OF COURT

[Form for Uniform Misdemeanor Citation]

REVERSE SIDE OF VIOLATOR'S COPY

IMPORTANT—READ CAREFULLY

WARNING:

WILLFUL FAILURE TO APPEAR AS PROMISED IS A SEPARATE VIOLATION FOR WHICH YOU MAY BE ARRESTED AND PUNISHED BY 6 MONTHS IN JAIL AND/OR $500.00 FINE, REGARDLESS OF THE DISPOSITION OF THE ORIGINAL CHARGE.

OFFICE OF COURT CLERK—HOURS

(THIS SPACE FOR REMITTANCE CONTROL MACHINE ENTRIES

(Continued)

FIGURE A-VI-C-4—(Continued)

FORMS APPROVED BY JUDICIAL COUNCIL
[Form for Uniform Misdemeanor Citation]
REVERSE SIDE OF COURT COPY

BAIL:
THE DEFENDANT IS TO BE ADMITTED TO BAIL IN THE SUM OF _____ DOLLARS

_____
JUDGE

BOOKING: (TO BE ORDERED ONLY ON THE REQUEST OF ARRESTING OFFICER) THE DEFENDANT IS ORDERED TO REPORT TO THE [NAME OF THE ARRESTING AGENCY] AT [ADDRESS.] AND TO BE BOOKED AS PROVIDED BY LAW.

_____
JUDGE

(THIS SPACE FOR REMITTANCE CONTROL MACHINE ENTRIES)

FIGURE A-VI-C-5

Bail Schedule

INSERT LOCAL ORDINANCES WHERE APPLICABLE

SECTION	OFFENSE	BAIL
103.4.3.1	Noncompliance with Orders or Notices	$500.00
103.4.3.2	Noncompliance with Condemnation Tag	500.00
103.4.3.3	Removal and Destruction of Tags and Signs	500.00
103.4.4	Unlawful Continuance of Hazards	500.00

All other violations are $75.00 plus court costs. Fines are forfeitable on first offense and mandatory appearance is required on second offense.

APPENDIX VI-D
REFERENCE TABLES FROM THE *UNIFORM BUILDING CODE*

TABLE 3-A—DESCRIPTION OF OCCUPANCIES BY GROUP AND DIVISION

GROUP AND DIVISION	SECTION	DESCRIPTION OF OCCUPANCY[1]
A-1	303.1.1	A building or portion of a building having an assembly room with an occupant load of 1,000 or more and a legitimate stage.
A-2		A building or portion of a building having an assembly room with an occupant load of less than 1,000 and a legitimate stage.
A-2.1		A building or portion of a building having an assembly room with an occupant load of 300 or more without a legitimate stage, including such buildings used for educational purposes and not classed as a Group E or Group B Occupancy.
A-3		Any building or portion of a building having an assembly room with an occupant load of less than 300 without a legitimate stage, including such buildings used for educational purposes and not classed as a Group E or Group B Occupancy.
A-4		Stadiums, reviewing stands and amusement park structures not included within other Group A Occupancies.
B	304.1	A building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts, and eating and drinking establishments with an occupant load of less than 50.
E-1	305.1	Any building used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or four hours in any one day.
E-2		Any building used for educational purposes through the 12th grade by less than 50 persons for more than 12 hours per week or four hours in any one day.
E-3		Any building or portion thereof used for day-care purposes for more than six persons.
F-1	306.1	Moderate-hazard factory and industrial occupancies including factory and industrial uses not classified as Group F, Division 2 Occupancies.
F-2		Low-hazard factory and industrial occupancies including facilities producing noncombustible or nonexplosive materials which during finishing, packing or processing do not involve a significant fire hazard.
H–1	307.1	Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a high explosion hazard as listed in Section 307.1.1.
H-2		Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a moderate explosion hazard or a hazard from accelerated burning as listed in Section 307.1.1.
H-3		Occupancies with a quantity of material in the building in excess of those listed in Table 3-D which present a high fire or physical hazard as listed in Section 307.1.1.
H-4		Repair garages not classified as Group S, Division 3 Occupancies.
H-5		Aircraft repair hangars not classified as Group S, Division 5 Occupancies and heliports.
H-6	307.1 and 307.11	Semiconductor fabrication facilities and comparable research and development areas when the facilities in which hazardous production materials are used, and the aggregate quantity of material is in excess of those listed in Table 3-D or Table 3-E.
H-7	307.1	Occupancies having quantities of materials in excess of those listed in Table 3-E that are health hazards as listed in Section 307.1.1.

TABLE 3-A—DESCRIPTION OF OCCUPANCIES BY GROUP AND DIVISION—(Continued)

GROUP AND DIVISION	SECTION	DESCRIPTION OF OCCUPANCY[1]
I-1.1	308.1	Nurseries for the full-time care of children under the age of six (each accommodating more than five children), hospitals, sanitariums, nursing homes with nonambulatory patients and similar buildings (each accommodating more than five patients).
I-1.2		Health-care centers for ambulatory patients receiving outpatient medical care which may render the patient incapable of unassisted self-preservation (each tenant space accommodating more than five such patients).
I-2		Nursing homes for ambulatory patients, homes for children six years of age or over (each accommodating more than five persons).
I-3		Mental hospitals, mental sanitariums, jails, prisons, reformatories and buildings where personal liberties of inmates are similarly restrained.
M	309.1	A building or structure, or a portion thereof, for the display and sale of merchandise, and involving stocks of goods, wares or merchandise, incidental to such purposes and accessible to the public.
R-1	310.1	Hotels and apartment houses, congregate residences (each accommodating more than 10 persons).
R-3		Dwellings, lodging houses, congregate residences (each accommodating 10 or fewer persons).
S-1	311.1	Moderate hazard storage occupancies including buildings or portions of buildings used for storage of combustible materials not classified as Group S, Division 2 or Group H Occupancies.
S-2		Low-hazard storage occupancies including buildings or portions of buildings used for storage of noncombustible materials.
S-3		Repair garages where work is limited to exchange of parts and maintenance not requiring open flame or welding and parking garages not classified as Group S, Division 4 Occupancies.
S-4		Open parking garages.
S-5		Aircraft hangars and helistops.
U-1	312.1	Private garages, carports, sheds and agricultural buildings.
U-2		Fences over 6 feet (182.9 mm) high, tanks and towers.

[1]For detailed descriptions, see the occupancy descriptions in the noted sections.

NOTE: U.F.C. Section 216 contains complete descriptions.

TABLE 3-B—REQUIRED SEPARATION IN BUILDINGS OF MIXED OCCUPANCY[1] (HOURS)

	A-2	A-2.1	A-3	A-4	B	E	F-1	F-2	H-2	H-3	H-4,5	H-6,7[2]	I	M	R-1	R-3	S-1	S-2	S-3	S-5	U-1[3]
A-1	N	N	N	N	3	N	3	3	4	4	4	4	3	3	1	1	3	3	4[5]	3	1
A-2		N	N	N	1	N	1	1	4	4	4	4	3	1	1	1	1	1	3[5]	1	1
A-2.1			N	N	1	N	1	1	4	4	4	4	3	1	1	1	1	1	3[5]	1	1
A-3				N	N	N	N	N	4	4	4	3	2	N	1	1	N	1	3[5]	1	1
A-4					1	N	1	1	4	4	4	4	3	1	1	1	1	1	3[5]	1	1
B						1	N[6]	N	2	1	1	1	2	N	1	1	N	1	1	1	1
E							1	1	4	4	4	3	1	1	1	1	1	1	3[5]	1	1
F-1								1	2	1	1	1	3	N[6]	1	1	N	1	1	1	1
F-2									2	1	1	1	2	1	1	1	N	1	1	1	1
H-1	NOT PERMITTED IN MIXED OCCUPANCIES. SEE CHAPTER 3.																				
H-2										1	1	2	4	2	4	4	2	2	2	2	1
H-3											1	1	4	1	3	3	1	1	1	1	1
H-4, 5												1	4	1	3	3	1	1	1	1	1
H-6,7[2]													4	1	4	4	1	1	1	1	3
I														2	1	1	2	4	4[5]	3	1
M															1	1	1[4]	1[4]	1	1	1
R-1																N	3	1	3[5]	1	1
R-3																	1	1	1	1	1
S-1																		1	1	1	1
S-2																			1	1	N
S-3																				1	1
S-4	OPEN PARKING GARAGES ARE EXCLUDED EXCEPT AS PROVIDED IN SECTION 311.2.																				
S-5																					N

N—No requirements for fire resistance.

[1]For detailed requirements and exceptions, see Section 302.4.

[2]For special provisions on highly toxic materials, see the Fire Code.

[3]For agricultural buildings, see also Appendix Chapter 3.

[4]See Section 309.2.2 for exception.

[5]Group S, Division 3 Occupancies used exclusively for parking or storage of pleasure-type motor vehicles and provided no repair or refueling is done may have the occupancy separation reduced one hour.

[6]For Group F, Division 1 woodworking establishments with more than 2,500 square feet (232.3 m^2), the occupancy separation shall be one hour.

TABLE 3-C—REQUIRED SEPARATION OF SPECIFIC-USE AREAS IN GROUP I, DIVISION 1.1 HOSPITALS AND NURSING HOMES

DESCRIPTION	OCCUPANCY SEPARATION
1. Employee locker rooms	None
2. Gift/retail shops	None
3. Handicraft shops	None
4. Kitchens	None
5. Laboratories which employ hazardous materials in quantities less than that which would cause classification as a Group H Occupancy	One hour
6. Laundries greater than 100 sq. ft. (9.3 m^2)	One hour
7. Paint shops employing hazardous substances and materials in quantities less than that which would cause classification as a Group H Occupancy	One hour
8. Physical plant maintenance shop	One hour
9. Soiled linen room	One hour
10. Storage rooms 100 sq. ft. (9.3 m^2) or less in area storing combustible material	None
11. Storage rooms more than 100 sq. ft. (9.3 m^2) storing combustible material	One hour
12. Trash-collection rooms	One hour

TABLE 3-D—MINIMUM DISTANCES FOR BUILDINGS CONTAINING EXPLOSIVE MATERIALS

QUANTITY OF EXPLOSIVE MATERIAL[1]		MINIMUM DISTANCE (feet) × 304.8 for mm		
Pounds Over	Pounds Not Over	Property Lines[2] and Inhabited Buildings[3]		Separation of Magazines[4,5,6]
× 0.4536 for kg		Barricaded[4]	Unbarricaded	
2	5	70	140	12
5	10	90	180	16
10	20	110	220	20
20	30	125	250	22
30	40	140	280	24
40	50	150	300	28
50	75	170	340	30
75	100	190	380	32
100	125	200	400	36
125	150	215	430	38
150	200	235	470	42
200	250	255	510	46
250	300	270	540	48
300	400	295	590	54
400	500	320	640	58
500	600	340	680	62
600	700	355	710	64
700	800	375	750	66
800	900	390	780	70
900	1,000	400	800	72
1,000	1,200	425	850	78
1,200	1,400	450	900	82
1,400	1,600	470	940	86
1,600	1,800	490	980	88
1,800	2,000	505	1,010	90
2,000	2,500	545	1,090	98
2,500	3,000	580	1,160	104
3,000	4,000	635	1,270	116
4,000	5,000	685	1,370	122
5,000	6,000	730	1,460	130
6,000	7,000	770	1,540	136
7,000	8,000	800	1,600	144
8,000	9,000	835	1,670	150
9,000	10,000	865	1,730	156
10,000	12,000	875	1,750	164
12,000	14,000	885	1,770	174
14,000	16,000	900	1,800	180
16,000	18,000	940	1,880	188
18,000	20,000	975	1,950	196
20,000	25,000	1,055	2,000	210
25,000	30,000	1,130	2,000	224
30,000	35,000	1,205	2,000	238
35,000	40,000	1,275	2,000	248
40,000	45,000	1,340	2,000	258
45,000	50,000	1,400	2,000	270

(Continued)

TABLE 3-D—MINIMUM DISTANCES FOR BUILDINGS CONTAINING EXPLOSIVE MATERIALS—(Continued)

QUANTITY OF EXPLOSIVE MATERIAL[1]		MINIMUM DISTANCE (feet) × 304.8 for mm		
Pounds Over	Pounds Not Over	Property Lines[2] and Inhabited Buildings[3]		Separation of Magazines[4,5,6]
× 0.4536 for kg		Barricaded[4]	Unbarricaded	
50,000	55,000	1,460	2,000	280
55,000	60,000	1,515	2,000	290
60,000	65,000	1,565	2,000	300
65,000	70,000	1,610	2,000	310
70,000	75,000	1,655	2,000	320
75,000	80,000	1,695	2,000	330
80,000	85,000	1,730	2,000	340
85,000	90,000	1,760	2,000	350
90,000	95,000	1,790	2,000	360
95,000	100,000	1,815	2,000	370
100,000	110,000	1,835	2,000	390
110,000	120,000	1,855	2,000	410
120,000	130,000	1,875	2,000	430
130,000	140,000	1,890	2,000	450
140,000	150,000	1,900	2,000	470
150,000	160,000	1,935	2,000	490
160,000	170,000	1,965	2,000	510
170,000	180,000	1,990	2,000	530
180,000	190,000	2,010	2,010	550
190,000	200,000	2,030	2,030	570
200,000	210,000	2,055	2,055	590
210,000	230,000	2,100	2,100	630
230,000	250,000	2,155	2,155	670
250,000	275,000	2,215	2,215	720
275,000	300,000	2,275	2,275	770

[1]The number of pounds (kg) of explosives listed is the number of pounds of trinitrotoluene (TNT) or the equivalent pounds (kg) of other explosive.

[2]The distance listed is the distance to property line, including property lines at public ways.

[3]Inhabited building is any building on the same property which is regularly occupied by human beings. When two or more buildings containing explosives or magazines are located on the same property, each building or magazine shall comply with the minimum distances specified from inhabited buildings, and, in addition, they shall be separated from each other by not less than the distances shown for "Separation of Magazines," except that the quantity of explosive materials contained in detonator buildings or magazines shall govern in regard to the spacing of said detonator buildings or magazines from buildings or magazines containing other explosive materials. If any two or more buildings or magazines are separated from each other by less than the specified "Separation of Magazines" distances, then such two or more buildings or magazines, as a group, shall be considered as one building or magazine, and the total quantity of explosive materials stored in such group shall be treated as if the explosive were in a single building or magazine located on the site of any building or magazine of the group, and shall comply with the minimum distance specified from other magazines or inhibited buildings.

[4]Barricades shall effectively screen the building containing explosives from other buildings, public ways or magazines. When mounds or revetted walls of earth are used for barricades, they shall not be less than 3 feet (914 mm) in thickness. A straight line from the top of any side wall of the building containing explosive materials to the eave line of any other building, magazine or a point 12 feet (3658 mm) above the center line of a public way shall pass through the barricades.

[5]Magazine is a building or structure approved for storage of explosive materials. In addition to the requirements of this code, magazines shall comply with the Fire Code.

[6]The distance listed may be reduced by 50 percent when approved natural or artificial barriers are provided in accordance with the requirements in Footnote 4.

TABLE 5-A—EXTERIOR WALL AND OPENING PROTECTION BASED ON LOCATION ON PROPERTY FOR ALL CONSTRUCTION TYPES[1,2,3]

For exceptions, see Section 503.4.

OCCUPANCY GROUP[4]	CONSTRUCTION TYPE	EXTERIOR WALLS		OPENINGS[5]
		Bearing	Nonbearing	
		Distances are measured to property lines (see Section 503).		
		× 304.8 for mm		
A-1	I-F.R. II-F.R.	Four-hour N/C	Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 20 feet
	II One-hour II-N III One-hour III-N IV-H.T. V One-hour V-N	Group A, Division 1 Occupancies are not allowed in these construction types.		
A-2 A-2.1 A-3 A-4	I-F.R. II-F.R. III One-hour IV-H.T.	Four-hour N/C	Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 20 feet
A-2 A-2.1[2]	II One-hour	Two-hour N/C less than 10 feet One-hour N/C elsewhere	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet
	II-N III-N V-N	Group A, Divisions 2 and 2.1 Occupancies are not allowed in these construction types.		
	V One-hour	Two-hour less than 10 feet One-hour elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
A-3	II One-hour	Two-hour N/C less than 5 feet One-hour N/C elsewhere	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet
	II-N	Two-hour N/C less than 5 feet One-hour N/C less than 20 feet NR, N/C elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
	III-N	Four-hour N/C	Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 20 feet

A-3 cont.	V One-hour	Two-hour less than 5 feet One-hour elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
	V-N	Two-hour less than 5 feet One-hour less than 20 feet NR elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
A-4	II One-hour	One-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Protected less than 10 feet
	II-N	One-hour N/C less than 10 feet NR, N/C elsewhere	Same as bearing	Protected less than 10 feet
	III-N	Four-hour N/C	Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 10 feet
	V One-hour	One-hour	Same as bearing	Protected less than 10 feet
	V-N	One-hour less than 10 feet NR elsewhere	Same as bearing	Protected less than 10 feet
B, F-1, M, S-1, S-3	I-F.R. II-F.R. III One-hour III-N IV-H.T.	Four-hour N/C less than 5 feet Two-hour N/C elsewhere	Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 20 feet
B F-1 M S-1, S-3	II One-hour	One-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet
	II-N[3]	One-hour N/C less than 20 feet NR, N/C elsewhere	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet
	V One-hour	One-hour	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
	V-N	One-hour less than 20 feet NR elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
E-1 E-2 E-3	I-F.R. II-F.R. III One-hour III-N IV-H.T.	Four-hour N/C	Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 20 feet
	II One-hour	Two-hour N/C less than 5 feet One-hour N/C elsewhere	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet

(Continued)

TABLE 5-A—EXTERIOR WALL AND OPENING PROTECTION BASED ON LOCATION ON PROPERTY FOR ALL CONSTRUCTION TYPES[1,2,3]—(Continued)

OCCUPANCY GROUP[4]	CONSTRUCTION TYPE	EXTERIOR WALLS		OPENINGS[5]
		Bearing	Nonbearing	
		Distances are measured to property lines (see Section 503).		
		× 304.8 for mm		
E-1 E-2 E-3 cont.	II-N	Two-hour N/C less than 5 feet One-hour N/C less than 10 feet NR, N/C elsewhere	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet
	V One-hour	Two-hour less than 5 feet One-hour elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
	V-N	Two-hour less than 5 feet One-hour less than 10 feet NR elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
F-2 S-2	I-F.R. II-F.R. III One-hour III-N IV-H.T.	Four-hour N/C less than 5 feet Two-hour N/C elsewhere	Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 3 feet Protected less than 20 feet
	II One-hour	One-hour N/C	Same as bearing NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet
	II-N[3]	One-hour N/C less than 5 feet NR, N/C elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
	V One-hour	One-hour	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
	V-N	One-hour less than 5 feet NR elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
H-1[2,3]	I-F.R. II-F.R.	Four-hour N/C	NR N/C	Not restricted[3]
	II One-hour	One-hour N/C	NR N/C	Not restricted[3]
	II-N	NR N/C	Same as bearing	Not restricted[3]
	III One-hour III-N IV-H.T. V One-hour V-N	Group H, Division 1 Occupancies are not allowed in buildings of these construction types.		

H-2[2,3] H-3[2,3] H-4[3] H-6 H-7	I-F.R. II-F.R. III One-hour III-N IV-H.T.	Four-hour N/C	Four-hour N/C less than 5 feet Two-hour N/C less than 10 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 20 feet
	II One-hour	Four-hour N/C less than 5 feet Two-hour N/C less than 10 feet One-hour N/C elsewhere	Four-hour N/C less than 5 feet Two-hour N/C less than 10 feet One-hour N/C less than 20 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 20 feet
	II-N	Four-hour N/C less than 5 feet Two-hour N/C less than 10 feet One-hour N/C less than 20 feet NR, N/C elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 20 feet
	V One-hour	Four-hour less than 5 feet Two-hour less than 10 feet One-hour elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 20 feet
	V-N	Four-hour less than 5 feet Two-hour less than 10 feet One-hour less than 20 feet NR elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 20 feet
H-5[2]	I-F.R. II-F.R. III One-hour III-N IV-H.T.	Four-hour N/C	Four-hour N/C less than 40 feet One-hour N/C less than 60 feet NR, N/C elsewhere	Protected less than 60 feet
	II One-hour	One-hour N/C	Same as bearing, except NR, N/C 60 feet or greater	Protected less than 60 feet
	II-N	One-hour N/C less than 60 feet NR, N/C elsewhere	Same as bearing	Protected less than 60 feet
	V One-hour	One-hour	Same as bearing	Protected less than 60 feet
	V-N	One-hour less than 60 feet NR elsewhere	Same as bearing	Protected less than 60 feet
I-1.1 I-1.2 I-2 I-3	I-F.R. II-F.R.	Four-hour N/C	Four-hour N/C less than 5 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 5 feet Protected less than 20 feet

(Continued)

TABLE 5-A—EXTERIOR WALL AND OPENING PROTECTION BASED ON LOCATION ON PROPERTY FOR ALL CONSTRUCTION TYPES[1,2,3]—(Continued)

OCCUPANCY GROUP[4]	CONSTRUCTION TYPE	EXTERIOR WALLS		OPENINGS[5]
		Bearing	Nonbearing	
		Distances are measured to property lines (see Section 503).		
		× 304.8 for mm		
I-1.1 I-1.2 I-3[2]	II One-hour	Two-hour N/C less than 5 feet One-hour N/C elsewhere	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet
	V One-hour	Two-hour less than 5 feet One-hour elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
I-1.1 I-1.2 I-2 I-3	II-N III-N V-N	These occupancies are not allowed in buildings of these construction types.[6]		
I-3	IV-H.T.	Group I, Division 3 Occupancies are not allowed in buildings of this construction type.		
I-1.1 I-1.2 I-2 I-3	III One-hour	Four-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 20 feet
I-1.1 I-1.2 I-2	IV-H.T.	Four-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 20 feet
I-2	II One-hour	One-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 10 feet
	V One-hour	One-hour	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
R-1	I-F.R. II-F.R. III One-hour III-N IV-H.T.	Four-hour N/C less than 3 feet Two-hour N/C elsewhere	Four-hour N/C less than 3 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 3 feet Protected less than 20 feet
	II One-hour	One-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet
	II-N	One-hour N/C less than 5 feet NR, N/C elsewhere	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet
	V One-hour	One-hour	Same as bearing	Not permitted less than 5 feet
	V-N	One-hour less than 5 feet NR elsewhere	Same as bearing	Not permitted less than 5 feet

R-3	I-F.R. II-F.R. III One-hour III-N IV-H.T.	Four-hour N/C	Four-hour N/C less than 3 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 3 feet Protected less than 20 feet
	II One-hour	One-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 3 feet
	II-N	One-hour N/C less than 3 feet NR, N/C elsewhere	Same as bearing	Not permitted less than 3 feet
	V One-hour	One-hour	Same as bearing	Not permitted less than 3 feet
	V-N	One-hour less than 3 feet NR elsewhere	Same as bearing	Not permitted less than 3 feet
S-4	I-F.R. II-F.R. II One-hour II-N[3]	One-hour N/C less than 10 feet NR, N/C elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 10 feet
	III One-hour III-N IV-H.T. V One-hour V-N	Group S, Division 4 open parking garages are not permitted in these types of construction.		
S-5	II One-hour	One-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 20 feet
	III-N[3]	One-hour N/C less than 20 feet NR, N/C elsewhere	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 5 feet Protected less than 20 feet
	V One-hour	One-hour	Same as bearing	Not permitted less than 5 feet Protected less than 20 feet
	V-N[3]	One-hour less than 20 feet NR elsewhere	Same as bearing	Not permitted less than 5 feet Protected less than 20 feet
U-1[3]	I-F.R. II-F.R. III One-hour III-N IV-H.T.	Four-hour N/C	Four-hour N/C less than 3 feet Two-hour N/C less than 20 feet One-hour N/C less than 40 feet NR, N/C elsewhere	Not permitted less than 3 feet Protected less than 20 feet
	II One-hour	One-hour N/C	Same as bearing except NR, N/C 40 feet or greater	Not permitted less than 3 feet
	V One-hour	One-hour	Same as bearing	Not permitted less than 3 feet

(Continued)

TABLE 5-A—EXTERIOR WALL AND OPENING PROTECTION BASED ON LOCATION ON PROPERTY FOR ALL CONSTRUCTION TYPES[1,2,3]—(Continued)

OCCUPANCY GROUP[4]	CONSTRUCTION TYPE	EXTERIOR WALLS		OPENINGS[5]
		Bearing	Nonbearing	
		Distances are measured to property lines (see Section 503).		
		× 304.8 for mm		
U-1[3] cont.	II-N[2]	One-hour N/C less than 3 feet[3] NR, N/C elsewhere	Same as bearing	Not permitted less than 3 feet
	V-N	One-hour less than 3 feet[3] NR elsewhere	Same as bearing	Not permitted less than 3 feet
U-2	All	Not regulated		

N/C — Noncombustible.
NR — Nonrated.
H.T. — Heavy timber.
F.R. — Fire resistive.

[1]See Section 503 for types of walls affected and requirements covering percentage of openings permitted in exterior walls. For walls facing streets, yards and public ways, see also Section 601.5.

[2]For additional restrictions see Chapters 3 and 6.

[3]For special provisions and exceptions, see also Section 503.4.

[4]See Table 3-A for a description of each occupancy type.

[5]Openings in exterior walls shall be protected by a fire assembly having at least a three-fourths-hour fire-protection rating.

[6]See Section 308.2.1, Exception 3.

TABLE 5-B—BASIC ALLOWABLE BUILDING HEIGHTS AND BASIC ALLOWABLE FLOOR AREA FOR BUILDINGS ONE STORY IN HEIGHT[1]

USE GROUP	HEIGHT/AREA	TYPE OF CONSTRUCTION							
		I	II			III		IV	V	
		F.R.	F.R.	One-hour	N	One-hour	N	H.T.	One-hour	N
		MAXIMUM HEIGHT IN FEET (mm)								
		UL	160 (48 768 mm)	65 (19 812 mm)	55 (16 764 mm)	65 (19 812 mm)	55 (16 764 mm)	65 (19 812 mm)	50 (15 240 mm)	40 (12 192 mm)
		MAXIMUM HEIGHT (Stories) AND MAXIMUM AREA (Sq. Ft. — × 0.0929 for mm)								
A-1	H	UL	4	Not Permitted						
	A	UL	29,900							
A-2, 2.1[2]	H	UL	4	2	NP	2	NP	2	2	NP
	A	UL	29,900	13,500	NP	13,500	NP	13,500	10,500	NP
A-3, 4[2]	H	UL	12	2	1	2	1	2	2	1
	A	UL	29,900	13,500	9,100	13,500	9,100	13,500	10,500	6,100
B, F-1, M, S-1, S-3, S-5	H	UL	12	4	2	4	2	4	3	2
	A	UL	39,900	18,000	12,000	18,000	12,000	18,000	14,000	8,000
E-1, 2, 3[4]	H	UL	4	2	1	2	1	2	2	1
	A	UL	45,200	20,200	13,500	20,200	13,500	20,200	15,700	9,100
F-2, S-2[3]	H	UL	12	4	2	4	2	4	3	2
	A	UL	59,900	27,000	18,000	27,000	18,000	27,000	21,000	12,000
H-1[5]	H	1	1	1	1	Not Permitted				
	A	15,000	12,400	5,600	3,700					
H-2[5]	H	UL	2	1	1	1	1	1	1	1
	A	15,000	12,400	5,600	3,700	5,600	3,700	5,600	4,400	2,500
H-3, 4, 5[5]	H	UL	5	2	1	2	1	2	2	1
	A	UL	24,800	11,200	7,500	11,200	7,500	11,200	8,800	5,100
H-6, 7	H	3	3	3	2	3	2	3	3	1
	A	UL	39,900	18,000	12,000	18,000	12,000	18,000	14,000	8,000
I-1.1[6], 1.2	H	UL	3	1	NP	1	NP	1	1	NP
	A	UL	15,100	6,800	NP	6,800	NP	6,800	5,200	NP
I-2	H	UL	3	2	NP	2	NP	2	2	NP
	A	UL	15,100	6,800	NP	6,800	NP	6,800	5,200	NP
I-3	H	UL	2	Not Permitted[7]						
	A	UL	15,100							

(Continued)

TABLE 5-B—BASIC ALLOWABLE BUILDING HEIGHTS AND BASIC ALLOWABLE FLOOR AREA FOR BUILDINGS ONE STORY IN HEIGHT[1]—(Continued)

		TYPE OF CONSTRUCTION								
		I	II			III		IV	V	
		F.R.	F.R.	One-hour	N	One-hour	N	H.T.	One-hour	N
		MAXIMUM HEIGHT IN FEET (mm)								
		UL	160 (48 768 mm)	65 (19 812 mm)	55 (16 764 mm)	65 (19 812 mm)	55 (16 764 mm)	65 (19 812 mm)	50 (15 240 mm)	40 (12 192 mm)
USE GROUP	HEIGHT/AREA	MAXIMUM HEIGHT (Stories) AND MAXIMUM AREA (Sq. Ft. — × 0.0929 for mm)								
R-1	H	UL	12	4	2[9]	4	2[9]	5	3	2[9]
	A	UL	29,900	13,500	9,100[9]	13,500	9,100[9]	13,500	10,500	6,000[9]
R-3	H	UL	3	3	3	3	3	3	3	3
	A	Unlimited								
S-4	See Table 3-H									
U[8]	H	See Chapter 3								
	A									

A—Building area in square feet.
H—Building height in number of stories.
H.T.—Heavy timber.
NP—Not permitted.
N—No requirements for fire resistance.
F.R.—Fire resistive.
UL—Unlimited.

[1]For multistory buildings, see Section 504.2.

[2]For limitations and exceptions, see Section 303.2.

[3]For open parking garages, see Section 311.9.

[4]See Section 305.2.3.

[5]See Section 307.

[6]See Section 308.2.1 for exception to the allowable area and number of stories in hospitals and nursing homes.

[7]See Section 308.2.2.2.

[8]For agricultural buildings, see also Appendix Chapter 3.

[9]For limitations and exceptions, see Section 310.2.

TABLE 6-A—TYPES OF CONSTRUCTION—FIRE-RESISTIVE REQUIREMENTS (In Hours)
For details, see occupancy section in Chapter 3, type of construction sections in Chapter 6 and sections referenced in Table 6-A.

BUILDING ELEMENT	TYPE I	TYPE II			TYPE III		TYPE IV	TYPE V	
		Noncombustible			Combustible				
	Fire-resistive	Fire-resistive	1-Hr.	N	1-Hr.	N	H.T.	1-Hr.	N
1. Bearing walls—exterior	4 Sec. 602.3.1	4 Sec. 603.3.1	1	N	4 Sec. 604.3.1	4 Sec. 604.3.1	4 Sec. 605.3.1	1	N
2. Bearing walls—interior	3	2	1	N	1	N	1	1	N
3. Nonbearing walls—exterior	4 Sec. 602.3.1	4 Sec. 603.3.1	1 Sec. 603.3.1	N	4 Sec. 604.3.1	4 Sec. 604.3.1	4 Sec. 605.3.1	1	N
4. Structural frame[1]	3	2	1	N	1	N	1 or H.T.	1	N
5. Partitions—permanent	1[2]	1[2]	1[2]	N	1	N	1 or H.T.	1	N
6. Shaft enclosures[3]	2	2	1	1	1	1	1	1	1
7. Floors and floor-ceilings	2	2	1	N	1	N	H.T.	1	N
8. Roofs and roof-ceilings	2 Sec. 602.5	1 Sec. 603.5	1 Sec. 603.5	N	1	N	H.T.	1	N
9. Exterior doors and windows	Sec. 602.3.2	Sec. 603.3.2	Sec. 603.3.2	Sec. 603.3.2	Sec. 604.3.2	Sec. 604.3.2	Sec. 605.3.2	Sec. 606.3	Sec. 606.3
10. Stairway construction	Sec. 602.4	Sec. 603.4	Sec. 603.4	Sec. 603.4	Sec. 604.4	Sec. 604.4	Sec. 605.4	Sec. 606.4	Sec. 606.4

N—No general requirements for fire resistance.

H.T.—Heavy timber.

[1]Structural frame elements in an exterior wall that is located where openings are not permitted or where protection of openings is required, shall be protected against external fire exposure as required for exterior bearing walls or the structural frame, whichever is greater.

[2]Fire-retardant-treated wood (see Section 207) may be used in the assembly, provided fire-resistance requirements are maintained. See Sections 602 and 603.

[3]For special provisions, see Sections 304.6, 306.6 and 711.

TABLE 8-A—FLAME-SPREAD CLASSIFICATION

Class	Flame-spread Index
I	0-25
II	26-75
III	76-200

TABLE 8-B—MAXIMUM FLAME-SPREAD CLASS[1]

OCCUPANCY GROUP	ENCLOSED VERTICAL EXITWAYS	OTHER EXITWAYS[2]	ROOMS OR AREAS
A	I	II	II[3]
E	I	II	III
I	I	I[4]	II[5]
H	I	II	III[6]
B, F, M and S	I	II	III
R-1	I	II	III
R-3	III	III	III[7]
U	NO RESTRICTIONS		

[1]Foam plastics shall comply with the requirements specified in Section 2602. Carpeting on ceilings and textile wall coverings shall comply with the requirements specified in Sections 804.2 and 805, respectively.
[2]Finish classification is not applicable to interior walls and ceilings of exterior exit balconies.
[3]In Group A, Divisions 3 and 4 Occupancies, Class III may be used.
[4]In Group I, Divisions 2 and 3 Occupancies, Class II may be used or Class III when the occupancy is sprinklered.
[5]In rooms in which personal liberties of inmates are forcibly restrained, Class I material only shall be used.
[6]Over two stories shall be Class II.
[7]Flame-spread provisions are not applicable to kitchens and bathrooms of Group R, Division 3 Occupancies.

TABLE 10-A—MINIMUM EGRESS REQUIREMENTS[1]

USE[2]	MINIMUM OF TWO EXITS OTHER THAN ELEVATORS ARE REQUIRED WHERE NUMBER OF OCCUPANTS IS AT LEAST	OCCUPANT LOAD FACTOR[3] (square feet) × 0.0929 for m²
1. Aircraft hangars (no repair)	10	500
2. Auction rooms	30	7
3. Assembly areas, concentrated use (without fixed seats) Auditoriums Churches and chapels Dance floors Lobby accessory to assembly occupancy Lodge rooms Reviewing stands Stadiums	50	7
Waiting area	50	3
4. Assembly areas, less-concentrated use Conference rooms Dining rooms Drinking establishments Exhibit rooms Gymnasiums Lounges Stages	50	15

5. Bowling alley (assume no occupant load for bowling lanes)	50	Note 4
6. Children's homes and homes for the aged	6	80
7. Classrooms	50	20
8. Congregate residences	10	200
9. Courtrooms	50	40
10. Dormitories	10	50
11. Dwellings	10	300
12. Exercising rooms	50	50
13. Garage, parking	30	200
14. Hospitals and sanitariums—		
Health-care center	10	80
Nursing homes		
Sleeping rooms	6	80
Treatment rooms	10	80
15. Hotels and apartments	10	200
16. Kitchen—commercial	30	200
17. Library reading room	50	50
18. Locker rooms	30	50
19. Malls (see Chapter 4)	—	—
20. Manufacturing areas	30	200
21. Mechanical equipment room	30	300
22. Nurseries for children (day care)	7	35
23. Offices	30	100
24. School shops and vocational rooms	50	50
25. Skating rinks	50	50 on the skating area; 15 on the deck
26. Storage and stock rooms	30	300
27. Stores—retail sales rooms		
Basements and ground floor	50	30
Upper floors	50	60
28. Swimming pools	50	50 for the pool area; 15 on the deck
29. Warehouses	30	500
30. All others	50	100

[1]Access to, and egress from, buildings for persons with disabilities shall be provided as specified in Chapter 11.
[2]For additional provisions on number of exits from Groups H and I Occupancies and from rooms containing fuel-fired equipment or cellulose nitrate, see Sections 1018, 1019 and 1020, respectively.
[3]This table shall not be used to determine working space requirements per person.
[4]Occupant load based on five persons for each alley, including 15 feet (4572 mm) of runway.

APPENDIX VI-E
RECOMMENDED SEPARATION DISTANCES FOR EXPLOSIVE MATERIALS

(See U.F.C. Sections 203, 206 and 213 and Articles 77 and 78)

The following information is provided as reference information for application of Article 77.

The information provided in Section 1 is excerpted from federal regulations in 49 C.F.R. A discussion of the new regulations is also provided.

Table A-VI-E-5 is reprinted with permission of the Institute of Makers of Explosives with the provision that the entire table, complete with all explanatory footnotes, be printed. Table A-VI-E-5 is used for magazines containing high explosives or a combination of high explosives and low explosives, and for magazines containing blasting agents.

SECTION 1 — CLASSIFICATION OF EXPLOSIVE MATERIALS

Section 1 provides guidance regarding the classification of explosive materials. This guidance is necessary because of a new explosive materials classification system that has been adopted by the United States Department of Transportation.

The *Uniform Fire Code* regulates explosives based on a combination of two systems used by the federal government for classification of explosives. One system is used by DOT and applies to transportation of materials. The other system is used by the Bureau of Alcohol, Tobacco and Firearms (BATF) and applies to storage.

The Bureau of Alcohol, Tobacco and Firearms classifies explosives as either high explosives, low explosives or blasting agents as specified in 27 C.F.R. These high-explosive, low-explosive and blasting agent categories are used when determining some of the U.F.C. requirements for storage of explosive materials. Some difficulty may be experienced when applying U.F.C. regulations that refer to these categories because packages for explosive materials may not be labeled with these designations.

Package labels and markings for explosive materials are typically based on the classification system prescribed by DOT regulations in 49 C.F.R., Parts 171-173. For many years, this system has designated explosives as Class A, Class B, Class C or blasting agents. Effective October 1, 1991, DOT revised the rules covering the classification, description, shipping name, packaging, labeling and placarding for the transportation of explosives. These revised rules are based on United Nations (UN) Recommendations and were designed to bring existing DOT regulations into alignment with international regulations. Effective October 1, 1991, the classification, marking, labeling, shipping papers and emergency response information for all *new* explosives were required to be in accordance with the revised regulations.

For explosives approved prior to October 1, 1991, DOT has established transition dates to provide an orderly transition to the new regulations. See Table A-VI-E-1. Note that the execution date for *mandatory* use of placards based on UN Recommendations has been extended to October 1, 2001.

The new UN/DOT system classifies explosives as Class 1 materials. They are then divided into divisions to indicate their relative hazard. Unfortunately, there is not a direct correlation between the designations used by the old DOT system and those used by the new system. Tables A-VI-E-2 and A-VI-E-3 provide some guidance with regard to the new categories and their relationship to the old categories.

Additionally, all Class 1 materials are assigned a compatibility letter to show which materials, when grouped together, will not significantly increase the probability of an accident, or for a given quantity, increase the magnitude of the effects from such an accident. See Table A-VI-E-4. During the transition period described in Table A-VI-E-1, special care should be taken to ensure that com-

patibility letters from the UN/DOT system are not confused with letters used to designate explosive classes under the old DOT classifications.

For additional information, see 49 C.F.R.

TABLE A-VI-E-1—TRANSITION DATES FOR EXPLOSIVES CLASSIFICATIONS AND RELATED DOT REGULATIONS

OCTOBER 1, 1991	DOT publishes new rules for explosives based on United Nations (UN) Recommendations. All *new* explosives must be classified under the new regulations.
OCTOBER 1, 1993	Mandatory compliance with new classification and hazard communication requirements except *placarding*.
OCTOBER 1, 1994	Mandatory use of new UN placards except existing DOT placards may continue to be used for domestic highway transport. Package manufacturers will only be permitted to make non-bulk packaging which meet United Nations performance standards.
OCTOBER 1, 1996	Mandatory use of performance-oriented packaging standards based on United Nations Recommendations for non-bulk packaging.
OCTOBER 1, 2001	Mandatory use of new United Nations placards for *all* modes of transportation.

TABLE A-VI-E-2—DEFINITIONS FOR DIVISIONS OF CLASS 1 (EXPLOSIVE) MATERIALS

DIVISION	DEFINITION
1.1	Explosives that have a mass hazard explosion. A mass explosion is one which affects almost the entire load instantaneously. (Examples include dynamite, cap-sensitive water gels, slurries, emulsions and cast boosters.)
1.2	Explosives that have a projection hazard but not a mass explosion hazard. (Examples include ammunition, projectiles and bombs.)
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. (Examples include some propellants, some fireworks and flares.)
1.4	Explosive devices that present a minor explosion hazard. External fire must not cause virtually instantaneous explosion of almost the entire contents of the package. (Examples include some detonators and detonating cords, safety fuse, electric squibs, igniters, igniting cord and some fireworks.)
1.5	Very insensitive explosives. This division is comprised of substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport. (Examples include blasting agents.)
1.6	Extremely insensitive articles which do not have a mass explosion hazard. This division is comprised of articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation. (This division is not commonly used for commercial explosives.)

TABLE A-VI-E-3—COMPARISON OF OLD TO CURRENT EXPLOSIVES CLASSIFICATIONS

OLD DOT CLASSIFICATION	CURRENT DOT CLASSIFICATION
CLASS A EXPLOSIVES	May be either DIVISION 1.1 or 1.2 depending on the material
CLASS B EXPLOSIVES	May be either DIVISION 1.2 or 1.3 depending on the material
CLASS C EXPLOSIVES	DIVISION 1.4
BLASTING AGENTS	DIVISION 1.5
(NO APPLICABLE CLASS)	DIVISION 1.6

TABLE A-VI-E-4—EXPLOSIVES COMPATIBILITY GROUPS

DESCRIPTION OF SUBSTANCES OR ARTICLE TO BE CLASSIFIED	COMPATIBILITY GROUP	CLASSIFICATION CODE
Primary explosive substance.	A	1.1A
Article containing a primary explosive substance and not containing two or more effective protective features.	B	1.1B 1.2B 1.4B
Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance.	C	1.1C 1.2C 1.3C 1.4C
Secondary detonating explosive substance or black powder or article containing a secondary detonating explosive substance, in each case without means of initiation and without a propelling charge, or article containing a primary explosive substance and containing two or more effective protective features.	D	1.1D 1.2D 1.4D 1.5D
Article containing a secondary detonating explosive substance, without means of initiation, with a propelling charge (other than one containing flammable liquid or hypergolic liquid).	E	1.1E 1.2E 1.4E
Article containing a secondary detonating explosive substance with its means of initiation, with a propelling charge (other than one containing flammable liquid or hypergolic liquid) or without a propelling charge.	F	1.1F 1.2F 1.3F 1.4F
Pyrotechnic substance or article containing a pyrotechnic substance, or article containing both an explosive substance and an illuminating, incendiary, tear-producing or smoke-producing substance (other than a water-activated article or one containing white phosphorus, phosphide or flammable liquid or gel or hypergolic liquid).	G	1.1G 1.2G 1.3G 1.4G
Article containing both an explosive substance and white phosphorus.	H	1.2H 1.3H
Article containing both an explosive substance and flammable liquid or gel.	J	1.1J 1.2J 1.3J
Article containing both an explosive substance and a toxic chemical agent.	K	1.2K 1.3K
Explosive substance or article containing an explosive substance and presenting a special risk (e.g., due to water-activation or presence of hypergolic liquids, phosphides or pyrophoric substances) needing isolation of each type.	L	1.1L 1.2L 1.3L
Articles containing only extremely insensitive detonating substances.	N	1.6N
Substance or article so packed or designed that any hazardous effects arising from accidental functioning are limited to the extent that they do not significantly hinder or prohibit fire fighting or other emergency response efforts in the immediate vicinity of the package.	S	1.4S

SECTION 2 — RECOMMENDED SEPARATION DISTANCES FOR EXPLOSIVE MATERIALS

See Table A-VI-E-5.

EXCEPTIONS: 1. The necessary absence in connection with loading or unloading the vehicle. During actual fuel transfer, Section 7904.6.3.2 shall apply. The vehicle location shall be in accordance with Section 7904.6.5.2.1.

2. Stops for meals during the day or night, if the street is well lighted at the point of parking. The vehicle location shall be in accordance with Section 7904.6.5.2.1.

7904.6.5.2.3 Durations exceeding one hour. Tank vehicles parked at any one point for longer than one hour shall be located off of streets, highways, avenues or alleys, and

1. Inside of a bulk plant and either 25 feet (7620 mm) or more from the nearest property line or within a building approved for such use, or

2. At other approved locations not less than 50 feet (15 240 mm) from buildings other than those approved for the storage or servicing of such vehicles.

7904.6.6 Garaging. Tank vehicles shall not be parked or garaged in buildings other than those specifically approved for such use by the chief.

7904.6.7 Fire protection. Tank vehicles shall be equipped with a fire extinguisher having a minimum rating of 2-A, 20-B:C.

During unloading of the tank vehicle, the 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.

7904.7 Refineries.

7904.7.1 General. Plants and portions of plants in which flammable liquids are produced on a commercial scale from crude petroleum, natural gasoline or other hydrocarbon sources shall be in accordance with Section 7904.7.

7904.7.2 Corrosion protection. Aboveground tanks and piping systems shall be protected against corrosion. See Article 90, Standard a.3.6.

7904.7.3 Inspection, repair, alteration or reconstruction of tanks and piping. The inspection, repair, alteration or reconstruction, including welding, cutting and hot tapping, of aboveground storage tanks and piping that have been placed in service shall be in accordance with nationally recognized standards. See Article 90, Standards a.3.7, a.3.14 and a.3.18.

7904.7.4 Cleaning of tanks. The safe entry and cleaning of petroleum storage tanks shall be conducted in accordance with nationally recognized standards and practices. See Article 90, Standard a.3.15.

7904.7.5 Asphalt products and residua derived from crude petroleum products. When asphalt products and residua derived from crude petroleum products are stored in heated tanks at refineries and bulk storage facilities in tank vehicles, such products shall be handled in accordance with nationally recognized standards. See Article 90, Standard a.3.16.

TABLE 7904.2-A—MINIMUM VENT SIZES FOR TANKS
(See Section 7904.2.5.3)

TANK CAPACITY (gallons)	MINIMUM VENT SIZE (Nominal Pipe Diameter, inches)
× 3.785 for L	× 25.4 for mm
Up to 275	$1\frac{1}{2}$
276-660	2
661-900	$2\frac{1}{2}$
901-1,100	3
1,101-10,000	See Sections 7902.1.10.7 and 7902.2.6.3

ARTICLE 80 — HAZARDOUS MATERIALS

SECTION 8001 — GENERAL

8001.1 Scope.

8001.1.1 General. Prevention, control and mitigation of dangerous conditions related to storage, dispensing, use and handling of hazardous materials and information needed by emergency response personnel shall be in accordance with Article 80.

EXCEPTIONS: 1. Off-site hazardous materials transportation in accordance with DOT requirements.

2. The quantities of alcoholic beverages, medicines, foodstuffs and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, in retail sales occupancies are unlimited when packaged in individual containers not exceeding 4 liters.

8001.1.2 Material classification. Hazardous materials are those chemicals or substances defined as such in Article 2. See Appendix VI-A for the classification of hazard categories and hazard evaluations.

The classification system referenced in Section 8002 shall apply to all hazardous materials, including those materials regulated elsewhere in this code.

Mixtures shall be classified in accordance with hazards of the mixture as a whole. Mixtures shall be classified by a qualified organization, individual or testing laboratory approved by the chief.

8001.1.3 Application. Section 8001 shall apply to all hazardous materials, including those materials regulated elsewhere in this code, except that when specific requirements are provided in other articles, those specific requirements shall apply.

When a material has multiple hazards, all hazards shall be addressed.

The provisions of Article 80 related to health hazards as classified in Section 8002 are waived when the chief has determined that such enforcement is preempted by other codes, statutes or ordinances. The details of any action granting such a waiver shall be recorded and entered in the files of the code enforcement agency.

8001.1.4 Existing buildings. For existing buildings, see Section 102.

8001.1.5 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 retail sales occupancies, see Section 8001.12.

8001.2 Definitions.

8001.2.1 General. For definitions of BARRICADE; BULK OXYGEN SYSTEM; CARCINOGEN; CEILING LIMIT, CHEMICAL; C.F.R.; CHEMICAL NAME; COMMON RADIATION SOURCE MATERIAL; COMPRESSED GAS; COMPRESSED GAS CONTAINER; COMPRESSED GAS SYSTEM; CONTINUOUS GAS-DETECTION SYSTEM; CONTROL AREA; CORROSIVE; CYLINDER; DEFLAGRATION; DETACHED STORAGE; DETONATION; DOT; EXCESS FLOW CONTROL; EXCESS FLOW VALVE; EXPLOSION; EXPLOSIVE; FISSILE MATERIAL; FLAMMABLE GAS; FLAMMABLE LIQUEFIED GAS; FLAMMABLE SOLID; HANDLING; HAZARDOUS MATERIAL; HEALTH HAZARD; HIGHLY TOXIC MATERIAL; HIGHLY VOLATILE LIQUID; IDLH; INERT GAS; IRRITANT; MATERIAL SAFETY DATA SHEET; NESTING; NORMAL TEMPERATURE AND PRESSURE (NTP); ORGANIC PEROXIDE; OSHA; OXIDIZER; PERMISSIBLE EXPOSURE LIMIT (PEL); PEROXIDE-FORMING CHEMICAL; PHYSICAL HAZARD; PORTABLE TANKS; PRIMARY CONTAINMENT; PROPRIETARY INFORMATION; PYROPHORIC; REDUCED FLOW VALVE; RETAIL SALES OCCUPANCY; SCAVENGED GAS; SECONDARY CONTAINMENT; SEGREGATED; SENSITIZER; SEPARATE GAS STORAGE ROOM; SIMPLE ASPHYXIANT GAS; STATIONARY TANK; STORAGE FACILITY; TOXIC MATERIAL; UN-

AUTHORIZED DISCHARGE; UNSTABLE MATERIAL; UNSTABLE (reactive) LIQUID; USE; USE, CLOSED SYSTEM; USE, OPEN SYSTEM; and WATER-REACTIVE MATERIAL, see Article 2.

8001.2.2 Limited application. For the purpose of Article 80, certain terms are defined as follows:

CONTAINER is any vessel of 60 United States gallons (227.1 L) or less capacity used for transporting or storing hazardous materials.

OUTDOOR AREA is a single, contiguous property exterior to buildings or without buildings thereon which is under the ownership or control of a single person. See also definition of PERSON in Section 217.

8001.3 Permits.

8001.3.1 General. Permits are required to store, dispense, use or handle hazardous material in excess of quantities specified in Section 105, Permit h.1.

A permit is required when a material is classified as having more than one hazard category if the quantity limits are exceeded in any category.

Permits are required to install, repair, abandon, remove, place temporarily out of service, close or substantially modify a storage facility or other area regulated by Article 80. See also Section 8001.11.

EXCEPTIONS: 1. Routine maintenance.

2. For emergency repair work performed on an emergency basis, application for permit shall be made within two working days of commencement of work.

Permittee shall apply for approval to close storage, use or handling facilities at least 30 days prior to the termination of the storage, use or handling of hazardous materials. Such application shall include any change or alteration of the facility closure plan filed pursuant to Section 8001.11. This 30-day period may be waived by the chief if there are special circumstances requiring such waiver.

8001.3.2 Hazardous materials management plan. When required by the chief, each application for a permit shall include a hazardous materials management plan (HMMP). The location of the HMMP shall be posted adjacent to permits when an HMMP is provided. The HMMP shall include a facility site plan designating the following:

1. Storage and use areas,
2. Maximum amount of each material stored or used in each area,
3. Range of container sizes,
4. Locations of emergency isolation and mitigation valves and devices,
5. Product conveying piping containing liquids or gases, other than utility-owned fuel gas lines and low-pressure fuel gas lines, and
6. On and off positions of valves for valves which are of the self-indicating type.

The plans shall be legible and approximately to scale. Separate distribution systems are allowed to be shown on separate pages.

See also Appendix II-E.

8001.3.3 Hazardous materials inventory statement. When required by the chief, each application for a permit shall include a hazardous materials inventory statement (HMIS). See also Appendix II-E.

8001.4 Systems, Equipment and Processes.

8001.4.1 General. Containers, cylinders and tanks utilized for storage, dispensing, use or handling of hazardous materials shall be in accordance with Section 8001.4.

8001.4.2 Design and construction of containers, cylinders and tanks. Containers, cylinders and tanks shall be designed and constructed in accordance with nationally recognized standards. See Article 90 and Section 101.3. Containers, cylinders, tanks and other means used for transporting hazardous materials shall be of an approved type.

8001.4.3 Piping, tubing, valves and fittings.

8001.4.3.1 General. Piping, tubing, valves and fittings conveying hazardous materials shall be installed in accordance with approved standards and shall be in accordance with Section 8001.4.3.

8001.4.3.2 Design and construction. Piping, tubing, valves, fittings and related components used for hazardous materials shall be in accordance with the following:

1. Piping, tubing, valves, fittings and related components shall be designed and fabricated from materials compatible with the material to be contained and shall be of adequate strength and durability to withstand the pressure, structural and seismic stress, and exposure to which they are subject,

2. Piping and tubing shall be identified in accordance with nationally recognized standards (see Article 90, Standard a.2.1) to indicate the material conveyed,

3. Emergency shutoff valves shall be identified and the location shall be clearly visible and indicated by means of a sign, and

4. Backflow-prevention or check valves shall be provided when the backflow of hazardous materials could create a hazardous condition or cause the unauthorized discharge of hazardous materials.

8001.4.3.3 Additional regulations for supply piping for health hazard materials. Supply piping and tubing for gases and liquids having a health hazard ranking of 3 or 4 in accordance with U.F.C. Standard 79-3 shall also be in accordance with the following:

1. Piping and tubing utilized for the transmission of highly toxic or toxic material shall have welded or brazed connections throughout unless an exhausted enclosure is provided if the material is a gas, or the piping is provided with a receptor for containment if the material is a liquid,

EXCEPTION: Nonmetallic piping with approved connections.

2. Piping and tubing shall not be located within exit corridors, within any portion of an exit required to be enclosed in fire-resistive construction, or above areas not classified as Group H Occupancies,

EXCEPTION: Piping and tubing within the space defined by the walls of exit corridors and floor or roof above or in concealed space above other occupancies when installed in accordance with the Building Code as required for Group H, Division 6 Occupancies. See U.B.C. Section 307.11.6.2.

3. Where gases or liquids are carried in pressurized piping above 15 psig (103.4 kPa), excess flow control shall be provided. Where the piping originates from within a hazardous material storage room or area, the excess flow control shall be located within the storage room or area. Where the piping originates from a bulk source, the excess flow control shall be located as close to the bulk source as practical, and

4. Readily accessible manual or automatic remotely activated fail-safe emergency shutoff valves shall be installed on supply piping and tubing at the following locations:

4.1 The point of use, and

4.2 The tank, cylinder or bulk source.

8001.4.3.4 Flammable, oxidizing and pyrophoric gases. Low melting point materials, such as aluminum, copper and some brass alloys or materials which soften on fire exposure, such as nonmetallic materials, or nonductile materials, such as cast iron, shall not be used for piping, valves or fittings conveying flammable, pyrophoric or oxidizing gases unless they are in accordance with one of the following:

1. Suitably protected against fire exposure by fire-resistive construction, gas cabinets, automatic fire sprinklers or other approved methods,

2. Located so that any release resulting from failure will not unduly expose persons, buildings or structures, or

3. Located where leakage can readily be controlled by operation of an accessible, remotely located valve or valves.

8001.4.4 Suitability of equipment, machinery and processes. Equipment, machinery and processes utilized for dispensing, use or handling of hazardous materials shall be approved, listed, or designed and constructed in accordance with approved standards for the intended use. Such equipment, machinery and processes shall be maintained in an operable condition.

8001.4.5 Installation of tanks.

8001.4.5.1 Underground tanks.

8001.4.5.1.1 General. Underground tanks used for the storage of liquid hazardous materials shall be located and protected in accordance with Section 7902.6.11.

8001.4.5.1.2 Secondary containment. Secondary containment shall be provided for new installations of underground tanks.

8001.4.5.2 Aboveground tanks. Aboveground stationary tanks used for the storage of hazardous materials shall be located and protected in accordance with the requirements for outdoor storage of the particular material involved and shall be marked as required by Section 8003.1.2.

8001.4.6 Empty containers and tanks. Empty containers and tanks previously used for the storage of hazardous materials shall be free from residual material and vapor as defined by DOT, the Resource Conservation and Recovery Act (RCRA) or other regulating authority or maintained as specified for the storage of the hazardous material.

8001.4.7 Maintenance.

8001.4.7.1 General. Defective containers, cylinders and tanks shall be removed from service, repaired or disposed of in an approved manner. Equipment, machinery and processes found to be defective shall be replaced, repaired or removed from service. See also Section 8001.4.4.

8001.4.7.2 Tanks out-of-service for 90 days. Stationary tanks not used for a period of 90 days shall be properly safeguarded or removed in a manner approved by the chief. Such tanks shall have the fill line, gauge opening and pump connection secured against tampering. Vent lines shall be properly maintained.

Tanks which are to be placed back in service shall be tested in a manner approved by the chief.

8001.4.7.3 Defective containers and tanks. Defective containers and tanks shall be removed from service, repaired or disposed of in an approved manner.

8001.5 Release of Hazardous Materials.

8001.5.1 General. Hazardous materials shall not be released into a sewer, storm drain, ditch, drainage canal, lake, river or tidal waterway, or upon the ground, sidewalk, street, highway or into the atmosphere.

EXCEPTIONS: 1. Pesticide products and materials intended for use in weed abatement, erosion control, soil amendment or similar applications when applied in accordance with the manufacturer's instructions, label directions and in accordance with nationally recognized standards.

2. Materials released in accordance with federal, state or local governing regulations or permits of the jurisdictional Air Quality Management Board with a National Pollutant Discharge Elimination System Permit, with waste discharge requirements established by the jurisdictional Water Quality Control Board or with local sewer pretreatment requirements for publicly owned treatment works.

8001.5.2 Unauthorized discharges.

8001.5.2.1 Records. Accurate records shall be kept of the unauthorized discharge of hazardous materials by the permittee.

8001.5.2.2 Notification. The chief shall be notified immediately when an unauthorized discharge becomes reportable under state, federal or local regulations.

8001.5.2.3 Preparation. Provisions shall be made for controlling and mitigating unauthorized discharges.

8001.5.2.4 Control. When an unauthorized discharge due to primary container failure is discovered, the involved primary container shall be repaired or removed from service.

8001.5.2.5 Responsibility for cleanup. The person, firm or corporation responsible for an unauthorized discharge shall institute and complete all actions necessary to remedy the effects of such unauthorized discharge, whether sudden or gradual, at no cost to the jurisdiction. When deemed necessary by the chief, cleanup may be initiated by the fire department or by an authorized individual or firm. Costs associated with such cleanup shall be borne by the owner, operator or other person responsible for the unauthorized discharge.

8001.6 Material Safety Data Sheets. Material safety data sheets (MSDS) shall be readily available on the premises for hazardous materials regulated by Article 80. See also Section 8001.3.2.

8001.7 Identification Signs. Visible hazard identification signs as specified in U.F.C. Standard 79-3 shall be placed at entrances to locations where hazardous materials are stored, dispensed, used or handled in quantities requiring a permit. Signs shall be provided at specific entrances designated by the chief.

> **EXCEPTION:** The chief may waive this requirement in special cases when consistent with safety if the owner or operator has submitted a hazardous materials management plan and hazardous materials inventory statement. See Appendix II-E and Sections 8001.3.2 and 8001.3.3.

Individual containers, cartons or packages shall be conspicuously marked or labeled in accordance with nationally recognized standards. See also Section 8003.1.2.

Rooms or cabinets containing compressed gases shall be conspicuously labeled COMPRESSED GAS.

8001.8 Construction Requirements.

8001.8.1 General. Buildings, or portions thereof, in which hazardous materials are stored, handled or used shall be constructed in accordance with the Building Code.

8001.8.2 Control areas.

8001.8.2.1 Construction requirements. Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation.

8001.8.2.2 Number. The number of control areas in buildings or portions of buildings used for retail or wholesale sales shall not exceed two. The number of control areas in buildings with other uses shall not exceed four.

8001.9 General Safety Precautions.

8001.9.1 Personnel training and written procedures.

8001.9.1.1 General. Persons responsible for the operation of areas in which hazardous materials are stored, dispensed, handled or used shall be familiar with the chemical nature of the materials and the appropriate mitigating actions necessary in the event of fire, leak or spill.

8001.9.1.2 Fire department liaison. Responsible persons shall be designated and trained to be liaison personnel for the fire department. These persons shall aid the fire department in preplanning

emergency responses and identification of the locations where hazardous materials are located and shall have access to material safety data sheets and be knowledgeable in the site emergency response procedures.

8001.9.2 Security. The storage, dispensing, use and handling areas shall be secured against unauthorized entry and safeguarded with such protective facilities as public safety requires.

8001.9.3 Protection from vehicles. Guard posts or other approved means shall be provided to protect storage tanks and connected piping, valves and fittings; dispensing areas; and use areas subject to vehicular damage. When guard posts are installed, the posts shall be:

1. Constructed of steel not less than 4 inches (101.6 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, and
5. Located not less than 5 feet (1524 mm) from the tank.

8001.9.4 Electrical wiring and equipment. Electrical wiring and equipment shall be installed in accordance with the Electrical Code.

8001.9.5 Static accumulation. When processes or conditions exist where a flammable mixture could be ignited by static electricity, means shall be provided to prevent the accumulation of a static charge.

8001.9.6 Protection from light. Materials which are sensitive to light shall be stored in containers designed to protect them from such exposure.

8001.9.7 Shock padding. Materials which are shock sensitive shall be padded, suspended or otherwise protected against accidental dislodgement and dislodgement during seismic activity. For seismic requirements and the seismic zone in which the material is located, see the Building Code.

8001.9.8 Separation of incompatible materials. Incompatible materials in storage and storage of materials incompatible with materials in use shall be separated when the stored materials are in containers having a capacity of more than 5 pounds (2.268 kg) or $^1/_2$ gallon (1.89 L). Separation shall be accomplished by:

1. Segregating incompatible materials storage by a distance of not less than 20 feet (6096 mm),
2. Isolating incompatible materials storage by a noncombustible partition extending not less than 18 inches (457.2 mm) above and to the sides of the stored material,
3. Storing liquid and solid materials in hazardous materials storage cabinets (see Section 8003.1.10), or
4. Storing compressed gases in gas cabinets or exhausted enclosures in accordance with Sections 8003.3.1.3.2 and 8003.3.1.3.3.

Materials which are incompatible shall not be stored within the same cabinet or exhausted enclosure.

8001.10 Handling and Transportation.

8001.10.1 General. Handling and transportation of hazardous materials in exit corridors or exit enclosures shall be in accordance with Section 8001.10. See also Section 8001.4.

Hazardous materials gas containers, cylinders and tanks in transit shall have their protective caps in place. Containers, cylinders and tanks of highly toxic or toxic compressed gases shall have their valve outlets capped or plugged with an approved closure device. See also Sections 7401.7 and 7403.3.

8001.10.2 Required use of carts and trucks. Liquids in containers exceeding 5 gallons (18.9 L) in an exit corridor or exit enclosure shall be transported on a cart or truck. Containers of hazardous materials having a hazard ranking of 3 or 4 in accordance with U.F.C. Standard 79-3 transported within exit corridors or exit enclosures shall be on a cart or truck. When carts and trucks are required for transporting hazardous materials, they shall be in accordance with Section 8001.10.3.

EXCEPTIONS: 1. Two hazardous materials liquid containers, which are hand carried in acceptable safety carriers.

2. Single drums not exceeding 55 gallons (208.2 L), which are transported by suitable drum trucks.

3. Containers and cylinders of compressed gases, which are transported by approved hand trucks, and containers and cylinders not exceeding 25 pounds (11.3 kg), which are hand carried.

4. Solid hazardous materials not exceeding 100 pounds (45.4 kg), which are transported by approved hand trucks, and a single container not exceeding 50 pounds (22.7 kg), which is hand carried.

8001.10.3 Carts and trucks.

8001.10.3.1 General. Carts and trucks required by Section 8001.10.2 to be used to transport hazardous materials shall be in accordance with Section 8001.10.3.

8001.10.3.2 Design. Carts and trucks used to transport hazardous materials shall be designed to provide a stable base for the commodities to be transported and shall have a means of restraining containers to prevent accidental dislodgement. Compressed gas cylinders placed on carts and trucks shall be individually restrained.

8001.10.3.3 Speed-control devices. Carts and trucks shall be provided with a device which will enable the operator to safely control movement by providing stops or speed-reduction devices.

8001.10.3.4 Construction. Construction materials for hazardous materials carts or trucks shall be compatible with the material transported. The cart or truck shall be of substantial construction.

8001.10.3.5 Spill control. Carts and trucks transporting liquids shall be capable of containing a spill from the largest single container transported.

8001.10.3.6 Attendance. Carts and trucks used to transport materials shall not obstruct or be left unattended within any part of an exit.

8001.10.3.7 Incompatible materials. Incompatible materials shall not be transported on the same cart or truck.

8001.11 Facility Closure.

8001.11.1 Temporarily out-of-service facilities. Facilities which are temporarily out of service shall continue to maintain a permit and be monitored and inspected.

8001.11.2 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 accordance with Section 8001.11.3.

8001.11.3 Plan. The permit holder or applicant shall submit a plan to the fire department to terminate storage, dispensing, handling or use of hazardous materials at least 30 days prior to facility closure. The plan shall demonstrate that hazardous materials which were stored, dispensed, handled or used in the facility have been transported, disposed of or reused in a manner that eliminates the need for further maintenance and any threat to public health and safety. Such plan shall be submitted in accordance with Section 8001.3.1.

8001.12 Retail and Wholesale Storage and Display.

8001.12.1 General. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials within a single control area of a Group M retail or wholesale sales occupancy is allowed to exceed the exempt amounts specified in Section 8001.13 when in

accordance with Section 8001.12. The maximum quantity allowed within a single control area of a retail or wholesale sales occupancy shall be the greater of the exempt amount derived from Section 8001.13 or the amount derived from the formula:

$$E_R = E \times R \times A$$

For **SI:**

$$E_R = 10.8 \times E \times R \times A$$

WHERE:

E_R = exempt amount allowed in a single control area of a retail or wholesale sales occupancy.

E = exempt amount specified in Section 8001.13.

R = multiplier for retail or wholesale sales occupancies from Table 8001.12-A.

A = area of the hazardous material retail display or storage in square feet (m^2).

8001.12.2 Maximum area. The maximum aggregate floor area "A" for hazardous material retail or wholesale display or storage over which the multiplier is applied shall not exceed 1,500 square feet (139.4 m^2) per control area.

8001.12.3 Storage and display areas.

8001.12.3.1 General. The area of storage or display shall also be in accordance with Section 8001.12.3.

8001.12.3.2 Density. Display of solids shall not exceed 200 pounds per square foot (976.4 kg/m^2) of floor area actually occupied by solid merchandise. Display of liquids shall not exceed 20 gallons per square foot (76 L/m^2) of floor area actually occupied by liquid merchandise.

8001.12.3.3 Height. Display height shall not exceed 6 feet (1829 mm).

8001.12.3.4 Container location. Individual containers less than 5 gallons (19 L) or less than 25 pounds (11.3 kg) shall be stored on pallets, racks or shelves.

8001.12.3.5 Racks and shelves. Storage racks and shelves shall be in accordance with Section 8003.1.4.

8001.12.3.6 Container type. Containers shall be approved for the use intended.

8001.12.3.7 Container size. Individual containers shall not exceed 100 pounds (45.4 kg) or a 5-gallon (19 L) capacity.

8001.12.3.8 Incompatible materials. Incompatible materials shall be separated in accordance with Section 8001.9.8.

8001.12.3.9 Floors. Floors shall be in accordance with Section 8003.1.18.

8001.12.3.10 Aisles. Aisles 4 feet (1219 mm) in width shall be maintained on three sides of the display area.

8001.12.3.11 Signs. Hazard identification signs shall be provided in accordance with Section 8001.7.

TABLE 8001.12-A—MULTIPLIER FOR EXEMPT AMOUNTS IN RETAIL OR WHOLESALE SALES OCCUPANCIES

HAZARD CATEGORIES[1]	MATERIAL CLASS	MULTIPLIER, *R*
Physical hazards: Oxidizers, unstable (reactive) materials, and water-reactive materials	Class 4	Not allowed
	Class 3	0.075
	Class 2	0.006
	Class 1	0.003
Health hazards: Highly toxic or toxic solids and liquids, corrosives, and other health hazard solids, liquids and gases	All	0.0013

[1]Hazard categories are as specified in Section 8002.2. Multipliers shall not apply to categories other than those listed.

8001.13 Exempt Amounts.

8001.13.1 General. Exempt amounts shall be as specified in Section 8001.13.2 and Tables 8001.13-A through 8001.13-D. Storage, dispensing, use and handling of hazardous materials in quantities exceeding exempt amounts shall be in accordance with Sections 8001, 8003 and 8004.

Storage, dispensing, use and handling of hazardous materials in quantities not exceeding exempt amounts shall be in accordance with Section 8001.

Where exempt amounts are indicated in pounds (kilograms), a conversion of 10 pounds per gallon (1.2 kg/L) shall be used.

For retail and wholesale display, see Section 8001.12.

8001.13.2 Special limitations for indoor storage and use by occupancy.

8001.13.2.1 General. Quantities of hazardous materials shall be limited within occupancies in accordance with Sections 8001.13.2 and 8001.13.3.

8001.13.2.2 Group A Occupancies.

8001.13.2.2.1 Toxic and highly toxic compressed gases. Toxic and highly toxic compressed gases shall not be stored or used within Group A Occupancies.

EXCEPTION: Cylinders not exceeding 20 cubic feet (0.57 m^3) at NTP are allowed within gas cabinets or fume hoods.

8001.13.2.2.2 Liquid and solid oxidizers. Class 4 liquid and solid oxidizers shall not be stored or used in Group A Occupancies.

EXCEPTION: Class 4 liquid and solid oxidizers are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.2.3 Organic peroxides. Unclassified detonatable and Class I organic peroxides shall not be stored or used in Group A Occupancies.

EXCEPTION: Unclassified detonatable and Class I organic peroxides are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.2.4 Unstable (reactive) materials. Class 3 and 4 unstable (reactive) materials shall not be stored or used in Group A Occupancies.

EXCEPTION: Class 3 and 4 unstable (reactive) materials are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.2.5 Flammable and oxidizing gases. Except for cylinders not exceeding 250 cubic feet (7.1 m^3) at NTP used for maintenance purposes, patient care or operation of equipment, flammable and oxidizing gases shall not be stored or used in Group A Occupancies.

The aggregate quantities of gases used for maintenance purposes and operation of equipment shall not exceed the exempt amounts listed in Table 8001.13-A.

8001.13.2.3 Groups B, F, M and S Occupancies.

8001.13.2.3.1 Toxic and highly toxic compressed gases. Toxic and highly toxic compressed gases shall not be stored or used in offices, retail sales or classroom portions of Group B, F, M or S Occupancies.

EXCEPTION: When within classrooms of Group B Occupancies, cylinders not exceeding 20 cubic feet (0.57 m^3) at NTP are allowed in gas cabinets or fume hoods.

8001.13.2.3.2 Liquid and solid oxidizers. Class 4 liquid and solid oxidizers shall not be stored or used in offices, retail sales or classroom portions of Group B, F, M or S Occupancies.

EXCEPTION: When within classrooms of Groups B, F and M Occupancies, Class 4 liquid and solid oxidizers are allowed when stored in hazardous materials storage cabinets. Hazardous material storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.3.3 Organic peroxides. Unclassified detonatable and Class I organic peroxides shall not be stored or used in offices, classrooms and retail sales portions of Group B, F, M or S Occupancies.

EXCEPTION: When within classrooms of Groups B, F and M Occupancies, undetonatable and Class I organic peroxides are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.3.4 Unstable (reactive) materials.

8001.13.2.3.4.1 Offices. Class 3 and 4 unstable (reactive) materials shall not be stored or used in offices of Group B, F, M or S Occupancies.

8001.13.2.3.4.2 Classrooms. Class 3 and 4 unstable (reactive) materials shall not be stored or used in classrooms of Group B, F or M Occupancies.

EXCEPTION: Class 3 and 4 unstable (reactive) materials are allowed when stored within hazardous materials storage cabinets. Hazardous material storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.3.4.3 Retail sales. Class 4 unstable (reactive) materials shall not be stored or used in retail sales portions of Group M Occupancies.

8001.13.2.3.5 Flammable and oxidizing gases. Except for cylinders not exceeding 250 cubic feet (7.08 m^3) at NTP used for maintenance purposes, patient care or operation of equipment, flammable and oxidizing gases shall not be stored or used in Group B, F, M or S Occupancies.

The aggregate quantities of gases used for maintenance purposes, patient care and operation of equipment shall not exceed the exempt amounts listed in Table 8001.13-A. Medical gas system supply cylinders shall be located in medical gas storage rooms or gas cabinets as set forth in Section 7404.2.

8001.13.2.4 Group E Occupancies.

8001.13.2.4.1 Toxic and highly toxic compressed gases. Toxic and highly toxic compressed gases shall not be stored or used in Group E Occupancies.

EXCEPTION: Cylinders not exceeding 20 cubic feet (0.57 m^3) at NTP are allowed within gas cabinets or fume hoods.

8001.13.2.4.2 Liquid and solid oxidizers. Class 4 liquid and solid oxidizers shall not be stored or used in Group E Occupancies.

EXCEPTION: Class 4 liquid and solid oxidizers are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.4.3 Organic peroxides. Unclassified detonatable and Class I organic peroxides shall not be stored or used in Group E Occupancies.

EXCEPTION: Unclassified detonatable and Class I organic peroxides are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.4.4 Unstable (reactive) materials. Class 3 and 4 unstable (reactive) materials shall not be stored or used in Group E Occupancies.

EXCEPTION: Class 3 and 4 unstable (reactive) materials are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.4.5 Flammable and oxidizing gases. Except for cylinders not exceeding 250 cubic feet (7.08 m^3) at NTP used for maintenance purposes or operation of equipment, flammable and oxidizing gases shall not be stored or used in Group E Occupancies.

The aggregate quantities of gases used for maintenance purposes and operation of equipment shall not exceed the exempt amounts listed in Table 8001.13-A.

8001.13.2.5 Group I Occupancies.

8001.13.2.5.1 Toxic and highly toxic compressed gases. Toxic and highly toxic compressed gases shall not be stored or used within Group I Occupancies.

EXCEPTION: Cylinders not exceeding 20 cubic feet (0.57 m^3) at NTP are allowed within gas cabinets or fume hoods in quantities up to the exempt amount.

8001.13.2.5.2 Liquid and solid oxidizers.

8001.13.2.5.2.1 Class 4. Class 4 liquid and solid oxidizers shall not be stored or used in Group I Occupancies.

EXCEPTION: Class 4 liquid and solid oxidizers are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.5.2.2 Class 3. A maximum of 200 pounds (90.7 kg) of solid or 2 gallons (7.57 L) of liquid Class 3 oxidizer is allowed in Group I Occupancies when such materials are necessary for maintenance purposes or operation of equipment. The oxidizers shall be stored in approved containers and in a manner approved by the chief.

8001.13.2.5.3 Organic peroxides. Unclassified detonatable and Class I organic peroxides shall not be stored or used in Group I Occupancies.

EXCEPTION: Unclassified detonatable and Class I organic peroxides are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.5.4 Unstable (reactive) materials. Class 3 and 4 unstable (reactive) materials shall not be stored or used in Group I Occupancies.

EXCEPTION: Class 3 and 4 unstable (reactive) materials are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.5.5 Flammable and oxidizing gases. Except for cylinders not exceeding 250 cubic feet (7.08 m^3) at NTP used for maintenance purposes, patient care or operation of equipment, flammable and oxidizing gases shall not be stored or used in Group I Occupancies.

The aggregate quantities of gases used for maintenance purposes, patient care and operation of equipment shall not exceed the exempt amounts listed in Table 8001.13-A. Medical gas system supply cylinders shall be located in medical gas storage rooms or gas cabinets as set forth in Section 7404.2.

8001.13.2.6 Group R Occupancies.

8001.13.2.6.1 Toxic and highly toxic compressed gases. Toxic and highly toxic compressed gases shall not be stored or used in Group R Occupancies.

8001.13.2.6.2 Liquid and solid oxidizers.

8001.13.2.6.2.1 Class 4. Class 4 liquid and solid oxidizers shall not be stored or used within Group R Occupancies.

8001.13.2.6.2.2 Class 3. A maximum of 200 pounds (90.7 kg) of solid or 20 gallons (7.57 L) of liquid Class 3 oxidizers is allowed in Group R Occupancies when such materials are necessary for maintenance purposes or operation of equipment. The oxidizers shall be stored in approved containers and in a manner approved by the chief.

8001.13.2.6.3 Organic peroxides. Unclassified detonatable and Class I organic peroxides shall not be stored or used within Group R Occupancies.

8001.13.2.6.4 Unstable (reactive) materials. Class 3 and 4 unstable (reactive) materials shall not be stored or used within Group R Occupancies.

8001.13.2.6.5 Flammable and oxidizing gases. Except for cylinders not exceeding 250 cubic feet (7.08 m^3) at NTP used for maintenance purposes or operation of equipment, flammable and oxidizing gases shall not be stored or used in Group R Occupancies.

The aggregate quantities of gases used for maintenance purposes and operation of equipment shall not exceed the exempt amounts listed in Table 8001.13-A.

8001.13.2.7 Group U Occupancies.

8001.13.2.7.1 Toxic and highly toxic compressed gases. Toxic and highly toxic compressed gases shall not be stored or used within Group U Occupancies.

EXCEPTION: Cylinders not exceeding 20 cubic feet (0.57 m^3) at NTP are allowed within gas cabinets or fume hoods.

8001.13.2.7.2 Liquid and solid oxidizers.

8001.13.2.7.2.1 Class 4. Class 4 liquid and solid oxidizers shall not be stored or used in Group U Occupancies.

EXCEPTION: Class 4 liquid and solid oxidizers are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.7.2.2 Class 3. A maximum of 200 pounds (90.7 kg) of solid or 2 gallons (7.57 L) of liquid Class 3 oxidizer is allowed in Group U Occupancies when such materials are necessary for maintenance purposes or operation of equipment. The oxidizers shall be stored in approved containers and in a manner approved by the chief.

8001.13.2.7.3 Organic peroxides. Unclassified detonatable and Class I organic peroxides shall not be stored or used in Group U Occupancies.

EXCEPTION: Unclassified detonatable and Class I organic peroxides are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.2.7.4 Unstable (reactive) materials. Class 3 and 4 unstable (reactive) materials shall not be stored or used in Group U Occupancies.

EXCEPTION: Class 3 and 4 unstable (reactive) materials are allowed when stored within hazardous materials storage cabinets. Hazardous materials storage cabinets shall comply with Section 8003.1.10 and shall not contain other storage.

8001.13.3 Special requirements for toxic liquids. The exempt amount for toxic liquids with vapor pressures in excess of 1 psia (6.89 kPa) at 77°F. (25°C.) shall be the exempt amount listed for highly toxic liquids.

8001.14 Regulations for Specific Hazardous Materials in Quantities not Exceeding Exempt Amounts.

8001.14.1 General. Hazardous materials stored, dispensed, used or handled in quantities not exceeding exempt amounts set forth in Section 8001.13 shall be in accordance with Section 8001.14.

8001.14.2 Flammable gases.

8001.14.2.1 Emergency shutoff. Compressed gas systems conveying flammable gases shall be provided with emergency shutoff capability in accordance with Section 8004.1.14.

8001.14.2.2 Ignition source control. Ignition sources in areas containing flammable gases shall be controlled in accordance with Section 8003.1.3.

NO SMOKING signs shall be posted in areas containing flammable gases in accordance with Section 8003.1.2.

8001.14.2.3 Liquefied flammable gases and flammable gases in solution. Containers of liquefied flammable gases and flammable gases in solution shall be positioned in accordance with Section 8004.1.15.

8001.14.3 Oxidizing gases.

8001.14.3.1 Emergency shutoff. Compressed gas systems conveying oxidizing gases shall be provided with emergency shutoff capability in accordance with Section 8004.1.14.

8001.14.3.2 Ignition source control. Ignition sources in areas containing oxidizing gases shall be controlled in accordance with Section 8003.1.3.

8001.14.4 Pyrophoric gases.

8001.14.4.1 Emergency shutoff. Compressed gas systems conveying pyrophoric gases shall be provided with emergency shutoff capability in accordance with Section 8004.1.14.

SECTION 8002 — CLASSIFICATION BY HAZARD

8002.1 General. Hazardous materials shall be classified according to hazard categories. The categories include materials regulated by Article 80 and materials regulated elsewhere in this code.

8002.2 Hazard Categories.

8002.2.1 Physical hazards. The materials categories listed in Section 8002.2.1 are classified as physical hazards. A material with a primary classification as a physical hazard can also present a health hazard.

1. Explosives and blasting agents, regulated elsewhere in this code.
2. Compressed gases, regulated in Article 80 and elsewhere in this code, as follows:
   - 2.1 Air,
   - 2.2 Flammable,
   - 2.3 Inert,
   - 2.4 Oxidizing,
   - 2.5 Pyrophoric,
   - 2.6 Simple asphyxiant,
   - 2.7 Unstable (reactive),
   - 2.8 Health hazards identified in Section 8002.2.2.
3. Flammable and combustible liquids regulated elsewhere in this code.
4. Flammable solids.
5. Organic peroxides.
6. Oxidizer solids and liquids.
7. Pyrophoric solids and liquids.
8. Unstable (reactive) solids and liquids.
9. Water-reactive solids and liquids.
10. Cryogenic fluids, regulated by Article 80 and elsewhere in this code.

8002.2.2 Health hazards. The materials categories listed in Section 8002.2.2 are classified as health hazards. A material with a primary classification as a health hazard can also present a physical hazard.

1. Highly toxic and toxic materials, including highly toxic and toxic compressed gases.
2. Radioactive materials.
3. Corrosives.
4. Carcinogens, irritants, sensitizers and other health hazards.

8002.3 Descriptions and Examples. For descriptions and examples of materials included in hazard categories, see Appendix VI-A.

TABLE 8001.13-A—EXEMPT AMOUNTS OF HAZARDOUS MATERIALS PRESENTING A PHYSICAL HAZARD

MAXIMUM QUANTITIES PER CONTROL AREA

When two units are given, values within parentheses are in cubic feet (cu. ft.) or pounds (lbs.)
(Apply table as specified in Section 8001.13.)

CONDITION		STORAGE[2]			USE[2]—CLOSED SYSTEMS			USE[2]—OPEN SYSTEMS	
Material	Class	Solid Lbs.[3] (Cu. Ft.) × 0.4536 for kg × 0.0283 for m^3	Liquid Gallons[3] (Lbs.) ×3.785 for L × 0.4536 for kg	Gas Cu. Ft. × 0.0283 for m^3	Solid Lbs. (Cu. Ft.) × 0.4536 for kg × 0.0283 for m^3	Liquid Gallons (Lbs.) ×3.785 for L × 0.4536 for kg	Gas Cu. Ft. × 0.0283 for m^3	Solid Lbs. (Cu. Ft.) × 0.4536 for kg × 0.0283 for m^3	Liquid Gallons (Lbs.) ×3.785 for L × 0.4536 for kg
1.1 Combustible liquid[4,5,6,7,8,9]	—	—	—	—	—	—	—	—	—
1.2 Combustible fiber[17] (loose) (baled)	—	(100) (1,000)	N.A. N.A.	N.A. N.A.	(100) (1,000)	N.A. N.A.	N.A. N.A.	(20) (200)	N.A. N.A.
1.3 Cryogenic, flammable or oxidizing[17]	—	N.A.	45	N.A.	N.A.	45	N.A.	N.A.	10
2.1 Explosives[12,17]	—	1[10,13]	(1)[10,13]	N.A.	1/4	(1/4)	N.A.	1/4	(1/4)
3.1 Flammable solid[17]	—	125[6,10]	N.A.	N.A.	[14]	N.A.	N.A.	[14]	N.A.
3.2 Flammable gas[17] (gaseous) (liquefied)	—	N.A. N.A.	N.A. 15[6,10]	750[6,10] N.A.	N.A. N.A.	N.A. 15[6,10]	750[6,10] N.A.	N.A. N.A.	N.A. N.A.
3.3 Flammable liquid[4,5,6,7,8,9] Combination I-A, I-B, I-C[4,5,6,7,8,9,15]	—	—	—	—	—	—	—	—	—
4.1 Organic peroxide, unclassified detonatable	—	1[10,12]	(1)[10,12]	N.A.	1/4[12]	(1/4)[12]	N.A.	1/4[12]	(1/4)[12]
4.2 Organic peroxide	I	5[6,10]	(5)[6,10]	N.A.	1[6]	(1)[6]	N.A.	1[6]	(1)[6]
	II	50[6,10]	(50)[6,10]	N.A.	50[6]	(50)[6]	N.A.	10[6]	(10)[6]
	III	125[6,10]	(125)[6,10]	N.A.	125[6]	(125)[6]	N.A.	25[6]	(25)[6]
	IV	500[6,10]	(500)[6,10]	N.A.	500[6]	(500)[6]	N.A.	100[6]	(100)[6]
	V	N.L.	N.L.	N.A.	N.L.	N.L.	N.A.	N.L.	N.L.
4.3 Oxidizer	4	1[10,12]	(1)[10,12]	N.A.	1/4[12]	(1/4)[12]	N.A.	1/4[12]	(1/4)[12]
	3[16]	10[6,10]	(10)[6,10]	N.A.	2[6]	(2)[6]	N.A.	2[6]	(2)[6]
	2	250[6,10]	(250)[6,10]	N.A.	250[6]	(250)[6]	N.A.	50[6]	(50)[6]
	1	4,000[6,10]	(4,000)[6,10]	N.A.	4,000[6]	(4,000)[6]	N.A.	1,000[6]	(1,000)[6]

4.4 Oxidizer—gas (gaseous)[6,10,17] (liquefied)[6,10,17]	—	N.A. N.A.	N.A. 15	1,500 N.A.	N.A. N.A.	N.A. 15	1,500 N.A.	N.A. N.A.	N.A. N.A.
5.1 Pyrophoric[17]	—	4[10,12]	(4)[10,12]	50[10,12]	1[12]	(1)[12]	10[10,12]	0	0
6.1 Unstable (reactive)[17]	4	1[10,12]	(1)[10,12]	10[10,12]	1/4[12]	(1/4)[12]	2[10,12]	1/4[12]	(1/4)[12]
	3	5[6,10]	(5)[6,10]	50[6,10]	1[6]	(1)[6]	10[6,10]	1[6]	(1)[6]
	2	50[6,10]	(50)[6,10]	250[6,10]	50[6]	(50)[6]	250[6,10]	10[6]	(10)[6]
	1	N.L.	N.L.	750[6,10]	N.L.	N.L.	N.L.	N.L.	N.L.
7.1 Water reactive	3	5[6,10]	(5)[6,10]	N.A.	5[6]	(5)[6]	N.A.	1[6]	(1)[6]
	2	50[6,10]	(50)[6,10]	N.A.	50[6]	(50)[6]	N.A.	10[6]	(10)[6]
	1	125[10,11]	(125)[10,11]	N.A.	125[11]	(125)[11]	N.A.	25[11]	(25)[11]

N.A.—Not applicable. N.L.—Not limited.

[1]Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation. The number of control areas within a building used for retail or wholesale sales shall not exceed two. The number of control areas in buildings with other uses shall not exceed four. See Sections 204 and 8001.8.2.

[2]The aggregate quantity in use and storage shall not exceed the quantity listed for storage. Quantities shall not exceed limits set forth in Section 8001.13.2.

[3]The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials within a single control area of Group M Occupancies used for retail sales may exceed the exempt amounts when such areas are in compliance with Section 8001.12.

[4]For flammable and combustible liquids, see Article 79. See also Section 8001.1.1, Exception 2.

[5]For aerosols, see Article 88.

[6]Quantities may be increased 100 percent in sprinklered buildings. When Footnote 10 also applies, the increase for both footnotes may be applied.

[7]For storage and use of flammable and combustible liquids in Groups A, B, E, F, H, I, M, R, S and U Occupancies, see also U.B.C. Sections 303.8, 304.8, 305.8, 306.8, 307.1.3-307.1.5, 308.8, 309.8, 310.12, 311.8 and 312.4.

[8]For wholesale and retail sales use, see Section 7902.5.10.2.

[9]Spray application of any quantity of flammable or combustible liquids shall be conducted as set forth in Article 45.

[10]Quantities may be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in Sections 8003.1.10, 8003.3.1.3.2 and 8003.3.1.3.3. When Footnote 6 also applies, the increase for both footnotes may be applied.

[11]The quantities permitted in a sprinklered building are not limited.

[12]Permitted in sprinklered buildings only. None is allowed in unsprinklered buildings.

[13]One pound (.454 kg) of black sporting powder and 20 pounds (9 kg) of smokeless powder are permitted in sprinklered or unsprinklered buildings.

[14]See definitions of Group H, Divisions 2 and 3 Occupancies in Section 216.

[15]See Article 79.

[16]A maximum quantity of 200 pounds (90.7 kg) of solid or 20 gallons (75.7 L) of liquid Class 3 oxidizers may be permitted in Groups I, R and U Occupancies when such materials are necessary for maintenance purposes or operation of equipment as set forth in Section 8001.13.

[17]For any amount, see Articles 28, 30, 45, 46, 48, 50, 74, 75, 76, 77 and 78 as applicable for the hazard category.

TABLE 8001.13-B—EXEMPT AMOUNTS OF HAZARDOUS MATERIALS PRESENTING A HEALTH HAZARD MAXIMUM QUANTITIES PER CONTROL AREA[1,2]

When two units are given, values within parentheses are in pounds (lbs.)
(Apply table as specified in Section 8001.13.)

MATERIAL	STORAGE[3]			USE[3]—CLOSED SYSTEMS			USE[3]—OPEN SYSTEMS	
	Solid Lbs.[4,5,6]	Liquid Gallons[4,5,6] (Lbs.)	Gas Cu. Ft.[5]	Solid Lbs.[5]	Liquid Gallons[5] (Lbs.)	Gas Cu. Ft.[5]	Solid Lbs.	Liquid Gallons (Lbs.)
	× 0.4536 for kg	× 3.785 for L × 0.4536 for kg	× 0.028 for m^3	× 0.4536 for kg	× 3.785 for L × 0.4536 for kg	× 0.028 for m^3	× 0.4536 for kg	× 3.785 for L × 0.4536 for kg
1. Carcinogens[9,11]	5,000	500	810[6]	5,000	500	810[6]	1,000[5]	100[5]
2. Corrosives	5,000	500	810[6]	5,000	500	810[6]	1,000[5]	100[5]
3. Highly toxics[7]	1	(1)	20[8]	1	(1)	20[8]	1/4[5]	(1/4)[5]
4. Irritants[9]	5,000	500	810[6]	5,000	500	810[6]	1,000[5]	100[5]
5. Radioactives[10]								
Alpha emitters	2 mCi (74 MBq)	2 mCi (74 MBq)	0.2 mCi[6] (7.4 MBq)	2 mCi (74 MBq)	2 mCi (74 MBq)	0.2 mCi (7.4 MBq)	1 mCi (37 MBq)	1 mCi (37 MBq)
Beta emitters	200 Ci (7.4×10^6 MBq)	200 Ci (7.4×10^6 MBq)	20 Ci[6] (7.4×10^5 MBq)	200 Ci (7.4×10^6 MBq)	200 Ci (7.4×10^6 MBq)	20 Ci (7.4×10^5 MBq)	100 Ci (3.7×10^6 MBq)	100 Ci (3.7×10^6 MBq)
Gamma emitters	14 Ci (5.2×10^5 MBq)	14 Ci (5.2×10^5 MBq)	1.4 Ci[6] (5.2×10^4 MBq)	14 Ci (5.2×10^5 MBq)	14 Ci (5.2×10^5 MBq)	1.4 Ci (5.2×10^4 MBq)	0.1 Ci (3700 MBq)	0.1 Ci (3700 MBq)
6. Sensitizers[9]	5,000	500	810[6]	5,000	500	810[6]	1,000[5]	100[5]
7. Other health hazards[9]	5,000	500	810[6]	5,000	500	810[6]	1,000[5]	100[5]
8. Toxics[7]	500	(500)	810[6]	500	(500)	810[10]	125[5]	(125)[5]

[1]Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation. The number of control areas within a building used for retail or wholesale sales shall not exceed two. The number of control areas in buildings with other uses shall not exceed four. See Sections 204 and 8001.8.2.

[2]See Section 8001.1.1, Exception 2.

[3]The aggregate quantity in use and storage shall not exceed the quantity listed for storage. Quantities shall not exceed limits set forth in Sections 8001.13.2 and 8001.13.3.

[4]The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid health hazard materials within a single control area of Group M Occupancies used for retail sales may exceed the exempt amounts when such areas are in compliance with Section 8001.12.

[5]Quantities may be increased 100 percent in sprinklered buildings. When Footnote 6 also applies, the increase for both footnotes may be applied.

[6]Quantities may be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in Sections 8003.1.10, 8003.3.1.3.2 and 8003.3.1.3.3. When Footnote 5 also applies, the increase for both footnotes may be applied.

[7]For special provisions, see Sections 8003.3, 8003.12, 8004.2.3.7 and 8004.3.6.

[8]Permitted only when located in approved gas cabinets, exhausted enclosures or gas rooms. See Sections 8003.3.1.3.2, 8003.3.1.3.3 and 8003.3.1.3.4.

[9]Carcinogens, irritants, sensitizers and other health hazards do not include commonly used building materials and consumer products which are not otherwise regulated by this code.

[10]Licensed, sealed sources for instruments, calibration devices and equipment are exempt. Licensing requirements and determination of whether a source is sealed or nonsealed shall be as set forth in Nuclear Regulatory Commission regulations.
Individual containers shall not exceed a quantity of 2 mCi (7.4×10^7 becquerels) for alpha emitters, 200 Ci (7.4×10^{12} becquerels) for beta emitters and 0.1 Ci (3.7×10^9 becquerels) for gamma emitters.
Ci = curies, mCi = millicuries

[11]See also applicable federal and state OSHA guidelines.

TABLE 8001.13-C—EXEMPT AMOUNTS OF HAZARDOUS MATERIALS PRESENTING A PHYSICAL HAZARD

MAXIMUM QUANTITIES PER OUTDOOR AREA PER SINGLE PROPERTY UNDER SAME OWNERSHIP OR CONTROL[1,2]

When two units are given, values within parentheses are in cubic feet (cu. ft.) or pounds (lbs.)

CONDITION		STORAGE		
		Solid Lbs. (Cu. Ft.)	Liquid Gallons (Lbs.)	Gas Cu. Ft.
Material	Class	× 0.4536 for kg × 0.0283 for m^3	×3.785 for L × 0.4536 for kg	× 0.0283 for m^3
1.1 Combustible liquid (see Article 79)	—	—	—	—
1.2 Combustible fiber[3]	—	—	—	—
1.3 Cryogenic, flammable or oxidizing[3]	—	—	—	—
2.1 Explosives[3]	—	—	—	—
3.1 Flammable solid[3]	—	125	N.A.	N.A.
3.2 Flammable gas[3] (gaseous) (liquefied)	—	N.A. N.A.	N.A. 15	750 N.A.
3.3 Flammable liquid (see Article 79)	—	—	—	—
4.1 Organic peroxide, unclassified detonatable	—	1	(1)	N.A.
4.2 Organic peroxide	I	5	(5)	N.A.
	II	50	(50)	N.A.
	III	125	(125)	N.A.
	IV	500	(500)	N.A.
	V	N.L.	N.L.	N.A.
4.3 Oxidizer	4	1	(1)	N.A.
	3	10	(10)	N.A.
	2	250	(250)	N.A.
	1	4,000	(4,000)	N.A.
4.4 Oxidizer—gas[3] (gaseous) (liquefied)	—	N.A. N.A.	N.A. 15	1,500 N.A.
5.1 Pyrophoric[3]	—	4	(4)	50
6.1 Unstable (reactive)[3]	4	1	(1)	10
	3	5	(5)	50
	2	50	(50)	250
	1	N.L.	N.L.	750

7.1 Water reactive	3	5	(5)	N.A.
	2	50	(50)	N.A.
	1	125	(125)	N.A.

N.A.—Not applicable. N.L.—Not limited.
[1]For definition of OUTDOOR AREA, see Section 8001.2.2.
[2]Exempt amounts for outdoor use are zero. Any quantity in outdoor use, dispensing or handling shall be in accordance with Sections 8001 and 8004.
[3]For any amount, see Articles 28, 30, 45, 46, 48, 50, 74, 75, 76, 77 and 78 as applicable for the hazard category.

TABLE 8001.13-D—EXEMPT AMOUNTS OF HAZARDOUS MATERIALS PRESENTING A HEALTH HAZARD MAXIMUM QUANTITIES PER OUTDOOR AREA PER SINGLE PROPERTY UNDER SAME OWNERSHIP OR CONTROL[1,2]
When two units are given, values within parentheses are in pounds (lbs.)

	STORAGE		
	Solid Lbs.	Liquid Gallons (Lbs.)	Gas Cu. Ft.
MATERIAL	× 0.4536 for kg	× 3.785 for L × 0.4536 for kg	× 0.028 for m^3
1. Carcinogens[3,4]	5,000	500	810
2. Corrosives	5,000	500	810
3. Highly toxics	1	(1)	20[5]
4. Irritants[3]	5,000	500	810
5. Radioactives[6] Alpha emitters Beta emitters Gamma emitters	 2 mCi (74 MBq) 200 Ci (7.4 × 10^6 MBq) 14 Ci (5.2 × 10^5 MBq)	 2 mCi (74 MBq) 200 Ci (7.4 × 10^6 MBq) 14 Ci (5.2 × 10^5 MBq)	 0.2 mCi (7.4 MBq) 20 Ci (7.4 × 10^5 MBq) 1.4 Ci (5.2 × 10^4 MBq)
6. Sensitizers[3]	5,000	500	810
7. Other health hazards[3]	5,000	500	810
8. Toxics	500	(500)	810

[1]For definition of OUTDOOR AREA, see Section 8001.2.2.
[2]Exempt amounts for outdoor use are zero. Any quantity in outdoor use, dispensing or handling shall be in accordance with Sections 8001 and 8004.
[3]Carcinogens, irritants, sensitizers and other health hazards do not include commonly used building materials and consumer products which are not otherwise regulated by this code.
[4]See also applicable federal and state OSHA guidelines.
[5]Permitted only when stored in approved gas cabinets or exhausted enclosures. See Sections 8003.3.1.3.2 and 8003.3.1.3.3.
[6]Licensed, sealed sources for instruments, calibration devices and equipment are exempt. Licensing requirements and determination of whether a source is sealed or nonsealed shall be as set forth in Nuclear Regulatory Commission regulations.
Individual containers shall not exceed a quantity of 2 mCi (7.4 × 10^7 becquerels) for alpha emitters, 200 Ci (7.4 × 10^{12} becquerels) for beta emitters and 0.1 Ci (3.7 × 10^9 becquerels) for gamma emitters.
Ci = curies, mCi = millicuries

SECTION 8003 — STORAGE

8003.1 General.

8003.1.1 Applicability. Storage of hazardous materials where the aggregate quantity is in excess of the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8001 and 8003.

Storage of hazardous materials where the aggregate quantity does not exceed the exempt amounts set forth in Section 8001.13 shall be in accordance with Section 8001.

For display and storage in retail and wholesale sales occupancies, see Section 8001.12.

Hazardous materials regulated by other articles are not required to be in accordance with Section 8003 unless specifically indicated in Section 8003.

8003.1.2 Signs. In addition to the hazard identification signs required by Section 8001.7, stationary aboveground tanks shall be placarded with hazard identification signs as specified in U.F.C. Standard 79-3 for the specific material contained.

Signs prohibiting smoking shall be provided in storage areas and within 25 feet (7620 mm) of outdoor storage areas.

Signs shall not be obscured or removed.

Signs shall be in English as a primary language or in symbols allowed by this code.

Signs shall be durable. The size, color and lettering shall be in accordance with nationally recognized standards.

8003.1.3 Sources of ignition. Smoking shall be prohibited in rooms where hazardous materials are stored or within 25 feet (7620 mm) of outdoor storage areas.

Open flames and high-temperature devices shall not be used in a manner which creates a hazardous condition. Energy-consuming equipment listed for use with the hazardous material stored is allowed.

8003.1.4 Shelving. Shelving shall be of substantial construction, adequately braced and anchored. For seismic requirements and the seismic zone in which the shelving is located, see the Building Code.

Shelves shall be provided with a lip or guard when used for the storage of individual containers.

EXCEPTION: Shelving in hazardous materials storage cabinets or laboratory furniture specifically designed for such use.

Shelf storage of hazardous materials shall be maintained in an orderly manner.

8003.1.5 Maximum quantity on site. The storage of hazardous materials shall be in accordance with local zoning regulations.

8003.1.6 Storage plan. A storage plan shall be provided for all storage facilities. The plan shall indicate the intended storage arrangement, including the location and dimensions of aisles.

8003.1.7 Spill control, drainage control and secondary containment.

8003.1.7.1 General. Rooms, buildings or areas used for the storage of solid and liquid hazardous materials shall be provided with a means to control spillage and to contain or drain off spillage and fire-protection water discharged in the storage area in accordance with Section 8003.1.7.

EXCEPTIONS: 1. Liquids that are a gas at NTP.

2. Outdoor storage of containers on approved containment pallets in accordance with Section 8003.1.7.5 do not require spill control, drainage control or secondary containment.

3. Storage of flammable solids.

8003.1.7.2 Spill control. Floors shall be sloped; constructed with sumps and collection systems; recessed a minimum of 4 inches (101.6 mm); provided with a liquid-tight raised sill to a minimum

height of 4 inches (101.6 mm) to prevent the flow of liquids to adjoining areas; or otherwise constructed to contain a spill from the largest single container or tank. Except for surfacing, the sill shall be constructed of noncombustible material, and the liquid-tight seal shall be compatible with the material stored. When liquid-tight sills are provided, they are not required at door openings which are provided with an open-grate trench that connects to an approved drainage system.

8003.1.7.3 Drainage control.

8003.1.7.3.1 General. Rooms, buildings or areas shall be provided with a drainage system to direct the flow of liquids to an approved location, or the room, building or area shall be designed to provide secondary containment for the hazardous materials and fire-protection water.

8003.1.7.3.2 Slope. A slope to drain not less than 1 percent shall be provided.

8003.1.7.3.3 Capacity for fire-extinguishing water. Drains from the area shall be sized to carry the automatic fire-extinguishing system design flow rate over the system design area.

8003.1.7.3.4 Materials. Materials of construction for the drainage system shall be compatible with the stored materials.

8003.1.7.3.5 Incompatible materials. Incompatible materials shall be separated from each other in drain systems. Incompatible materials are allowed to be combined when they have been rendered acceptable by an approved means for discharge into the public sewer.

8003.1.7.3.6 Termination. Flow from the drainage system shall be directed to an approved location.

Drainage of spillage and fire-protection water is allowed to be directed to a neutralizer or treatment system which complies with the following:

1. The system shall be designed to handle the maximum worst case spill from the single largest container plus the volume of fire-protection water from the system over the minimum design area for a period of 20 minutes, and

2. The system shall be designed to overflow from the neutralizer or treatment system so that liquid leakage and fire-protection water is directed to a safe location away from the building, valves, means of egress, adjoining property and fire department access roadways.

8003.1.7.4 Secondary containment. Drains shall be directed to containment systems or other locations designed as secondary containment for the hazardous materials liquids and fire-protection water, or the building, room or area shall be designed to provide secondary containment of hazardous material liquids and fire-protection water through the use of recessed floors or liquid-tight raised sills.

EXCEPTIONS: 1. The provisions of Section 8003.1.7.4 may be waived when the chief has determined that such enforcement is preempted by other codes, statutes or ordinances. See Section 8001.1.3.

2. Outdoor storage of oxidizers.

3. Outdoor storage of organic peroxides.

4. Storage of pyrophoric solids.

5. Storage of corrosive solids.

6. Storage of carcinogen, irritant, sensitizer and other health hazard solids.

Secondary containment shall be designed to retain the spill from the largest single container plus the design flow rate of the automatic fire-extinguishing system for the area of the room or area in which the storage is located or the system design area, whichever is smaller. The containment capacity shall be capable of containing the flow for a period of 20 minutes.

Overflow from the secondary containment system shall be provided to direct liquid leakage and fire-protection water to a safe location away from the building, valves, means of egress, fire access roadway, adjoining property or storm drains.

If the storage area is open to rainfall, the secondary containment shall be designed to accommodate the volume of a 24-hour rainfall as determined by a 25-year storm. Where curbs are used, provisions shall be made for draining accumulations of groundwater or rainwater.

A monitoring method capable of detecting hazardous material leakage from the primary containment into the secondary containment shall be provided. Visual inspection of the primary containment shall be used unless other means of monitoring are approved by the chief. Where secondary containment is subject to the intrusion of water, a monitoring method for such water shall be provided. When monitoring devices are provided, they shall be connected to distinct visual or audible alarms.

8003.1.7.5 Containment pallets. When used as a substitute for spill control, drainage control and secondary containment for outdoor storage in accordance with Section 8003.1.7.1, Exception 2, containment pallets shall comply with the following:

1. A liquid-tight sump accessible for visual inspection shall be provided,
2. The sump shall be designed to contain not less than 66 gallons (249.8 L),
3. Exposed surfaces shall be compatible with material stored, and
4. Containment pallets shall be protected to prevent collection of rainwater within the sump.

8003.1.8 Ventilation.

8003.1.8.1 General. Indoor storage areas and storage buildings shall be provided with mechanical exhaust ventilation or natural ventilation where natural ventilation can be shown to be acceptable for the materials as stored.

EXCEPTION: Storage areas for flammable solids. See also Article 76.

8003.1.8.2 System requirements. Exhaust ventilation systems shall comply with all of the following:

1. Installation shall be in accordance with the Mechanical Code,
2. Mechanical ventilation shall be at a rate of not less than 1 cubic foot per minute per square foot (5.1 l/s per m^2) of floor area over the storage area,
3. Systems shall operate continuously unless alternate designs are approved by the chief,
4. A manual shutoff control shall be provided outside of the room in a position adjacent to the access door to the room or in a location approved by the chief. The switch shall be of the break-glass type and shall be labeled VENTILATION SYSTEM EMERGENCY SHUTOFF,
5. Exhaust ventilation shall be arranged to consider the density of the potential fumes or vapors released. For fumes or vapors that are heavier than air, exhaust shall be taken from a point within 12 inches (304.8 mm) of the floor,
6. The location of both the exhaust and inlet air openings shall be arranged to provide air movement across all portions of the floor or room to prevent the accumulation of vapors, and
7. Exhaust ventilation shall not be recirculated within the room or building if the materials stored are capable of emitting hazardous vapors.

8003.1.9 Separation of incompatible hazardous materials. See Section 8001.9.8.

8003.1.10 Hazardous materials storage cabinets.

8003.1.10.1 General. When storage cabinets are used to comply with Article 80, such cabinets shall be in accordance with Section 8003.1.10.

EXCEPTION: Compressed gases shall be stored in cabinets or exhausted enclosures designed in accordance with Section 8003.3.1.3.2 or 8003.3.1.3.3.

Cabinets shall be conspicuously labeled in red letters on contrasting background HAZARDOUS—KEEP FIRE AWAY.

8003.1.10.2 Construction. Cabinets shall be constructed of metal. The interior of cabinets shall be treated, coated or constructed of materials that are nonreactive with the hazardous material stored. Such treatment, coating or construction shall include the entire interior of the cabinet. Cabinets shall either be listed as suitable for the intended storage or constructed in accordance with the following:

1. Cabinets shall be 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 (38.1 mm) airspace between the walls. Joints shall be riveted or welded and shall be tightfitting. Doors shall be well fitted, self-closing and equipped with a self-latching device, and

2. The bottoms of cabinets utilized for the storage of liquids shall be liquid tight to a minimum height of 2 inches (50.8 mm).

For requirements regarding electrical equipment and devices within cabinets used for the storage of hazardous gases or liquids, see the Electrical Code.

8003.1.11 Fire-extinguishing systems. Indoor storage areas and storage buildings shall be protected by an automatic sprinkler system. The design of the sprinkler system shall not be less than that required by the Building Code for Ordinary Hazard Group 2 with a minimum design area of 3,000 square feet (278.7 m^2). See U.B.C. Standard 9-1. Where the materials or storage arrangement requires a higher level of sprinkler system protection in accordance with nationally recognized standards, the higher level of sprinkler system protection shall be provided.

EXCEPTION: Approved alternate automatic fire-extinguishing systems are allowed.

8003.1.12 Explosion control. Indoor storage rooms, areas and buildings containing the following materials shall be provided with explosion control in accordance with the Building Code:

1. Highly toxic flammable or toxic flammable gases when not stored in gas cabinets, exhausted enclosures or gas rooms (see Section 8003.1.3).
2. Combustible dusts. See Article 76.
3. Class 4 oxidizers.
4. Unclassified detonatable and Class I organic peroxides.
5. Pyrophoric gases.
6. Class 3 and 4 unstable (reactive) materials.
7. Class 2 and 3 water-reactive solids and liquids.

8003.1.13 Standby power. When mechanical ventilation, treatment systems, temperature control, alarm, detection or other electrically operated systems are required, such systems shall be connected to a secondary source of power to automatically supply electrical power in the event of loss of power from the primary source. See the Electrical Code.

EXCEPTION: Storage areas for:

1. Class 1 and 2 oxidizers.
2. Class III, IV and V organic peroxides.

8003.1.14 Limit controls.

8003.1.14.1 General. Limit controls shall be provided in accordance with Section 8003.1.14.

8003.1.14.2 Liquid-level limit control. Atmospheric tanks with a capacity exceeding 500 gallons (1893 L) used for the storage of hazardous materials liquids shall be equipped with a liquid-level limit control to prevent overfilling of the tank.

EXCEPTIONS: 1. Tanks monitored by a system which will limit net contents by weight.

2. Atmospheric tanks used for storage of Class II, III, IV and V organic peroxides.

8003.1.14.3 Temperature control. Materials which must be stored at temperatures other than normal ambient temperatures to prevent a hazardous reaction shall be stored in an area provided

with a means to maintain the temperature within a safe range. Redundant temperature control equipment which will operate upon failure of the primary temperature control system shall be provided. Alternate means which prevent a hazardous reaction are allowed.

8003.1.14.4 Pressure control. Stationary tanks used for the storage of hazardous materials liquids which can generate pressures exceeding the tank design limits due to exposure fires or internal reaction shall have some form of construction or device that will relieve excessive internal pressure. Such relief devices shall vent to an approved location or to an exhaust scrubber or treatment system when specified in Sections 8003.2 through 8003.15.

8003.1.15 Emergency alarm. An approved emergency alarm system shall be provided in buildings, rooms or areas used for storage of hazardous materials. Emergency alarm-initiating devices shall be installed outside of each interior exit door of storage buildings, rooms or areas. Activation of an emergency alarm-initiating device shall sound a local alarm to alert occupants of an emergency situation involving hazardous materials.

8003.1.16 Supervision. Emergency alarm, detection and automatic fire-extinguishing systems required by Section 8003 shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

8003.1.17 Clearance from combustibles. The area surrounding an outdoor storage area or tank shall be kept clear of combustible materials and vegetation for a minimum distance of 30 feet (9144 mm).

8003.1.18 Noncombustible floor. Except for surfacing, floors of storage areas shall be of noncombustible construction.

8003.1.19 Professional engineer. The chief is authorized to require design submittals to bear the stamp of a professional engineer.

8003.1.20 Weather protection. When overhead noncombustible construction is provided for sheltering outdoor hazardous material storage areas, such storage shall not be considered indoor storage when all of the following conditions are met:

EXCEPTION: Storage of explosive, detonatable or pyrophoric materials shall be considered as indoor storage.

1. Supports shall be of noncombustible construction,

2. Supports and walls shall not obstruct more than 25 percent of the perimeter of the storage area, and

3. The distance to buildings, property lines, streets, alleys, public ways or exits to a public way shall not be less than the distance required for an outdoor hazardous material storage area without weather protection.

8003.1.21 Required detached storage. Group H Occupancies containing quantities of hazardous materials in excess of those set forth in Table 8003.1-A shall be in buildings used for no other purpose, shall not exceed one story in height and shall be without basements, crawl spaces or other under-floor spaces.

TABLE 8003.1-A—REQUIRED DETACHED STORAGE (See Section 8003.1.21)

DETACHED STORAGE IS REQUIRED WHEN THE QUANTITY OF MATERIAL EXCEEDS THAT LISTED			
Material		Solids and Liquids (tons)[1,2] × 907.2 for kg	Gases (cubic feet)[1,2] × 0.0283 for m^3
1. Explosives, blasting agents, black powder, fireworks, detonatable organic peroxides 2. Class 4 oxidizers 3. Class 3 or 4 detonatable unstable (reactives)		Over exempt amounts	Over exempt amounts
4. Oxidizers, liquids and solids	Class 3 Class 2	1,200 2,000	N.A. N.A.
5. Organic peroxides	Class I Class II Class III	Over exempt amounts 25 50	N.A. N.A. N.A.
6. Unstable (reactives)	Class 4 Class 3 Class 2	1/1,000 1 25	20 2,000 10,000
7. Water reactives	Class 3 Class 2	1 25	N.A. N.A.
8. Pyrophoric gases		N.A.	2,000

N.A.—Not applicable.

[1]For materials which are detonatable, the distance to other buildings or property lines shall be as specified in the Building Code. (See U.B.C. Tables 3-F; 3-G, Footnote 1; and 5-A.)

[2]"Over exempt amounts" means over the quantities set forth in Table 8001.13-A.

8003.2 Explosives and Blasting Agents. Storage of explosives and blasting agents shall be in accordance with Article 77. Storage of fireworks shall be in accordance with Article 78.

Storage of explosives, blasting agents, black powder and fireworks shall be in detached buildings in accordance with Section 8003.1.21 when required by Section 8003.1.21.

8003.3 Toxic and Highly Toxic Compressed Gases.

8003.3.1 Indoor storage.

8003.3.1.1 General. Indoor storage of toxic and highly toxic compressed gases in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1, 8003.3.1 and 8003.3.3.

8003.3.1.2 Fire-extinguishing system. In addition to Section 8003.1.11, the following requirements shall apply:

1. Gas cabinets, exhausted enclosures and gas rooms for the storage of cylinders shall be internally sprinklered, and

2. Alternate fire-extinguishing systems shall not be used for storage areas, gas cabinets, exhausted enclosures or gas rooms.

8003.3.1.3 Ventilation and storage arrangement.

8003.3.1.3.1 Ventilated area. Cylinders shall be stored within gas cabinets, exhausted enclosures or gas rooms.

EXCEPTION: Toxic gas cylinders having an aggregate capacity not exceeding the exempt amounts set forth in Table 8001.13-B when Footnote 6 is not applied.

within the time specified in Table 8003.3-A. When portable tanks or cylinders are equipped with approved excess flow or reduced flow valves, the worst-case release shall be determined by the maximum achievable flow from the valve as determined by the valve manufacturer or the gas supplier. Reduced flow and excess flow valves shall be permanently marked by the manufacturer to indicate the maximum design flow rate. Such markings shall indicate the flow rate for air under standard conditions.

TABLE 8003.3-A—RATE OF RELEASE FOR CYLINDERS AND PORTABLE TANKS

CONTAINER	NONLIQUEFIED (Minutes)	LIQUEFIED (Minutes)
Cylinders	5	30
Portable tanks	40	240

8003.3.1.4 Emergency power. Emergency power shall be provided in lieu of standby power for:

1. Exhaust ventilation, including the power supply for treatment systems,
2. Gas-detection systems,
3. Emergency alarm systems, and
4. Temperature-control systems.

8003.3.1.5 Limit controls. In addition to the limit controls required by Section 8003.1.14, excess flow control shall be provided for stationary tanks which are piped for filling or dispensing.

8003.3.1.6 Gas detection. A continuous gas-detection system shall be provided to detect the presence of gas at or below the permissible exposure limit or ceiling limit. The detection system shall initiate a local alarm and transmit a signal to a constantly attended control station. The alarm shall be both visual and audible and shall be designed to provide warning both inside and outside of the storage area. The audible alarm shall be distinct from all other alarms.

EXCEPTIONS: 1. Signal transmission to a constantly attended control station need not be provided when not more than one cylinder is stored.

2. A continuous gas-detection system need not be provided for toxic gases when the physiological warning properties for the gas are at a level below the accepted permissible exposure limit for the gas.

The gas-detection system shall be capable of monitoring the room or area in which the gas is stored at or below the permissible exposure limit or ceiling limit and the discharge from the treatment system at or below one-half the IDLH limit.

8003.3.1.7 Smoke detection. An approved supervised smoke-detection system shall be provided in rooms or areas where highly toxic compressed gases are stored indoors. Activation of the detection systems shall sound a local alarm.

8003.3.1.8 Maximum number of cylinders per gas cabinet. The number of cylinders contained in a single gas cabinet shall not exceed three.

EXCEPTION: Cabinets containing cylinders not exceeding 1 pound (0.4536 kg) net contents each shall be limited to a maximum of 100 cylinders.

8003.3.2 Outdoor storage.

8003.3.2.1 General. Outdoor storage of highly toxic or toxic compressed gases in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1, 8003.3.2 and 8003.3.3.

8003.3.2.2 Distance from storage to exposures.

8003.3.2.2.1 General. Outdoor storage of highly toxic or toxic compressed gases shall comply with the Building Code and Section 8003.3.2.2.

8003.3.2.2.2 Distance limitation to exposures. Outdoor storage of highly toxic or toxic compressed gases shall not be within 75 feet (22 860 mm) of a building, property line, street, alley, pub-

lic way or exit to a public way unless the storage is shielded by a structure having a minimum fire-resistive rating of two hours and which interrupts the line of sight between the storage and the exposure. The protective structure shall be at least 5 feet (1524 mm) from exposures. The protective structure shall not have more than two sides at approximately 90-degree directions, or three sides with connecting angles of approximately 135 degrees.

EXCEPTION: Gases in gas cabinets complying with Section 8003.3.1.3.2 and located 5 feet (1524 mm) or more from buildings and 25 feet (7620 mm) from exits. Section 8003.3.2.2.3 shall not apply.

8003.3.2.2.3 Openings in exposed buildings. When the storage area is located closer than 75 feet (22 860 mm) to a building, openings into a building other than piping shall not be above the height of the top of the shielding structure or within 50 feet (15 240 mm) horizontally from the storage area whether or not shielded by a protective structure.

8003.3.2.2.4 Air intakes. The storage area shall not be within 75 feet (22 860 mm) of air intakes.

8003.3.2.3 Canopies. Portable tanks and cylinders stored outside of buildings shall be stored under a canopy of noncombustible construction. Such storage shall not be considered indoor storage. See also Section 8003.1.20.

An automatic fire-sprinkler system shall be provided for canopies used for storage of highly toxic or toxic compressed gases.

8003.3.2.4 Piping and controls. In addition to the requirements of Section 8001.4.3, piping and controls on stationary tanks shall be in accordance with all of the following:

1. Pressure-relief devices shall be vented to a treatment system designed in accordance with Section 8003.3.1.3.5,

2. Where filling or dispensing connections are provided, they shall have a means of local exhaust. Such exhaust shall be designed to capture fumes and vapors. The exhaust shall be directed to a treatment system designed in accordance with Section 8003.3.1.3.5, and

3. Stationary tanks shall be provided with a means of excess flow control on tank inlet and outlet connections.

EXCEPTIONS: 1. Inlet connections that are designed to preclude backflow.

2. Pressure-relief devices.

8003.3.3 Special provisions.

8003.3.3.1 Seismic protection. Stationary tanks and associated piping systems shall be seismically braced in accordance with the Building Code.

8003.3.3.2 Security. See Section 8001.9.2.

8003.3.3.3 Leaking cylinders. One or more gas cabinets or exhausted enclosures shall be provided to handle leaking cylinders.

EXCEPTION: A cabinet or exhausted enclosure need not be provided for leaking cylinders if:

1. All cylinders are stored within gas cabinets or exhausted enclosures, or
2. Approved containment vessels are provided in accordance with all of the following:
   - 2.1 Containment vessels shall be capable of fully containing a release,
   - 2.2 Trained personnel shall be available at an approved location, and
   - 2.3 Containment vessels shall be capable of being transported to the leaking cylinder.

Gas cabinets or exhausted enclosures shall be located as follows:

1. Within or adjacent to outdoor storage areas, or

2. Within gas rooms.

Gas cabinets or exhausted enclosures shall be connected to an exhaust system. See Section 8003.3.1.3.5.

8003.3.3.4 Local exhaust for leaking portable tanks. A means of local exhaust shall be provided to capture leaks from portable tanks. Portable ducts or collection systems designed to be applied to the site of a leak in a valve or fitting on the tank are acceptable. The local exhaust system shall be connected to a treatment system as specified in Section 8003.3.1.3.5. The local exhaust system shall be provided:

1. Within or immediately adjacent to outdoor storage areas, or
2. Within gas rooms used for portable or stationary tanks.

8003.4 Flammable and Combustible Liquids. Storage of flammable and combustible liquids shall be in accordance with Article 79.

8003.5 Flammable Solids and Flammable Gases.

8003.5.1 Indoor storage.

8003.5.1.1 General. Indoor storage of flammable solids and flammable gases in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.5.1. Storage of combustible fibers shall be in accordance with Article 28. See also Section 8001.14.2 for storage of flammable gases in quantities not exceeding exempt amounts.

8003.5.1.2 Pile size limits and location for solids. Flammable solids stored in quantities greater than 1,000 cubic feet (28.3 m^3) shall be separated into piles each not larger than 1,000 cubic feet (28.3 m^3). Aisle widths between piles shall not be less than the height of the piles or 4 feet (1219 mm), whichever is greater.

Flammable solids shall not be stored in basements.

8003.5.1.3 Static-producing equipment. Static-producing equipment located in flammable gas storage areas shall be grounded.

8003.5.2 Outdoor storage.

8003.5.2.1 General. Outdoor storage of flammable solids and flammable gases in amounts exceeding exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.5.2. Storage of combustible fibers shall be in accordance with Article 28.

8003.5.2.2 Distance from storage to exposures. Outdoor storage of flammable solids shall not be located within 20 feet (6096 mm) of any building, property line, street, alley, public way, or exit to a public way. An unpierced two-hour fire-resistive wall extending not less than 30 inches (762 mm) above and to the sides of the storage area is allowed in lieu of such distance.

Outdoor storage of flammable gases shall be in accordance with Table 8003.5-A.

8003.5.2.3 Pile size limits for solids. Outdoor storage of flammable solids shall be separated into piles not larger than 5,000 cubic feet (141 m^3) each. Aisle widths between piles shall not be less than one-half the height of the piles or 10 feet (3048 mm), whichever is greater.

8003.5.2.4 Static-producing equipment. Static-producing equipment in flammable gas storage areas shall be grounded.

TABLE 8003.5-A—FLAMMABLE COMPRESSED GASES—DISTANCE FROM STORAGE TO EXPOSURES[1]

MAXIMUM AMOUNT PER STORAGE AREA (cubic feet)	MINIMUM DISTANCE TO BUILDINGS, STREETS, ALLEYS, PUBLIC WAYS OR PROPERTY LINES THAT CAN BE BUILT ON (feet)	MINIMUM DISTANCE BETWEEN STORAGE AREAS (feet)
× 0.0283 for m^3	× 304.8 for mm	
0-4,225	5	5
4,226-21,125	10	10
21,126-50,700	15	10
50,701-84,500	20	10
84,501 or greater	25	20

[1]The distances can be reduced to 5 feet (1524 mm) when protective structures having a minimum fire resistance of two hours interrupt the line of sight between the container and the exposure. The protective structure shall be at least 5 feet (1524 mm) from the exposure. The configuration of the protective structure shall allow natural ventilation to prevent the accumulation of hazardous gas concentrations.

8003.6 Oxidizers.

8003.6.1 Indoor storage.

8003.6.1.1 General. Indoor storage of oxidizers in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.6.1. Retail display of oxidizers shall be in accordance with Section 8001.12.

See also Section 8001.14.3 for storage of oxidizing gases in quantities not exceeding exempt amounts.

8003.6.1.2 Detached storage. Storage of liquid and solid oxidizers shall be in detached buildings in accordance with Section 8003.1.21 when required by Section 8003.1.21.

8003.6.1.3 Distance from detached storage buildings to exposures. In addition to the requirements of the Building Code, detached storage buildings shall be located in accordance with Tables 8003.6-A and 8003.6-B.

TABLE 8003.6-A—CLASS 1, 2 AND 3 OXIDIZER LIQUIDS AND SOLIDS—SEPARATION OF DETACHED AND OUTDOOR STORAGE FROM OTHER BUILDINGS, PROPERTY LINES, STREETS, ALLEYS, PUBLIC WAYS OR EXITS TO A PUBLIC WAY

OXIDIZER CLASS	MINIMUM DISTANCE (feet)
	× 304.8 for mm
1	N.R.
2	35
3	50

N.R. = not required.

TABLE 8003.6-B—CLASS 4 OXIDIZER LIQUIDS AND SOLIDS—SEPARATION OF DETACHED AND OUTDOOR STORAGE FROM OTHER BUILDINGS, PROPERTY LINES, STREETS, ALLEYS, PUBLIC WAYS OR EXITS TO A PUBLIC WAY

WEIGHT (pounds)	MINIMUM DISTANCE (feet)
× 0.4536 for kg	× 304.8 for mm
Over 10 to 100	75
101 to 500	100
501 to 1,000	125
1,001 to 3,000	200
3,001 to 5,000	300
5,001 to 10,000	400
Over 10,000	As determined by the chief

8003.6.1.4 Liquid-tight floor. In addition to Section 8003.1.18, floors of storage areas for liquid and solid oxidizers shall be of liquid-tight construction.

8003.6.1.5 Smoke and heat venting. Smoke and heat venting shall be provided. The design criteria shall be as set forth in the Building Code.

8003.6.1.6 Smoke detection. An approved supervised smoke-detection system shall be installed in liquid and solid oxidizer storage areas. Activation of the detection systems shall sound a local alarm.

EXCEPTION: A smoke-detection system need not be provided in detached storage buildings protected by an automatic fire-extinguishing system.

8003.6.1.7 Storage conditions. The maximum quantities per building in detached storage buildings shall not exceed those set forth in Tables 8003.6-C through 8003.6-F.

The storage arrangement for liquid and solid oxidizers shall be as set forth in Tables 8003.6-C through 8003.6-F.

Class 2 oxidizers shall not be stored in basements except when such storage is in stationary tanks. Class 3 and 4 oxidizers in excess of the exempt amounts set forth in Section 8001.13 shall be stored on the ground floor only.

TABLE 8003.6-C—STORAGE OF CLASS 1 OXIDIZER LIQUIDS AND SOLIDS IN COMBUSTIBLE CONTAINERS[1]

CONDITION	LIMITS (feet) × 304.8 for mm
Piles	
Maximum length	No limit
Maximum width	50
Maximum height	20
Minimum distance to next pile	3
Minimum distance to walls	2
Maximum quantity per building	No limit

[1]Storage in noncombustible containers or in bulk in detached storage buildings is not limited as to quantity or arrangement.

TABLE 8003.6-D—STORAGE OF CLASS 2 OXIDIZER LIQUIDS AND SOLIDS[1,2,3]

CONDITION	LIMITS × 304.8 for mm × 0.4536 for kg		
	Segregated	Cut Off	Detached
Piles			
Maximum height (feet)	10	12	12
Minimum distance to next pile (feet)	Footnote 2	Footnote 2	Footnote 2
Minimum distance to walls (feet)	2	2	2
Maximum quantity per pile (tons)	20	50	200
Maximum quantity per building (tons)	200	500	No limit

[1]Storage in noncombustible containers is not limited as to quantity or arrangement, except that piles shall be at least 2 feet (609.6 mm) from walls in sprinklered buildings and 4 feet (1219 mm) from walls in nonsprinklered buildings; the distance between piles shall not be less than the pile height.

[2]Aisle width shall not be less than the pile height.

[3]Quantity limits shall be reduced by 50 percent in buildings or portions of buildings used for retail sales.

TABLE 8003.6-E—STORAGE OF CLASS 3 OXIDIZER LIQUIDS AND SOLIDS[1, 2]

CONDITION	LIMITS (× 304.8 for mm, × 0.4536 for kg)		
	Segregated	Cut Off	Detached
Piles			
Maximum height (feet)	8	10	10
Minimum distance to next pile (feet)	Footnote 3	Footnote 3	Footnote 3
Minimum distance to walls (feet)	4	4	4
Maximum quantity per pile (tons)	20	30	150
Maximum quantity per building (tons)	100	300	No limit

[1]Except in buildings used for retail sales, quantity limits per pile and per building are allowed to be doubled where Class 3 oxidizers are in noncombustible containers.

[2]Quantity limits per pile and per building shall be reduced by 50 percent in buildings or portions of buildings used for retail sales.

[3]Aisle width shall not be less than the pile height.

TABLE 8003.6-F—STORAGE OF CLASS 4 OXIDIZER LIQUIDS AND SOLIDS

CONDITION	LIMIT (feet) (× 304.8 for mm)
Piles	
Maximum length	10
Maximum width	4
Maximum height	8
Minimum distance to next pile	8
Maximum quantity per building	No limit

8003.6.1.8 Separation of Class 4 oxidizers from other materials. In addition to Section 8001.9.8, Class 4 oxidizer liquids and solids shall be separated from other hazardous materials by not less than one-hour fire-resistive construction or stored in hazardous materials storage cabinets. See Section 8003.1.10.

Detached storage buildings for Class 4 oxidizer liquids and solids shall be located a minimum of 50 feet (15 240 mm) from other hazardous materials storage.

8003.6.1.9 Contamination. Liquid and solid oxidizers shall not be stored on or against combustible surfaces. During storage, care shall be taken to prevent contamination.

8003.6.1.10 Static-producing equipment. Static-producing equipment in oxidizer gas storage areas shall be grounded.

8003.6.2 Outdoor storage.

8003.6.2.1 General. Outdoor storage of oxidizers in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.6.2.

8003.6.2.2 Distance from storage to exposures.

8003.6.2.2.1 Solids and liquids. Storage areas for liquid and solid oxidizers shall be located in accordance with Tables 8003.6-A and 8003.6-B.

8003.6.2.2.2 Gases. Storage areas for oxidizer gases shall be in accordance with Table 8003.6-G.

8003.6.2.3 Storage conditions.

8003.6.2.3.1 Solids and liquids. Storage arrangement for liquid and solid oxidizers shall be in accordance with Tables 8003.6-C through 8003.6-F.

8003.6.2.3.2 Gases. Storage arrangement for oxidizer gases shall be in accordance with Table 8003.6-G.

TABLE 8003.6-G—OXIDIZING GASES—DISTANCE FROM USE TO EXPOSURES[1]

QUANTITY OF GAS STORED (cubic feet at NTP)	DISTANCE TO A BUILDING OR PUBLIC WAY OR PROPERTY LINE THAT CAN BE BUILT ON (feet)	DISTANCE BETWEEN STORAGE AREAS (feet)
× 3.785 for L	× 304.8 for mm	
0-50,000	5	5
50,001-100,000	10	10
100,001 or greater	15	10

[1]The distances do not apply when protective structures having a minimum fire resistance of two hours interrupt the line of sight between the storage container and the exposure. The protective structure shall be at least 5 feet (1524 mm) from the exposure. The configuration of the protective structure shall allow natural ventilation to prevent the accumulation of hazardous gas concentrations.

8003.7 Organic Peroxides.

8003.7.1 Indoor storage.

8003.7.1.1 General. Indoor storage of organic peroxides in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.7.1.

Unclassified detonatable organic peroxides that are capable of detonation in their normal shipping containers under conditions of fire exposure shall be stored in accordance with Article 77 as required for high explosives.

8003.7.1.2 Detached storage. Storage of organic peroxides shall be in detached buildings in accordance with Section 8003.1.21 when required by Section 8003.1.21.

8003.7.1.3 Distance from detached storage buildings to exposures. In addition to the requirements of the Building Code, detached storage buildings shall be located in accordance with Tables 8003.7-A and 8003.7-B.

TABLE 8003.7-A—SEPARATION OF DETACHED AND OUTDOOR STORAGE FROM OTHER BUILDINGS, PROPERTY LINES, STREETS, ALLEYS, PUBLIC WAYS OR EXITS TO A PUBLIC WAY

ORGANIC PEROXIDE CLASS[1]	MAXIMUM STORAGE QUANTITY (pounds) AT MINIMUM SEPARATION		
	× 0.4536 for kg		
	50 Feet (15 240 mm)	100 Feet (30 480 mm)	150 Feet (45 720 mm)
I	2,000	20,000	175,000
II	100,000	200,000	No limit
III	200,000	No limit	No limit

[1]Class IV and V, no requirement.

TABLE 8003.7-B—SEPARATION BETWEEN INDIVIDUAL DETACHED STORAGE BUILDINGS OR AREAS

ORGANIC PEROXIDE CLASS[2]	MAXIMUM STORAGE QUANTITY (pounds) AT MINIMUM SEPARATION		
	× 0.4536 for kg		
	20 Feet (6096 mm)	75 Feet (22 860 mm)	100 Feet (30 480 mm)
I	2,000	20,000	175,000
II and III	Footnote 1		

[1]When the amount of organic peroxide stored does not exceed the amount indicated in Table 8003.7-A, minimum separation shall be 20 feet (6096 mm). When the amount of organic peroxide stored exceeds the amount indicated in Table 8003.7-A, minimum separation shall be 50 feet (15 240 mm).

[2]Class IV and V, no requirement.

8003.7.1.4 Liquid-tight floor. In addition to Section 8003.1.18, floors of storage areas shall be of liquid-tight construction.

8003.7.1.5 Smoke and heat venting. Smoke and heat venting shall be provided. The design criteria shall be as set forth in the Building Code.

8003.7.1.6 Electrical wiring and equipment. In addition to Section 8001.9.4, electrical wiring and equipment in storage areas for Class I or II organic peroxides shall comply with the requirements for electrical Class I, Division 2 locations.

8003.7.1.7 Smoke detection. An approved supervised smoke-detection system shall be provided in rooms or areas where Class I, II, III or IV organic peroxides are stored. Activation of the detection system shall sound a local alarm.

EXCEPTION: A smoke-detection system need not be provided in detached storage buildings protected by an automatic fire-extinguishing system.

8003.7.1.8 Storage conditions.

8003.7.1.8.1 Maximum quantities. Maximum quantity per building in a mixed-occupancy building shall not exceed the amounts set forth in Table 8003.1-A. Maximum quantity per building in a detached storage building shall not exceed the amounts specified in Tables 8003.7-A and 8003.7-B.

8003.7.1.8.2 Storage arrangement. Storage arrangement for organic peroxides shall be in accordance with Tables 8003.7-C through 8003.7-E 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,
3. A minimum 2-foot (609.6 mm) clear space shall be maintained between storage and uninsulated metal walls, and
4. Fifty-five-gallon (208.2 L) drums shall not be stored more than one drum high.

TABLE 8003.7-C—STORAGE OF CLASS I ORGANIC PEROXIDES

CONDITION	LIMITS (feet) × 304.8 for mm
Piles	
Maximum width	6
Maximum height	8
Minimum distance to next pile	4[1]
Minimum distance to walls	4[2]
Maximum quantity per building	Footnote 3

[1]At least one main aisle with a minimum width of 8 feet (2438.4 mm) shall divide the storage area.
[2]Distance to noncombustible walls is allowed to be reduced to 2 feet (609.6 mm).
[3]See Section 8003.1.21 and Tables 8003.7-A and 8003.7-B for maximum quantities.

TABLE 8003.7-D—STORAGE OF CLASS II AND III ORGANIC PEROXIDES

CONDITION	LIMITS (feet) × 304.8 for mm
Piles	
Maximum width	10
Maximum height	8
Minimum distance to next pile	4[1]
Minimum distance to walls	4[2]
Maximum quantity per building	Footnote 3

[1]At least one main aisle with a minimum width of 8 feet (2438.4 mm) shall divide the storage area.
[2]Distance to noncombustible walls is allowed to be reduced to 2 feet (609.6 mm).
[3]See Section 8003.1.21 and Tables 8003.7-A and 8003.7-B for maximum quantities.

TABLE 8003.7-E—STORAGE OF CLASS IV ORGANIC PEROXIDES

CONDITION	LIMITS (feet) × 304.8 for mm
Piles	
Maximum width	16
Maximum height	10
Minimum distance to next pile	3[1,2]
Minimum distance to walls	4

[1]At least one main aisle with a minimum width of 8 feet (2438.4 mm) shall divide the storage area.

[2]Distance shall not be less than one-half the pile height.

8003.7.1.8.3 Location in building. The storage of Class I and II organic peroxides shall be on the ground floor. Class III organic peroxides shall not be stored in basements.

8003.7.1.9 Contamination. Organic peroxides shall be stored in their original DOT shipping containers. During storage, care shall be taken to prevent contamination.

8003.7.2 Outdoor storage.

8003.7.2.1 General. Outdoor storage of organic peroxides in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.7.2.

EXCEPTION: Unclassified detonatable organic peroxides that are capable of detonation in their normal shipping containers under fire conditions shall be stored in accordance with Article 77 as required for high explosives.

8003.7.2.2 Distance from storage to exposures. Storage areas for organic peroxides shall be located in accordance with Tables 8003.7-A and 8003.7-B.

8003.7.2.3 Electrical wiring and equipment. In addition to Section 8001.9.4, electrical wiring and equipment in outdoor storage areas containing Class I, II or III organic peroxides shall comply with the requirements for electrical Class I, Division 2 locations.

8003.7.2.4 Storage conditions.

8003.7.2.4.1 Maximum quantities. Maximum quantities of organic peroxides shall be in accordance with Tables 8003.7-A and 8003.7-B.

8003.7.2.4.2 Storage arrangement. Storage arrangement shall be in accordance with Tables 8003.7-C, 8003.7-D and 8003.7-E.

8003.7.2.5 Separation. In addition to Section 8001.9.8, storage areas for organic peroxides exceeding the amounts specified in Table 8003.1-A shall be located a minimum distance of 50 feet (15 240 mm) from other hazardous material storage.

8003.8 Pyrophoric Materials.

8003.8.1 Indoor storage.

8003.8.1.1 General. Indoor storage of pyrophoric solids, liquids and gases in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.8.1. See also Section 8001.14.4.

Indoor storage of silane and mixtures of silane greater than 2 percent by volume shall be in accordance with U.F.C. Standard 80-1.

8003.8.1.2 Liquid-tight floor. In addition to Section 8003.1.18, floors of storage areas containing pyrophoric liquids shall be of liquid-tight construction.

8003.8.1.3 Electrical wiring and equipment. In addition to Section 8001.9.4, electrical wiring and equipment in storage areas for pyrophoric gases shall comply with the requirements for electrical Class I, Division 2 locations.

8003.8.1.4 Storage conditions.

8003.8.1.4.1 Pyrophoric solids and liquids. Storage of pyrophoric liquids and solids shall be limited to a maximum area of 100 square feet (9.29 m^2) per pile. Storage shall not exceed 5 feet (1524 mm) in height. Individual containers shall not be stacked.

Aisles between storage piles shall be a minimum of 10 feet (3048 mm) in width.

Individual tanks or containers shall not exceed 500 gallons (1893 L) capacity.

8003.8.1.4.2 Pyrophoric gases. Storage of pyrophoric gases shall be in detached buildings in accordance with Section 8003.1.21 when required by Section 8003.1.21.

8003.8.1.5 Separation. In addition to Section 8001.9.8, indoor storage of pyrophoric solids, liquids and gases shall be isolated from incompatible hazardous materials by one-hour fire-resistive walls with openings protected in accordance with the Building Code.

EXCEPTION: Storage in approved hazardous materials storage cabinets constructed in accordance with Section 8003.1.10.

8003.8.2 Outdoor storage.

8003.8.2.1 General. Outdoor storage of pyrophoric solids, liquids and gases in quantities exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.8.2.

Outdoor storage of silane and mixtures of silane greater than 2 percent by volume shall be in accordance with U.F.C. Standard 80-1.

8003.8.2.2 Distance from storage to exposures. The separation of pyrophoric solids, liquids and gases from buildings, property lines, streets, alleys, public ways or exits to a public way shall be in accordance with the following:

1. **Solids and liquids.** Twice the separation required by Article 79 for Class I-B flammable liquids.

2. **Gases.** The location and maximum amount of pyrophoric gas per storage area shall be in accordance with Table 8003.8-A.

8003.8.2.3 Storage conditions. Quantities, arrangement and spacing for pyrophoric liquids and solids in tanks, portable tanks and containers shall be in accordance with Article 79 as required for Class I-B flammable liquids.

8003.8.2.4 Separation of incompatible materials. In addition to Section 8001.9.8, separation of pyrophoric liquids and solids from other hazardous materials shall be in accordance with Article 79 as required for Class I-B flammable liquids.

TABLE 8003.8-A—PYROPHORIC GASES—DISTANCE FROM STORAGE TO EXPOSURES[1]

MAXIMUM AMOUNT PER STORAGE AREA (cubic feet)	MINIMUM DISTANCE BETWEEN STORAGE AREAS (feet)	MINIMUM DISTANCE TO PROPERTY LINES THAT CAN BE BUILT UPON (feet)	MINIMUM DISTANCE TO STREETS, ALLEYS OR PUBLIC WAYS (feet)	MINIMUM DISTANCE TO BUILDINGS ON THE SAME PROPERTY		
				Nonrated or Openings within 25 feet (7620 mm)	Two-hour and No Openings within 25 feet (7620 mm)	Four-hour and No Openings within 25 feet (7620 mm)
× 3.785 for L	× 304.8 for mm					
250	5	25	5	5	0	0
2,500	10	50	10	10	5	0
7,500	20	100	20	20	10	0

[1]The distances can be reduced to 5 feet (1524 mm) when protective structures having a minimum fire resistance of two hours interrupt the line of sight between the container and the exposure. The protective structure shall be at least 5 feet (1524 mm) from the exposure. The configuration of the protective structure shall allow natural ventilation to prevent the accumulation of hazardous gas concentrations.

8003.9 Unstable (Reactive) Materials.

8003.9.1 Indoor storage.

8003.9.1.1 General. Indoor storage of unstable (reactive) materials in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.9.1.

In addition, Class 3 and 4 unstable (reactive) detonatable materials shall be stored in accordance with the Building Code requirements for explosives.

Retail display of unstable (reactive) materials shall be in accordance with Section 8001.12.

8003.9.1.2 Detached storage. Storage of unstable (reactive) materials shall be in detached buildings in accordance with Section 8003.1.21 when required by Section 8003.1.21.

8003.9.1.3 Liquid-tight floor. In addition to Section 8003.1.18, floors of storage areas for liquids and solids shall be of liquid-tight construction.

8003.9.1.4 Smoke and heat venting. Smoke and heat venting shall be provided. The design criteria shall be as set forth in the Building Code.

8003.9.1.5 Storage conditions. Unstable (reactive) materials stored in quantities greater than 500 cubic feet (14.16 m^3) shall be separated into piles, each not larger than 500 cubic feet (14.16 m^3). Aisle width shall not be less than the height of the piles or 4 feet (1219 mm), whichever is greater.

EXCEPTION: Materials stored in tanks.

Unstable (reactive) materials shall not be stored in basements.

8003.9.2 Outdoor storage.

8003.9.2.1 General. Outdoor storage of unstable (reactive) materials in quantities exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.9.2.

8003.9.2.2 Distance from storage to exposures. Outdoor storage of unstable (reactive) material which can deflagrate shall not be within 75 feet (22 860 mm) of buildings, property lines, streets, alleys, public ways or exits to a public way.

Outdoor storage of nondeflagrating unstable (reactive) materials shall not be within 20 feet (6096 mm) of buildings, property lines, streets, alleys, public ways or exits to a public way. An unpierced two-hour fire-resistive wall extending not less than 30 inches (762 mm) above and to the sides of the storage is allowed in lieu of such distance.

8003.9.2.3 Storage conditions. Piles of unstable (reactive) materials shall not exceed 1,000 cubic feet (28.3 m^3).

Aisle widths between piles shall not be less than one-half the height of the pile or 10 feet (3048 mm), whichever is greater.

8003.10 Water-reactive Solids and Liquids.

8003.10.1 Indoor storage.

8003.10.1.1 General. Indoor storage of water-reactive solids and liquids in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.10.1.

Retail display of water-reactive solids and liquids shall be in accordance with Section 8001.12.

8003.10.1.2 Detached storage. Storage of water-reactive materials shall be in detached buildings in accordance with Section 8003.1.21 when required by Section 8003.1.21.

8003.10.1.3 Liquid-tight floor. In addition to Section 8003.1.18, floors of storage areas shall be of liquid-tight construction.

8003.10.1.4 Waterproof room. Rooms or areas used for the storage of water-reactive solids or liquids shall be constructed in a manner which resists the penetration of water through the use of waterproof materials. Piping carrying water for other than approved automatic fire-sprinkler systems shall not be within such rooms or areas.

8003.10.1.5 Smoke and heat venting. Smoke and heat venting shall be provided. The design criteria shall be as set forth in the Building Code.

8003.10.1.6 Fire-extinguishing systems. When Class 3 solids or liquids are stored in areas protected by an automatic fire-sprinkler system, the materials shall be stored in closed watertight containers.

8003.10.1.7 Storage conditions. Water-reactive solids and liquids stored in quantities greater than 500 cubic feet (14.16 m^3) shall be separated into piles, each not larger than 500 cubic feet (14.16 m^3). Aisle widths between piles shall not be less than the height of the pile or 4 feet (1219 mm), whichever is greater.

EXCEPTION: Water-reactive solids and liquids stored in tanks.

Class 2 water-reactive solids and liquids shall not be stored in basements unless such materials are stored in closed watertight containers or tanks.

Class 3 water-reactive solids and liquids shall not be stored in basements.

For storage with flammable liquids, see Section 7902.5.4.

8003.10.2 Outdoor storage.

8003.10.2.1 General. Outdoor storage of water-reactive solids and liquids shall be within tanks or closed watertight containers, and in quantities exceeding the exempt amounts set forth in Section 8001.13, shall be in accordance with Sections 8003.1 and 8003.10.2.

8003.10.2.2 Distance from storage to exposures. Outdoor storage of Class 3 water-reactive solids and liquids shall not be within 75 feet (22 860 mm) of buildings, property lines, streets, alleys, public ways or exits to a public way.

Outdoor storage of Class 1 and 2 water-reactive solids and liquids shall not be within 20 feet (6096 mm) of buildings, property lines, streets, alleys, public ways or exits to a public way. An unpierced two-hour fire-resistive wall extending not less than 30 inches (762 mm) above and to the sides of the storage area is allowed in lieu of such distance.

8003.10.2.3 Storage conditions. Class 3 water-reactive solids and liquids shall be limited to piles not greater than 100 cubic feet (2.83 m^3).

Class 1 or 2 water-reactive solids and liquids shall be limited to piles not greater than 1,000 cubic feet (28.3 m^3).

Aisle widths between piles shall not be less than one-half the height of the pile or 10 feet (3048 mm), whichever is greater.

8003.11 Cryogenic Fluids. Storage of cryogenic fluids shall be in accordance with Article 75.

Cryogenic fluids in individual cylinders, containers or tanks which exceed a water capacity of 1,000 pounds (453.6 kg) shall not be stored inside of buildings.

8003.12 Highly Toxic and Toxic Solids and Liquids.

8003.12.1 Indoor storage.

8003.12.1.1 General. Indoor storage of highly toxic and toxic solids and liquids in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.12.1.

Retail display of highly toxic or toxic materials shall be in accordance with Section 8001.12.

8003.12.1.2 Liquid-tight floors. In addition to Section 8003.1.18, floors of storage rooms shall be of liquid-tight construction.

8003.12.1.3 Exhaust scrubber. Exhaust scrubbers or other systems for the processing of highly toxic liquid vapors shall be provided for storage areas where a spill or other accidental release of such liquids can be expected to release highly toxic vapors. Exhaust scrubbers and other processing systems shall be installed in accordance with the Mechanical Code. Emission control shall conform to the requirements of the local air quality authority.

8003.12.1.4 Separation. In addition to Section 8001.9.8, storage of highly toxic liquids and solids shall be isolated from other hazardous materials by one-hour fire-resistive construction or stored in approved hazardous material storage cabinets. See Section 8003.1.10.

8003.12.2 Outdoor storage.

8003.12.2.1 General. Outdoor storage of highly toxic and toxic solids and liquids in quantities exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.12.2.

8003.12.2.2 Distance from storage to exposures. Outdoor storage of highly toxic or toxic solids and liquids shall not be within 20 feet (6096 mm) of buildings, property lines, streets, alleys, public ways or exits to a public way. An unpierced two-hour fire-resistive wall extending not less than 30 inches (762 mm) above and to the sides of the storage area is allowed in lieu of such distance.

8003.12.2.3 Fire-extinguishing systems. Outdoor storage of highly toxic solids and liquids shall be in fire-resistive containers or shall comply with one of the following:

1. The storage area shall be protected by an automatic, open head, deluge fire-sprinkler system of the type and density specified in the Building Code (see U.B.C. Standard 9-1), or

2. Storage shall be located under a canopy of noncombustible construction, with the canopied area protected by an automatic fire-sprinkler system of the type and density specified in the Building Code. See U.B.C. Standard 9-1. Such storage shall not be considered indoor storage. See Section 8003.1.20.

8003.12.2.4 Storage conditions. Outdoor storage piles of highly toxic solids and liquids shall be separated into piles, each not larger than 2,500 cubic feet (70.79 m^3). Aisle widths between piles shall not be less than one-half the height of the pile or 10 feet (3048 mm), whichever is greater.

The storage of highly toxic liquids which liberate highly toxic vapors in the event of a spill or other accidental discharge shall not be outside of a building unless effective collection and treatment systems are provided. The treatment system shall comply with the Mechanical Code.

8003.13 Radioactive Materials.

8003.13.1 Indoor storage.

8003.13.1.1 General. Indoor storage of radioactive materials in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.13.1.

8003.13.1.2 Liquid-tight floor. In addition to Section 8003.1.18, floors of storage areas shall be of liquid-tight construction.

8003.13.1.3 Detection. Areas used for the storage of radioactive materials shall be provided with detection equipment suitable for determining surface level contamination at levels that would present a short-term hazard condition. Such detection equipment is allowed to be maintained at a location other than the storage area but shall be on the premises.

8003.13.1.4 Storage conditions. The maximum quantity and storage arrangement of radioactive materials to be stored in buildings or rooms designed for such purposes shall be in accordance with the requirements of the Nuclear Regulatory Commission and state and local requirements.

Storage of contaminated combustible materials shall be in tightly closed noncombustible containers which do not contain other waste. Special attention shall be given to prompt disposal of combustible wastes contaminated with oxidizing materials that are subject to spontaneous heating.

8003.13.1.5 Container quantity limits. The quantity of material in any individual container shall not exceed 2 millicuries (7.4×10^7 becquerels) for alpha emitters, 200 curies (7.4×10^{12} becquerels) for beta emitters or 0.1 curies (3.7×10^9 becquerels) for gamma emitters.

EXCEPTION: Licensed, sealed sources for instruments, calibration devices and equipment. Licensing requirements and determination of whether a source is sealed or nonsealed shall be as set forth in Nuclear Regulatory Commission regulations.

8003.13.2 Outdoor storage.

8003.13.2.1 General. Outdoor storage of radioactive materials in quantities exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.13.2.

8003.13.2.2 Distance from storage to exposures. Outdoor storage shall not be within 20 feet (6096 mm) of property lines, streets, alleys, public ways or exits to a public way. An unpierced two-hour fire-resistive wall extending not less than 30 inches (762 mm) above and to the sides of the storage area is allowed in lieu of such distance.

Outdoor storage shall not be within 20 feet (6096 mm) of buildings unless the building exterior walls are not less than one-hour fire-resistive construction. Storage shall not be within 10 feet (3048 mm) from building openings. Building openings less than 20 feet (6096 mm) from outdoor storage shall be protected by a fire assembly having a 45-minute fire-resistive rating.

8003.13.2.3 Fire-extinguishing systems. Outdoor storage of radioactive materials shall be in fire-resistive containers or shall comply with one of the following:

1. The storage area shall be protected by an automatic, open head, deluge fire-sprinkler system of the type and density specified in the Building Code (see U.B.C. Standard 9-1), or

2. Storage shall be located under a canopy of noncombustible construction, with the canopied area protected by an approved automatic fire-extinguishing system. Such storage shall not be considered to be indoor storage. See Section 8003.1.20.

8003.13.2.4 Storage conditions. Storage shall be arranged in accordance with Nuclear Regulatory Commission, state and local requirements.

8003.14 Corrosives.

8003.14.1 Indoor storage.

8003.14.1.1 General. Indoor storage of corrosive materials in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.14.1.

Retail display of corrosive materials shall be in accordance with Section 8001.12.

8003.14.1.2 Liquid-tight floor. In addition to Section 8003.1.18, floors in storage areas for corrosive liquids shall be of liquid-tight construction.

8003.14.2 Outdoor storage.

8003.14.2.1 General. Outdoor storage of corrosive materials in quantities exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.14.2.

8003.14.2.2 Distance from storage to exposures. Outdoor storage of corrosive liquids shall not be within 20 feet (6096 mm) of buildings, property lines, streets, alleys, public ways or exits to a public way. An unpierced two-hour fire-resistive wall extending not less than 30 inches (762 mm) above and to the side of the storage area is allowed in lieu of such distance.

8003.15 Carcinogens, Irritants, Sensitizers and Other Health Hazard Solids, Liquids and Gases.

8003.15.1 Indoor storage.

8003.15.1.1 General. Indoor storage of carcinogens, irritants, sensitizers and other health hazard solids, liquids and gases in amounts exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.15.1.

Retail display of carcinogens, irritants, sensitizers and other health hazard materials shall be in accordance with Section 8001.12.

8003.15.1.2 Liquid-tight floor. In addition to Section 8003.1.18, floors in storage areas for carcinogens, irritants, sensitizers or other health hazard liquids shall be of liquid-tight construction.

8003.15.2 Outdoor storage.

8003.15.2.1 General. Outdoor storage of carcinogens, irritants, sensitizers and other health hazard solids, liquids and gases in quantities exceeding the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8003.1 and 8003.15.2.

8003.15.2.2 Distance from storage to exposures. Outdoor storage of carcinogens, irritants, sensitizers or other health hazard solids, liquids and gases shall not be within 20 feet (6096 mm) of buildings, property lines, streets, alleys, public ways or exits to a public way. An unpierced two-hour fire-resistive wall extending not less than 30 inches (762 mm) above and to the sides of the storage area is allowed in lieu of such distance.

8003.15.2.3 Storage conditions. Outdoor storage of carcinogens, irritants, sensitizers and other health hazard solids and liquids shall be separated into piles not larger than 2,500 cubic feet (70.79 m^3). Aisle widths between piles shall not be less than one-half the height of the piles or 10 feet (3048 mm), whichever is greater.

SECTION 8004 — USE, DISPENSING AND HANDLING

8004.1 General.

8004.1.1 Applicability. Use, dispensing and handling of hazardous materials where the aggregate quantity is in excess of the exempt amounts set forth in Section 8001.13 shall be in accordance with Sections 8001 and 8004.

Use, dispensing and handling of hazardous materials where the aggregate quantity does not exceed the exempt amounts set forth in Section 8001.13 shall be in accordance with Section 8001. For flammable, oxidizing and pyrophoric gases, see also Section 8001.14.

Hazardous materials regulated by other articles, including refrigerants, are not required to be in accordance with Section 8004 unless specifically indicated in Section 8004.

8004.1.2 Separation from storage of hazardous materials. See Section 8001.9.8.

8004.1.3 Noncombustible floor. Except for surfacing, floors of areas where liquid or solid hazardous materials are dispensed or used in open systems shall be of noncombustible, liquid-tight construction.

8004.1.4 Spill control, drainage control and secondary containment. When required by other provisions of Section 8004, spill control, drainage control and secondary containment shall be provided in accordance with Section 8003.1.7.

8004.1.5 Sources of ignition. Smoking shall be prohibited in rooms or areas where hazardous materials are dispensed or used in open systems and within 25 feet (7620 mm) of outdoor dispensing areas.

Open-flame and other heat-producing equipment shall be located a safe distance from areas where temperature-sensitive materials, flammable materials and compressed gases are dispensed, used or handled.

8004.1.6 Limit controls.

8004.1.6.1 General. Limit controls shall be provided in accordance with Section 8004.1.6.

8004.1.6.2 Liquid level.

8004.1.6.2.1 High level. Open tanks in which hazardous materials are used shall be equipped with a liquid level limit control or other means to prevent overfilling of the tank.

8004.1.6.2.2 Low level. Open tanks and containers in which hazardous materials are heated shall be equipped with approved automatic shutoff controls which will sense low liquid levels and shut off the source of heat.

8004.1.6.3 Temperature. Process tanks and equipment which involve temperature control of the material shall be provided with limit controls to maintain the temperature within a safe range.

8004.1.6.4 Pressure. Stationary tanks and equipment containing materials which can generate pressures exceeding the tank or equipment design limits due to exposure fires or internal reaction shall be equipped with pressure-limiting or relief devices. Relief devices for stationary tanks or equipment for highly toxic, toxic or corrosive materials shall vent to an exhaust scrubber or treatment system for processing of vapors or gases. See Section 8003.3.1.3.5. Relief devices for flammable or explosive vapors or gases shall vent to an approved location.

8004.1.7 Standby and emergency power. When mechanical ventilation, treatment systems, temperature control, manual alarm, detection or other electrically operated systems are required by other provisions of Section 8004, such systems shall be connected to a standby source of power to automatically supply electrical power in the event of loss of power from the primary source. See the Electrical Code.

When highly toxic or toxic compressed gases or highly toxic, highly volatile liquids are used or dispensed, emergency power shall be provided in lieu of standby power on all required systems. See the Electrical Code.

8004.1.8 Supervision. Manual alarm, detection, and automatic fire-extinguishing systems required by other provisions of Section 8004 shall be supervised by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

8004.1.9 Signs. In addition to the hazard identification signs required by Section 8001.7, additional hazard identification and warning signs shall be provided as follows:

1. Signs prohibiting smoking shall be provided in dispensing and open-use areas and within 25 feet (7620 mm) of outdoor dispensing or open-use areas, and

2. Stationary containers and tanks shall be placarded with hazard identification signs as specified in U.F.C. Standard 79-3 for the specific material contained.

8004.1.10 Seismic protection. Machinery and equipment utilizing hazardous materials shall be seismically anchored in accordance with the Building Code.

8004.1.11 Lighting. Adequate lighting by natural or artificial means shall be provided. Artificial lighting shall be in accordance with nationally recognized standards. See Article 90, Standard i.1.1.

8004.1.12 Fire-extinguishing systems. Indoor rooms or areas in which hazardous materials are dispensed or used shall be protected by an automatic fire-extinguishing system. Sprinkler system design shall not be less than that required by the Building Code for Ordinary Hazard, Group 2, with a minimum design area of 3,000 square feet (278.7 m^2). See U.B.C. Standard 9-1. Where the mate-

rials or storage arrangement require a higher level of sprinkler system protection in accordance with nationally recognized standards, the higher level of sprinkler system protection shall be provided.

EXCEPTION: Approved alternate automatic fire-extinguishing systems are allowed.

8004.1.13 Ventilation. Indoor dispensing and use areas shall be provided with exhaust ventilation in accordance with Section 8003.1.8.

EXCEPTION: Ventilation is not required for dispensing and use of flammable solids other than finely divided particles.

8004.1.14 Emergency shutoff for flammable, oxidizing and pyrophoric gases. Flammable, oxidizing and pyrophoric gas systems shall be provided with approved emergency shutoff systems that can be activated from each point of use and at each source. A readily accessible cylinder shutoff valve is acceptable for shutoff at the source for flammable and oxidizing gases.

8004.1.15 Container position for liquefied flammable gases and flammable gases in solution. Containers of liquefied flammable gases and flammable gases in solution shall be in the upright position or positioned such that the pressure-relief valve is in direct contact with the vapor phase of the container.

8004.1.16 Bulk oxygen systems. Bulk oxygen systems at industrial and institutional consumer sites shall be in accordance with U.F.C. Standard 74-1.

8004.1.17 Liquid transfer. Liquids having a hazard ranking of 3 or 4 in accordance with U.F.C. Standard 79-3 shall be transferred by one of the following methods:

EXCEPTION: Liquids having a hazard ranking of 3 and in containers not exceeding 5.3 gallons (20.1 L) capacity.

1. From safety cans.
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. From containers or tanks by gravity through an approved self- or automatic-closing valve when the container or tank and dispensing operations are provided with spill control and secondary containment. See Section 8003.1.7.

EXCEPTION: Highly toxic liquids shall not be dispensed by gravity from tanks.

5. Engineered liquid transfer systems approved by the chief.

8004.1.18 Silane. Use and dispensing of silane and mixtures of silane greater than 2 percent by volume shall be in accordance with Section 8004 and U.F.C. Standard 80-1.

8004.2 Indoor Dispensing and Use.

8004.2.1 General. Indoor dispensing and use of hazardous materials shall be in buildings complying with the Building Code and in accordance with Sections 8004.1 and 8004.2.

8004.2.2 Open systems.

8004.2.2.1 General. Dispensing and use of hazardous materials in open containers or systems shall be in accordance with Section 8004.2.2.

8004.2.2.2 Ventilation. When gases, liquids or solids having a hazard ranking of 3 or 4 in accordance with U.F.C. Standard 79-3 are dispensed or used, mechanical exhaust ventilation shall be provided to capture fumes, mists or vapors at the point of generation.

EXCEPTION: Gases, liquids or solids which can be demonstrated not to create harmful fumes, mists or vapors.

8004.2.2.3 Fire-extinguishing system. In addition to Section 8004.1.12, laboratory fume hoods and spray booths where flammable materials are dispensed or used shall be protected by an automatic fire-extinguishing system.

8004.2.2.4 Explosion control. Explosion control shall be provided in accordance with Section 8003.1.12 when an explosive environment can occur because of the characteristics or nature of the hazardous materials dispensed or used, or as a result of the dispensing or use process.

8004.2.2.5 Spill control, drainage control and secondary containment. Rooms or areas where hazardous material liquids are dispensed into containers exceeding a 1-gallon (3.785 L) capacity or used in open containers or systems exceeding a 5-gallon (18.93 L) capacity shall be provided with spill control. Secondary containment shall be provided when the capacity of an individual container exceeds 55 gallons (208.2 L) or the aggregate capacity of multiple containers exceeds 100 gallons (378.5 L).

8004.2.3 Closed systems.

8004.2.3.1 General. Use of hazardous materials in closed containers or systems shall be in accordance with Section 8004.2.3.

8004.2.3.2 Use. Systems shall be suitable for the use intended and shall be designed by persons competent in such design. Where nationally recognized good practices or standards have been established for the processes employed, they shall be followed in the design. Controls shall be designed to prevent materials from entering or leaving process or reaction systems at other than the intended time, rate or path. When automatic controls are provided, they shall be designed to be fail safe.

8004.2.3.3 Ventilation. If closed systems are designed to be opened as part of normal operations, ventilation shall be provided in accordance with Section 8004.2.2.2.

8004.2.3.4 Fire-extinguishing system. In addition to Section 8004.1.12, laboratory fume hoods and spray booths where flammable materials are used shall be protected by an automatic fire-extinguishing system.

8004.2.3.5 Explosion control. Explosion control shall be provided in accordance with Section 8003.1.12 when an explosive environment can occur because of the hazardous materials dispensed or used, or as a result of the dispensing or use process.

EXCEPTION: When process vessels are designed to fully contain the worst-case explosion anticipated within the vessel under process conditions considering the most likely failure.

8004.2.3.6 Spill control, drainage control and secondary containment. Rooms or areas where hazardous material liquids are used in individual tanks or containers exceeding 55 gallons (208.2 L) shall be provided with spill control. Secondary containment shall be provided if the aggregate capacity of multiple tanks or containers exceeds 1,000 gallons (3785 L).

8004.2.3.7 Special requirements for highly toxic and toxic compressed gases.

8004.2.3.7.1 Ventilation and storage arrangement. Compressed gas cylinders shall be within gas cabinets, exhausted enclosures or gas rooms. Portable or stationary tanks shall be within gas rooms or exhausted enclosures.

8004.2.3.7.2 Gas cabinets. Gas cabinets shall be in accordance with Section 8003.3.1.3.2. Gas cabinets shall be internally sprinklered.

8004.2.3.7.3 Exhausted enclosures. Exhausted enclosures shall be in accordance with Section 8003.3.1.3.3. Exhausted enclosures shall be internally sprinklered.

8004.2.3.7.4 Gas rooms. Gas rooms shall be in accordance with Section 8003.3.1.3.4. Gas rooms shall be internally sprinklered.

8004.2.3.7.5 Treatment systems. Treatment systems shall be provided in accordance with Section 8003.3.1.3.5.

8004.2.3.7.6 Gas detection. Gas detection shall be provided in accordance with Section 8003.3.1.6. Activation of the monitoring system shall automatically close the shutoff valve on highly toxic or toxic gas supply lines related to the system being monitored.

EXCEPTION: Automatic shutdown need not be provided for reactors utilized for the production of toxic or highly toxic gases when such reactors are:

1. Operated at pressures less than 15 psig (103.4 kPa),
2. Constantly attended, and
3. Provided with readily accessible emergency shutoff valves.

8004.2.3.7.7 Smoke detection. Smoke detection shall be provided in accordance with Section 8003.3.1.7.

8004.2.3.7.8 Maximum number of cylinders per gas cabinet. The number of cylinders contained in a single gas cabinet shall not exceed three.

8004.2.3.7.9 Process equipment. Effluent from process equipment containing highly toxic or toxic gases which could be discharged to the atmosphere shall be processed through an exhaust scrubber or other processing system. Such systems shall be in accordance with the Mechanical Code as required for product-conveying ventilation systems.

8004.3 Outdoor Dispensing and Use.

8004.3.1 General. Outdoor dispensing or use of hazardous materials in both closed or open containers or systems shall be in accordance with Sections 8004.1 and 8004.3.

8004.3.2 Location. Outdoor dispensing and use areas for hazardous materials shall be located as required for outdoor storage in accordance with Section 8003.

8004.3.3 Fire-extinguishing system. Flammable hazardous materials dispensing or use areas located within 50 feet (15 240 mm) of either a storage area or building, and vehicle loading racks where flammable hazardous materials are dispensed, shall be protected by an approved fire-extinguishing system.

8004.3.4 Spill control, drainage control and secondary containment.

8004.3.4.1 Open systems. Outdoor areas where hazardous materials liquids are dispensed into containers exceeding a 1-gallon (3.785 L) capacity or used in open containers or systems exceeding a 5-gallon (18.93 L) capacity shall be provided with spill control. Secondary containment shall be provided when the capacity of an individual container exceeds 55 gallons (208.2 L) or the aggregate capacity of multiple containers exceeds 100 gallons (378.5 L).

8004.3.4.2 Closed systems. Outdoor areas where hazardous materials liquids are used in individual tanks or containers exceeding 55 gallons (208.2 L) shall be provided with a means to control spills. Secondary containment shall be provided when the aggregate capacity of multiple tanks or containers exceeds 1,000 gallons (3785 L).

8004.3.5 Clearance from combustibles. The area surrounding an outdoor dispensing or use area shall be kept clear of combustible materials and vegetation for a minimum distance of 30 feet (9144 mm).

8004.3.6 Special requirements for toxic and highly toxic compressed gases.

8004.3.6.1 Ventilation and arrangement. When cylinders, containers or portable tanks are used outdoors, gas cabinets or exhausted enclosures shall be provided.

8004.3.6.2 Gas cabinets. Gas cabinets shall be in accordance with Section 8003.3.1.3.2.

8004.3.6.3 Exhausted enclosures. Exhausted enclosures shall be in accordance with Section 8003.3.1.3.3.

8004.3.6.4 Treatment systems. Treatment systems shall be provided in accordance with Section 8003.3.1.3.5.

8004.3.6.5 Gas detection. Gas detection shall be provided in gas cabinets and exhausted enclosures in accordance with Section 8003.3.1.6. Activation of the monitoring system shall automati-

cally close the shutoff valve on highly toxic or toxic gas supply lines related to the system being monitored.

EXCEPTION: Automatic shutdown need not be provided for reactors utilized for the production of toxic or highly toxic gases when such reactors are:

1. Operated at pressures less than 15 psig (103.4 kPa),
2. Constantly attended, and
3. Provided with readily accessible emergency shutoff valves.

8004.3.6.6 Fire-extinguishing system. Gas cabinets and exhausted enclosures shall be internally sprinklered.

8004.3.7 Special requirements for flammable gases. Flammable gases shall be located in accordance with Table 8003.5-A.

8004.3.8 Special requirements for oxidizer gases. Oxidizer gases shall be located in accordance with Table 8003.6-G.

8004.3.9 Special requirements for pyrophoric gases. Pyrophoric gases shall be located in accordance with Table 8003.8-A.

8004.4 Handling.

8004.4.1 General. Handling of hazardous materials in indoor and outdoor locations shall be in accordance with Sections 8004.1 and 8004.4.

8004.4.2 Location. Outdoor handling areas for hazardous materials shall be located as required for outdoor storage in accordance with Section 8003.

8004.4.3 Emergency alarm. When hazardous materials having a hazard ranking of 3 or 4 in accordance with U.F.C. Standard 79-3 are transported through exit corridors or exit enclosures, there shall be an emergency telephone system, a local manual alarm station or an approved alarm-initiating device at not more than 150-foot (45 720 mm) intervals and at each exit doorway throughout the transport route. The signal shall be relayed to an approved central, proprietary or remote station service or constantly attended on-site location and shall also initiate a local audible alarm.

ARTICLE 81 — HIGH-PILED COMBUSTIBLE STORAGE

SECTION 8101 — GENERAL

8101.1 Scope. Buildings containing high-piled combustible storage shall be in accordance with Article 81. In addition to the requirements of Article 81, aerosols shall be in accordance with Article 88, flammable and combustible liquids shall be in accordance with Article 79, and hazardous materials shall be in accordance with Article 80.

8101.2 Definitions.

8101.2.1 General. For definitions of AEROSOL; ARRAY; ARRAY, CLOSED; BINBOX; COMMODITY; CURTAIN BOARD; EARLY SUPPRESSION FAST-RESPONSE SPRINKLER; EXPANDED PLASTIC; EXTRAHIGH-RACK COMBUSTIBLE STORAGE; HIGH-PILED COMBUSTIBLE STORAGE; LONGITUDINAL FLUE SPACE; MANUAL STOCKING METHODS; MECHANICAL STOCKING METHODS; SHELF STORAGE; AND TRANSVERSE FLUE SPACE, see Article 2.

8101.2.2 Limited application. For the purpose of Article 81, certain terms are defined as follows:

HIGH-PILED STORAGE AREA is an area within a building which is designated, intended, proposed or actually used for high-piled combustible storage.

SOLID SHELVING is shelving that is solid, slatted, mesh, or grated located within racks that obstructs sprinkler water penetration through the racks.

8101.3 Permits and Plan Submittal.

8101.3.1 Permits. For a permit to use a building for high-piled combustible storage, see Section 105, Permit h.3.

8101.3.2 Plans and specifications submittal. At the time of permit application, plans and specifications including the information specified in Section 8101.3.2 shall be submitted for review and approval. Following approval of the plans, a copy of the approved plans shall be maintained on the premises in an approved location. The plans shall include the following:

1. Floor plan of the building showing locations and dimensions of high-piled storage areas.
2. Useable 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 8101.4.
8. Location of commodities which are banded or encapsulated.
9. Location of required fire department access doors.
10. Type of fire-suppression and fire-detection 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, when required by the chief.

8101.3.3 Evacuation plan. When required by the chief, an evacuation plan for public accessible areas and a separate set of plans indicating location and width of aisles, location of exits and exit signs, height of storage, and locations of hazardous materials shall be submitted at the time of permit application for review and approval. Following approval of the plans, a copy of the approved plans shall be maintained on the premises in an approved location.

8101.4 Commodity Classification.

8101.4.1 General.

8101.4.1.1 Classification of commodities. Commodities shall be classified as Class I, II, III, IV or high hazard in accordance with Section 8101.4.1. Materials listed within each commodity classification are assumed to be unmodified for improved combustibility characteristics. Use of flame-retarding modifiers or the physical form of the material could change the classification. See Section 8101.4.2 for classification of Groups A, B and C plastics.

8101.4.1.2 Class I commodities. Class I commodities are essentially noncombustible products on wooden or nonexpanded polyethylene solid deck pallets, in ordinary corrugated cartons with or without single-thickness dividers, or in ordinary paper wrappings with or without pallets. Class I commodities are allowed to contain a limited amount of Group A plastics in accordance with Section 8101.4.3. Examples of Class I commodities include, but are not limited to, the following:

Alcoholic beverages not exceeding 20 percent alcohol

Appliances—noncombustible, electrical

Cement in bags

Ceramics

Dairy products in nonwax-coated containers (excluding bottles)

Dry insecticides

Foods in noncombustible containers

Fresh fruits and vegetables in nonplastic trays or containers

Frozen foods

Glass

Glycol in metal cans

Gypsum board

Inert materials, bagged

Insulation, noncombustible

Noncombustible liquids in plastic containers having less than a 5-gallon (18.9 L) capacity

Noncombustible metal products

8101.4.1.3 Class II commodities. Class II commodities are Class I products in slatted wooden crates, solid wooden boxes, multiple-thickness paperboard cartons or equivalent combustible packaging material with or without pallets. Class II commodities are allowed to contain a limited amount of Group A plastics in accordance with Section 8101.4.3. Examples of Class II commodities include, but are not limited to, the following:

Alcoholic beverages not exceeding 20 percent alcohol, in combustible containers

Foods in combustible containers

Incandescent or fluorescent light bulbs in cartons

Thinly coated fine wire on reels or in cartons

8101.4.1.4 Class III commodities. Class III commodities are commodities of wood, paper, natural fiber cloth, or Group C plastics or products thereof, with or without pallets. Products are allowed to contain limited amounts of Group A or B plastics, such as metal bicycles with plastic handles, pedals, seats and tires. Group A plastics shall be limited in accordance with Section 8101.4.3. Examples of Class III commodities include, but are not limited to, the following:

Aerosol, Level 1 (see Article 88)

Combustible fiberboard

Cork, baled

Feed, bagged

Fertilizers, bagged

Food in plastic containers

Furniture: wood, natural fiber, upholstered, nonplastic, wood or metal with plastic-padded and covered arm rests

Glycol in combustible containers not exceeding 25 percent

Lubricating or hydraulic fluid in metal cans

Lumber

Mattresses, excluding foamed rubber and foamed plastics

Noncombustible liquids in plastic containers having a capacity of more than 5 gallons (18.9 L)

Paints, oil base, in metal cans

Paper, waste, baled

Paper and pulp, horizontal storage, or vertical storage that is banded or protected with approved wrap

Paper in cardboard boxes

Pillows, excluding foamed rubber and foamed plastics

Plastic-coated paper food containers

Plywood

Rags, baled

Rugs, without foamed backing

Sugar, bagged

Wood, baled

Wood doors, frames and cabinets

Yarns of natural fiber and viscose

8101.4.1.5 Class IV commodities. Class IV commodities are Class I, II or III products containing Group A plastics in ordinary corrugated cartons and Classes I, II and III products, with Group A plastic packaging, with or without pallets. Group B plastics and free-flowing Group A plastics are also included in this class. The total amount of nonfree-flowing Group A plastics shall be in accordance with Section 8101.4.3. Examples of Class IV commodities include, but are not limited to, the following:

Aerosol, Level 2 (see Article 88)

Alcoholic beverages, exceeding 20 percent but less than 80 percent alcohol, in cans or bottles in cartons

Clothing, synthetic or nonviscose

Combustible metal products (solid)

Furniture, plastic upholstered

Furniture, wood or metal with plastic covering and padding

Glycol in combustible containers (greater than 25 percent and less than 50 percent)

Linoleum products

Paints, oil base in combustible containers

Pharmaceutical, alcoholic elixirs, tonics, etc.

Rugs, foamed back

Shingles, asphalt

Thread or yarn, synthetic or nonviscose

8101.4.1.6 High-hazard commodities. High-hazard commodities are high-hazard products presenting special fire hazards beyond those of Class I, II, III or IV. Group A plastics not otherwise classified are included in this class. Examples of high-hazard commodities include, but are not limited to, the following:

Aerosol, Level 3 (see Article 88)

Alcoholic beverages, exceeding 80 percent alcohol, in bottles or cartons

Flammable solids (except solid combustible metals)

Glycol in combustible containers (50 percent or greater)

Lacquers, which dry by solvent evaporation, in metal cans or cartons

Lubricating or hydraulic fluid in plastic containers

Mattresses, foamed rubber or foamed plastics

Pallets and flats which are idle combustible

Paper, asphalt, rolled, horizontal storage

Paper, asphalt, rolled, vertical storage

Paper and pulp, rolled, in vertical storage which is unbanded or not protected with an approved wrap

Pillows, foamed rubber and foamed plastics

Pyroxylin

Rubber tires

Vegetable oil and butter in plastic containers

8101.4.2 Classification of plastics.

8101.4.2.1 General. Plastics shall be designated as Group A, B or C in accordance with Section 8101.4.2.

8101.4.2.2 Group A plastics. Group A plastics are plastic materials having a heat of combustion that is much higher than that of ordinary combustibles, and a burning rate higher than that of Group B plastics. Examples of Group A plastics include, but are not limited to, the following:

ABS (acrylonitrile-butadiene-styrene copolymer)

Acetal (polyformaldehyde)

Acrylic (polymethyl methacrylate)

Butyl rubber

EPDM (ethylene-propylene rubber)

FRP (fiberglass-reinforced polyester)

Natural rubber (expanded)

Nitrile rubber (acrylonitrile-butadiene rubber)

PET or PETE (polyethylene terephthalate)

Polybutadiene

Polycarbonate

Polyester elastomer

Polyethylene

Polypropylene

Polystyrene (expanded and unexpanded)

Polyurethane (expanded and unexpanded)

PVC (polyvinyl chloride greater than 15 percent plasticized, e.g., coated fabric unsupported film)

SAN (styrene acrylonitrile)

SBR (styrene-butadiene rubber)

8101.4.2.3 Group B plastics. Group B plastics are plastic materials having a heat of combustion and a burning rate higher than that of ordinary combustibles, but not as high as those of Group A plastics. Examples of Group B plastics include, but are not limited to, the following:

Cellulosics (cellulose acetate, cellulose acetate butyrate, ethyl cellulose)

Chloroprene rubber

Fluoroplastics (ECTFE, ethylene-chlorotrifluoroethylene copolymer; ETFE, ethylene-tetrafluoroethylene copolymer; FEP, fluorinated ethylene-propylene copolymer)

Natural rubber (nonexpanded)

Nylon (Nylon 6, Nylon 6/6)

PVC (polyvinyl chloride greater than 5 percent, but not exceeding 15 percent plasticized)

Silicone rubber

8101.4.2.4 Group C plastics. Group C plastics are plastic materials which have a heat of combustion and a burning rate similar to those of ordinary combustibles. Examples of Group C plastics include, but are not limited to, the following:

Fluoroplastics (PCTFE, polychlorotrifluoroethylene; PTFE, polytetrafluoroethylene)

Melamine (melamine formaldehyde)

Phenol

PVC (polyvinyl chloride, rigid or plasticized less than 5 percent, e.g., pipe, pipe fittings)

PVDC (polyvinylidene chloride)

PVDF (polyvinylidene fluoride)

PVF (polyvinyl fluoride)

Urea (urea formaldehyde)

8101.4.3 Limited quantities of Group A plastics in mixed commodities. Figure 8101.4-A shall be used to determine the quantity of Group A Plastics allowed to be stored in a package or carton or on a pallet without increasing the commodity classification.

8101.5 Designation of High-piled Storage Areas.

8101.5.1 General. High-piled storage areas, and portions of high-piled storage areas intended for storage of a different commodity class than adjacent areas, shall be designed and specifically designated to contain Class I, Class II, Class III, Class IV or high-hazard commodities. The designation of a high-piled combustible storage area, or portion thereof intended for storage of a different commodity class, shall be based on the highest hazard commodity class stored except as provided in Section 8101.5.2.

8101.5.2 Designation based on engineering analysis. The designation of a high-piled combustible storage area, or portion thereof, is allowed to be based on a lower hazard class than that of the highest class of commodity stored when a limited quantity of the higher hazard commodity has been demonstrated by engineering analysis to be adequately protected by the sprinkler system provided. The engineering analysis shall consider the ability of the sprinkler system to deliver the higher density required by the higher-hazard commodity. The higher density shall be based on the actual storage height of the pile or rack and the minimum allowable design area for sprinkler operation as set forth in the density/area figures provided in U.F.C. Standards 81-1 and 81-2. The contiguous area occupied by higher-hazard commodity shall not exceed 120 square feet (11.15 m^2), and additional areas of higher-hazard commodity shall be separated from other such areas by 25 feet (7620 mm) or more.

The sprinkler system shall be capable of delivering the higher density over a minimum area of 900 square feet (83.6 m^2) for wet pipe systems and 1,200 square feet (111.5 m^2) for dry pipe systems. The shape of the design area shall be in accordance with the Building Code (see U.B.C. Standard 9-1).

8101.6 Housekeeping and Maintenance.

8101.6.1 Rack structures. The structural integrity of racks shall be maintained.

8101.6.2 Ignition sources.

8101.6.2.1 General. Clearance from ignition sources shall be provided in accordance with Section 1109.

8101.6.2.2 Smoking. Smoking shall be prohibited. Approved NO SMOKING signs shall be conspicuously posted. See Section 1109.4.

8101.6.3 Aisle maintenance. When restocking is not being conducted, aisles shall be kept clear of storage, waste material and debris. Fire department access doors, aisles and exit doors shall not be obstructed.

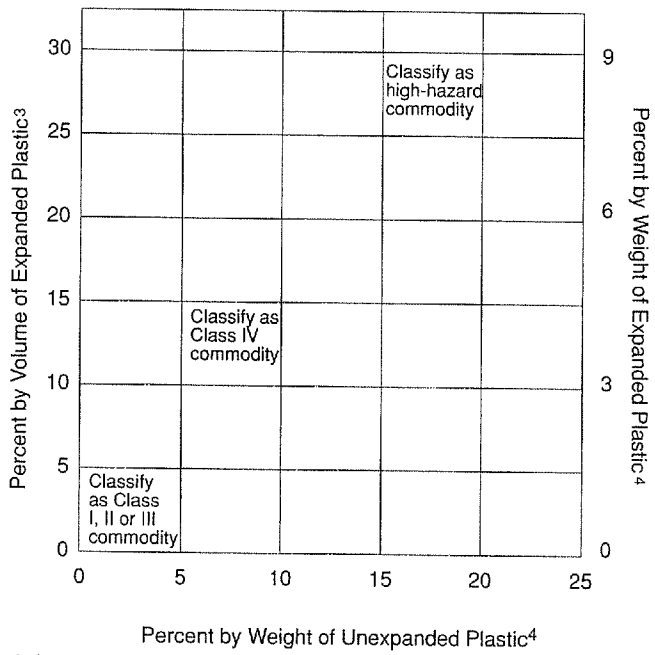
During restocking operations using manual stocking methods, a minimum unobstructed aisle width of 24 inches (609.6 mm) shall be maintained in 48-inch (1219.2 mm) or smaller aisles, and a minimum unobstructed aisle width of one half of the required aisle width shall be maintained in aisles greater than 48 inches (1219.2 mm). During mechanical stocking operations, a minimum unobstructed aisle width of 44 inches (1117.6 mm) shall be maintained. See Section 8102.9.

8101.6.4 Pile dimension and height limitations. See Section 8103.3.

8101.6.5 Arrays. See Section 8103.4.

8101.6.6 Flue spaces. See Section 8104.3.

FIGURE 8101.4-A—MIXED COMMODITIES[1,2]
(See Section 8101.4.3)



[1]This table is intended to determine the commodity classification of a mixed commodity in a package, carton or on a pallet when plastics are involved.

[2]The following is an example of how to apply the table: A package containing a Class III commodity has 12 percent Group A expanded plastic by volume. The weight of the unexpanded plastic is 10 percent. This commodity is classified as a Class IV commodity. If the weight of the unexpanded plastic is increased to 14 percent, the classification changes to a high-hazard commodity.

[3]Percent by volume = $\frac{\text{Volume of plastic in pallet load}}{\text{Total volume of pallet load, including pallet}}$

[4]Percent by weight = $\frac{\text{Weight of plastic in pallet load}}{\text{Total weight of pallet load, including pallet}}$

SECTION 8102 — GENERAL FIRE-PROTECTION AND LIFE-SAFETY FEATURES

8102.1 General. Fire-protection and life-safety features for high-piled storage areas shall be in accordance with Section 8102. Nationally recognized standards or guidelines, as applicable, are allowed to be used when approved by the chief.

8102.2 Separation of High-piled Storage Areas. Portions of buildings that do not meet the requirements of Article 81 for high-piled storage areas shall be separated from high-piled storage areas by one of the following methods:

EXCEPTION: Separation is not required between accessory areas that are fully protected with automatic sprinkler systems. Accessory areas shall include, but need not be limited to, loading areas, check out areas, restrooms, employee lounges and offices. Fire protection for high-piled storage and smoke and heat venting shall extend a minimum of 15 feet (4572 mm) beyond the high-piled storage area.

1. A two-hour area-separation wall between areas not protected with automatic sprinkler systems or high-piled storage areas in excess of the maximum allowable areas set forth in Table 81-A,

2. A 60-foot (18 288 mm) space not used for combustible storage, or

3. A minimum of a one-hour occupancy separation wall between other sprinklered areas that are not accessory to the high-piled storage area.

8102.3 Fire Sprinklers. Fire sprinkler systems shall be provided in accordance with Sections 8103 and 8104.

8102.4 Fire Detection. When fire detection is required by Table 81-A, an approved automatic fire-detection system shall be installed throughout the high-piled storage area. The system shall be monitored and shall be in accordance with Section 1007.

8102.5 Building Access.

8102.5.1 Access roadways. When building access is required by Table 81-A, access roadways shall be provided to within 150 feet (45.7 mm) of all portions of the exterior walls of buildings used for high-piled storage.

EXCEPTION: When access roads cannot be installed due to topography, railways, waterways, nonnegotiable grades or other similar conditions, the chief is authorized to require additional fire protection as required for special hazards in Section 1001.9.

Specifications for fire apparatus access roads shall be in accordance with Section 902.2.

8102.5.2 Access doors.

8102.5.2.1 General. When building access is required by Table 81-A, fire department access doors shall be provided in accordance with Section 8102.5.2. Access doors shall be accessible without the use of a ladder.

8102.5.2.2 Number of doors required. One or more access doors shall be provided in each 100 lineal feet (30 480 mm), or major fraction thereof, of the exterior walls which face required access roadways.

8102.5.2.3 Door size and type. Access doors shall not be less than 3 feet (914 mm) in width and 6 feet 8 inches (2032 mm) in height. Roll-up doors shall not be used unless approved by the chief.

8102.5.2.4 Locking devices. Only approved locking devices shall be used.

8102.6 Smoke and Heat Removal.

8102.6.1 General. When smoke and heat removal are required by Table 81-A, smoke and heat vents shall be provided in accordance with Section 8102.6.

EXCEPTIONS: 1. When the installation of smoke and heat vents is determined by the chief to be impractical, mechanical smoke-removal systems are allowed to be provided in accordance with U.F.C. Standard 81-3.

2. Frozen food storage classified as a Class I or Class II commodity is not required to be provided with smoke and heat vents or mechanical smoke removal when protected by an automatic sprinkler system.

8102.6.2 Types of vents. Smoke and heat vents shall be of an approved type and shall be operated automatically by activation of a heat-responsive device rated between 100 and 200°F. (37.8 and 182.2°C.) above estimated ambient temperatures. The heat-responsive device shall be listed and labeled. Smoke and heat vents shall activate fully when the vent cavity is exposed to a simulated fire or a time/temperature gradient that reaches an air temperature of 500°F. (260°C.) within five minutes. Smoke and heat vents shall have the capability of being opened by an approved manual operation.

8102.6.3 Vent dimensions. The effective venting area shall not be less than 16 square feet (1.49 m^2) with no dimension less than 4 feet (1219 mm), excluding ribs or gutters having a total width not exceeding 6 inches (152.4 mm).

8102.6.4 Vent locations. Smoke and heat vents shall be located in accordance with Table 81-B. Vents shall be located 20 feet (6096 mm) or more from lines of adjacent properties and 10 feet (3048 mm) or more from occupancy separation walls separating other high-piled storage areas. Vents shall be uniformly located within the roof area above high-piled storage areas.

8102.7 Curtain Boards.

8102.7.1 General. When curtain boards are required by Table 81-A, curtain boards shall be provided in accordance with Section 8102.7.

8102.7.2 Construction. Curtain boards shall be constructed of sheet metal, lath and plaster, gypsum wallboard, or other approved materials which provide equivalent performance that will resist the passage of smoke. Joints and connections shall be smoke tight.

8102.7.3 Location and depth. The location and depth of curtain boards shall be in accordance with Table 81-B.

8102.8 Hose Stations and Hose Connections.

8102.8.1 Small hose stations. When small hose valves and stations are required by Table 81-A, approved $1^1/_2$-inch (38.1 mm) hose valves shall be provided at approved locations. When required by the chief, hose, nozzles, hose racks, and cabinets or covers shall be provided. See U.F.C. Standards 81-1 and 81-2.

8102.8.2 Fire department hose connections. When exit passageways are required by the building code for egress, a Class I standpipe system shall be provided in accordance with the Building Code. See U.B.C. Standard 9-2.

8102.9 Aisles.

8102.9.1 General. Aisles providing access to exits and fire department access doors shall be provided in high-piled storage areas exceeding 500 square feet (46.45 m^2) in accordance with Section 8102.9. For aisles separating storage piles or racks, see also U.F.C. Standards 81-1 and 81-2 and Article 88.

EXCEPTION: Where aisles are precluded by rack storage systems, alternate methods of access and protection are allowed when approved by the chief.

8102.9.2 Width.

8102.9.2.1 General. Aisle width shall be in accordance with Section 8102.9.2.

EXCEPTIONS: 1. Cross aisles used only for employee access between aisles shall be 24 inches (609.6 mm) or more in width.

2. Aisles separating shelves classified as shelf storage shall be 30 inches (762 mm) or more in width.

8102.9.2.2 Sprinklered buildings. Aisles in sprinklered buildings shall be 44 inches (1117.6 mm) or more in width. Aisles shall be 96 inches (2438.4 mm) or more in width in high-piled storage areas exceeding 2,500 square feet (232.26 m^2) in area and designated to contain high-hazard commodities.

Aisles shall be 96 inches (2438.4 mm) or more in width in public accessible areas where mechanical stocking methods are used.

8102.9.2.3 Nonsprinklered buildings. Aisles in nonsprinklered buildings shall be 96 inches (2438.4 mm) or more in width.

8102.9.3 Clear height. The required aisle width shall extend from floor to ceiling. Rack structural supports and catwalks are allowed to cross aisles at a height 6 feet 8 inches (2032 mm) or more above the level of the finished floor, provided that such supports do not interfere with fire department hose stream trajectory.

8102.9.4 Dead ends. Dead end aisles shall be in accordance with the Building Code (see U.B.C. Chapter 10).

8102.10 Portable Fire Extinguishers. Portable fire extinguishers shall be provided in accordance with U.F.C. Standard 10-1.

SECTION 8103 — SOLID-PILED AND SHELF STORAGE

8103.1 General. Shelf storage and storage in solid piles, solid piles on pallets and binbox storage in binboxes not exceeding 5 feet (1524 mm) in any dimension shall be in accordance with Sections 8102 and 8103.

8103.2 Fire Protection.

8103.2.1 General. When fire sprinklers are required by Table 81-A, an approved automatic fire sprinkler system shall be installed. The design and installation of the automatic fire sprinkler system and other applicable fire protection shall be in accordance with the Building Code (see U.B.C. Standard 9-1) and U.F.C. Standard 81-1.

8103.2.2 Shelf storage. Shelf storage greater than 12 feet (3658 mm) but less than 15 feet in height shall be in accordance with the fire-protection requirements set forth in U.F.C. Standard 81-1. Shelf storage 15 feet (4572 mm) or more in height shall be protected in an approved manner with special fire protection, such as in-rack sprinklers.

8103.3 Pile Dimension and Height Limitations. Pile dimensions, the maximum permissible storage height and pile volume shall be in accordance with Table 81-A.

8103.4 Array. When a fire sprinkler system design utilizes protection based on a closed array, array clearances shall be provided and maintained as specified by the standard used.

SECTION 8104 — RACK STORAGE

8104.1 General. Rack storage shall be in accordance with Sections 8102 and 8104. Binboxes exceeding 5 feet (1524 mm) in any dimension shall be regulated as rack storage.

8104.2 Fire Protection.

8104.2.1 General. When fire sprinklers are required by Table 81-A, an approved automatic fire sprinkler system shall be installed. The design and installation of the automatic fire sprinkler system and other applicable fire protection shall be in accordance with the Building Code (see U.B.C. Standard 9-1) and U.F.C. Standard 81-2.

8104.2.2 Plastic pallets and shelves. Storage on plastic pallets or plastic shelves shall be protected by approved specially engineered fire-protection systems.

8104.2.3 Racks with solid shelving.

8104.2.3.1 General. Racks with solid shelving having an area greater than 32 square feet (2.97 m^2), measured between approved flue spaces at all four edges of the shelf, shall be in accordance with Section 8104.2.3.

> **EXCEPTION:** Racks with mesh, grated, slatted or similar shelves having uniform openings not more than 6 inches (152.4 mm) apart, comprising at least 50 percent of overall shelf area, and with approved flue spaces, are allowed to be treated as racks without solid shelves.

8104.2.3.2 Fire protection. Fire protection for racks with solid shelving shall be in accordance with the requirements for racks with solid shelving set forth in U.F.C. Standard 81-2 or other nationally recognized standards. See Article 90, Standard f.1.1.

8104.3 Flue Spaces.

8104.3.1 General. Flue spaces shall be provided in accordance with Section 8104.3. Required flue spaces shall be maintained.

8104.3.2 Transverse flues. Racks that are not protected with an approved in-rack sprinkler system shall have nominal 3-inch (76.2 mm) transverse flue spaces provided between loads or at rack uprights. Random variation in width or in vertical alignment is allowed, provided the configuration does not obstruct water penetration.

8104.3.3 Longitudinal flues. Six-inch (152.4 mm) longitudinal flue spaces shall be provided in double and multirow racks.

EXCEPTION: Longitudinal flue spaces in double-row racks not exceeding 25 feet (7620 mm) without solid shelving that are provided with 6-inch (152.4 mm) transverse flue spaces.

8104.3.4 ESFR sprinklers. Longitudinal flue spacing shall be provided in rack configurations that are protected by early suppression-fast response (ESFR) sprinklers.

8104.4 Column Protection. Steel building columns shall be protected in accordance with U.F.C. Standard 81-2.

8104.5 Extrahigh-rack Storage Systems.

8104.5.1 Required approvals. Approval of the chief shall be obtained prior to installing extra-high-rack combustible storage.

8104.5.2 Fire protection. Buildings with extrahigh-rack combustible storage shall be protected with a specially engineered automatic sprinkler system. Extrahigh-rack combustible storage shall be provided with additional special fire protection, such as separation from other buildings and additional built-in fire-protection features and fire department access, when required by the chief.

TABLE 81-A—GENERAL FIRE-PROTECTION AND LIFE-SAFETY REQUIREMENTS

COMMODITY CLASS	SIZE OF HIGH-PILED STORAGE AREA[1] (sq. ft.) (See Section 8102.2) × 0.0929 for m^2	ALL STORAGE AREAS (See Sections 8102, 8103 and 8104)[2]						SOLID-PILED STORAGE, SHELF STORAGE AND PALLETIZED STORAGE (See Section 8103.3)		
		Automatic Fire-extinguishing System (See Section 8102.3)	Fire-detection System (See Section 8102.4)	Building Access (See Section 8102.5)	Smoke and Heat Removal (See Section 8102.6)	Curtain Boards (See Section 8102.7)	Small Hose Valves and Stations (See Section 8102.8)	Maximum Pile Dimension[4] (ft.) × 3048 for mm	Maximum Permissible Storage Height[5] (ft.) × 3048 for mm	Maximum Pile Volume (cu. ft.) × 0.0283 for m^3
I-IV	0-500	NR	NR	NR[6]	NR	NR[3]	NR	NR	NR	NR
	501-2,500	NR	Yes	NR[6]	NR	NR[3]	NR	100	40	100,000
	2,501-12,000 Public accessible	Yes	NR	NR[6]	NR	NR[3]	NR	100	40	400,000
	2,501-12,000 Nonpublic accessible (Option 1)	Yes	NR	NR[6]	NR	NR[3]	NR	100	40	400,000
	2,501-12,000 Nonpublic accessible (Option 2)	NR	Yes	Yes	Yes	Yes	Yes	100	30[7]	200,000
	12,001-20,000	Yes	NR	Yes	Yes	Yes	Yes	100	40	400,000
	20,001-500,000	Yes	NR	Yes	Yes	Yes	Yes	100	40	400,000
	Greater than 500,000[8]	Yes	NR	Yes	Yes	Yes	Yes	100	40	400,000
High hazard	0-500	NR	NR	NR[6]	NR	NR[3]	NR	50	NR	NR
	501-2,500 Public accessible	Yes	NR	NR[6]	NR	NR[3]	NR	50	30	75,000
	501-2,500 Nonpublic accessible (Option 1)	Yes	NR	NR[6]	NR	NR[3]	NR	50	30	75,000
	501-2,500 Nonpublic accessible (Option 2)	NR	Yes	Yes	Yes	Yes	Yes	50	20	50,000
	2,501-300,000	Yes	NR	Yes	Yes	Yes	Yes	50	30	75,000
	300,001-500,000[8,9]	Yes	NR	Yes	Yes	Yes	Yes	50	30	75,000

NR = Not required.

[1]The size of the high-piled storage area to be considered when using this table shall include the high-piled storage area and all portions of the building not separated from the high-piled storage area in accordance with Section 8102.2.

[2]For aisles, see Section 8102.9.

[3]Curtain boards shall be installed as required by the Building Code. See U.B.C. Section 906.

[4]Piles shall be separated by aisles complying with Section 8102.9.

[5]For storage in excess of the height indicated, special fire protection shall be provided in accordance with Footnote 8 when required by the chief. See also Articles 79 and 88 for special limitations for flammable and combustible liquids and aerosols.

[6]Section 902.2 shall apply for fire apparatus access.

[7]For storage exceeding 30 feet (914 mm) in height, Option 1 shall be used.

[8]Special fire-protection provisions such as, 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 additional fire department hose connections shall be provided when required by the chief.

[9]High-piled storage areas shall not exceed 500,000 square feet (46 451.5 m^2). A two-hour area separation wall shall be used to divide high-piled storage exceeding 500,000 square feet (46 451.5 m^2) in area.

TABLE 81-B—REQUIREMENTS FOR CURTAIN BOARDS AND SMOKE VENTING[1]
(See Sections 8102.6.4 and 8102.7.3)

COMMODITY CLASSIFICATION	DESIGNATED STORAGE HEIGHT (ft.)	CURTAIN BOARD DEPTH (ft.)	MAXIMUM AREA FORMED BY CURTAIN BOARDS[2] (sq. ft.)	VENT AREA TO FLOOR AREA RATIO	MAXIMUM SPACING OF VENT CENTERS (ft.)	MAXIMUM DISTANCE TO VENTS FROM WALL OR CURTAIN BOARDS[3] (ft.)
	× 3048 for mm		× 0.0929 for m^2		× 3048 for mm	
I-IV (Option 1)	20 or less	6	10,000	1:100	100	60
	over 20-40	6	8,000	1:75	100	55
I-IV (Option 2)	20 or less	4	3,000	1:75	100	55
	over 20-40	4	3,000	1:50	100	50
High hazard (Option 1)	20 or less	6	6,000	1:50	100	50
	over 20-30	6	6,000	1:40	90	45
High hazard (Option 2)	20 or less	4	4,000	1:50	100	50
	over 20-30	4	2,000	1:30	75	40

[1]For rack storage heights in excess of those indicated, see Section 8104.5. For solid-piled storage heights in excess of those indicated, an approved engineered design shall be used.

[2]When curtain boards are provided in buildings equipped with early suppression-fast response sprinklers, the curtain boards shall be located only at the perimeters of sprinkler systems.

[3]The distance specified is the maximum distance from any vent in a particular curtained area to walls or curtain boards which form the perimeter of the curtained area.

ARTICLE 82 — LIQUEFIED PETROLEUM GASES

SECTION 8201 — SCOPE

Storage, handling and transportation of LP-gas and the installation of equipment pertinent to systems for such uses shall be in accordance with Article 82. For determining properties of LP-gases, see U.F.C. Standard 82-1, Appendix A.

SECTION 8202 — PERMITS, PLANS AND RECORDS

8202.1 Permits and Plans. For a permit to store, use, handle or dispense LP-gas, or to install or maintain an LP-gas container see Section 105, Permit 1.1.

EXCEPTION: A permit is not required to install or maintain portable containers of less than 125-gallon (473.2 L) aggregate water capacity.

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 chief.

Where a single container is over 2,000-gallon (7571 L) water capacity or the aggregate capacity of containers is over 4,000-gallon (15 142 L) water capacity, the installer shall submit plans for such installation.

8202.2 Records. Installers shall maintain a record of installations for which a permit is not required by Section 105 and have such record available for inspection by the chief.

EXCEPTION: Installation of gas-burning appliances and replacement of portable cylinders.

SECTION 8203 — INSTALLATION OF EQUIPMENT

8203.1 General. Liquefied petroleum gas equipment shall be installed in accordance with U.F.C. Standard 82-1, except as otherwise provided in Article 82 and in other laws or regulations.

8203.2 Use of LP-gas Containers in Buildings.

8203.2.1 Portable containers.

8203.2.1.1 General. Portable LP-gas containers, as defined in U.F.C. Standard 82-1, shall not be used in buildings except as specified in U.F.C. Standard 82-1 and Section 8203.2.1.

8203.2.1.2 Construction and temporary heating. Portable containers are allowed to be used in buildings or areas of buildings undergoing construction or for temporary heating as set forth in U.F.C. Standard 82-1, Sections 3-4.3, 3-4.4, 3-4.5 and 3-4.7.

8203.2.1.3 Industrial uses. In occupancies used for industrial purposes, portable LP-gas containers are allowed to be used to supply quantities necessary for processing, research or experimentation. When manifolded, the aggregate water capacity of such containers shall not exceed 735 pounds (333.4 kg) per manifold. When multiple manifolds of such containers are present in the same room, each manifold shall be separated from other manifolds by a distance of not less than 20 feet (6096 mm).

8203.2.1.4 Educational and institutional uses. In occupancies used for educational and institutional purposes, portable LP-gas containers are allowed to be used for research and experimentation. Such containers shall not be used in classrooms. Such containers shall not exceed a 50-pound (22.7 kg) water capacity in occupancies used for educational purposes and shall not exceed a 12-pound (5.4 kg) water capacity in occupancies used for institutional purposes. When more than one such container is present in the same room, each container shall be separated from other containers by a distance of not less than 20 feet (6096 mm).

8203.2.1.5 Demonstration uses and food preparation. Portable LP-gas containers are allowed to be used temporarily for demonstrations and public exhibitions. Such containers shall not be used for residential or commercial food preparation. Such containers shall not exceed a 12-pound (5.4 kg) water capacity. When more than one such container is present in the same room, each container shall be separated from other containers by a distance of not less than 20 feet (6096 mm).

8203.2.1.6 Use with self-contained torch assemblies. Portable LP-gas containers are allowed to be used to supply approved self-contained torch assemblies or similar appliances. Such containers shall not be used for residential or commercial food preparation. Such containers shall not exceed a $2^1/_2$-pound (1.13 kg) water capacity.

8203.2.1.7 Use for food preparation. See Sections 8203.2.1.5 and 8203.2.1.6.

8203.2.2 Industrial vehicles and floor maintenance machines. Containers on industrial vehicles and floor maintenance machines shall be in accordance with U.F.C. Standard 82-1, Section 3-6.

8203.3 Location of Equipment and Piping. Equipment and piping shall not be installed in locations where such equipment and piping is prohibited by the Mechanical Code. See U.M.C. Chapter 3 and U.M.C. Appendix B, Chapter 13.

SECTION 8204 — LOCATION OF CONTAINERS

8204.1 General. The storage and transportation of LP-gas and the installation and maintenance of pertinent equipment shall be in accordance with U.F.C. Standard 82-1 and subject to the approval of the chief, except as provided in Article 82.

8204.2 Maximum Capacity within Established Limits. Within the limits established by law restricting the storage of LP-gas for the protection of heavily populated or congested commercial areas, the aggregate capacity of any one installation shall not exceed a 2,000-gallon (7571 L) water capacity (see sample adoption ordinance, Section 5).

8204.3 Container Location. Containers shall be located with respect to buildings, public ways, and lines of adjoining property which can be built on in accordance with Table 8204-A.

Containers shall also be located with respect to special hazards such as aboveground flammable or combustible liquid tanks, oxygen or gaseous hydrogen containers, flooding or electric power lines as specified in U.F.C. Standard 82-1, Section 3-2.2.6.

8204.4 Multiple Container Installation. Multiple container installations with a total water storage capacity of more than 180,000 gallons (681 374 L) [150,000-gallon (567 811 L) LP-gas capacity] shall be subdivided into groups containing not more than 180,000 gallons (681 374 L) in each group. Such groups shall be separated by a distance of not less than 50 feet (15 240 mm), unless the containers are:

1. Mounded in an approved manner,
2. Protected with approved insulation on areas that are subject to impingement of ignited gas from pipelines or other leakage,
3. Protected by firewalls of approved construction,
4. Protected by an approved system for application of water as specified in U.F.C. Standard 82-1, Table 3-2.2.4, or
5. Protected by other approved means.

Where one of these forms of protection is provided, the separation shall not be less than 25 feet (7620 mm) between container groups.

SECTION 8205 — PROHIBITED USE OF LP-GAS

8205.1 Nonapproved Equipment. Liquefied petroleum gas shall not be used for the purpose of operating devices or equipment unless such device or equipment is approved for use with LP-gas.

8205.2 Release to the Atmosphere. Liquefied petroleum gas shall not be released to the atmosphere, except through an approved liquid-level gauge or other approved device.

SECTION 8206 — DISPENSING AND OVERFILLING

8206.1 Attendants. Dispensing of LP-gases shall be performed by a qualified attendant.

8206.2 Overfilling. Liquefied petroleum gas containers shall not be filled or maintained with LP-gas in excess of the fixed outage gauge installed by the manufacturer or the weight stamped on the tank.

8206.3 Dispensing Locations. The point of transfer of LP-gas from one container to another shall be separated from exposures as specified in U.F.C. Standard 82-1, Section 4-3.

SECTION 8207 — SAFETY DEVICES

Safety devices on LP-gas containers, equipment and systems shall not be tampered with or made ineffective.

SECTION 8208 — SMOKING AND OTHER SOURCES OF IGNITION

NO SMOKING signs shall be posted when required by the chief. Smoking within 15 feet (4572 mm) of a point of transfer, while filling operations are in progress at containers or vehicles, shall be prohibited.

For control of other sources of ignition, refer to U.F.C. Standard 82-1, Section 3-8.

SECTION 8209 — 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.

SECTION 8210 — PROTECTING CONTAINERS FROM VEHICLES

When exposed to probable vehicular damage due to proximity to alleys, driveways or parking areas, LP-gas containers, regulators and piping shall be suitably protected.

SECTION 8211 — FIRE PROTECTION

8211.1 General. Fire protection shall be provided for installations having storage containers of more than a 4,000-gallon (15 141 L) water capacity, as required by U.F.C. Standard 82-1, Section 3-10.

8211.2 Fire Extinguishers. Fire extinguishers shall be provided as specified in U.F.C. Standard 82-1, and in accordance with U.F.C. Standard 10-1.

SECTION 8212 — STORAGE OF PORTABLE CONTAINERS AWAITING USE OR RESALE

8212.1 General. Storage of portable containers of 1,000 pounds (453.6 kg) or less, whether filled, partially filled or empty, at consumer sites or distributing points, and for resale by dealers or resellers shall be in accordance with Section 8212.

EXCEPTIONS: 1. Containers which have not previously been in LP-gas service.

2. Containers at distributing plants.

3. Containers at consumer sites or distributing points, which are connected for use.

8212.2 Exposure hazards. Containers in storage shall be located in a manner which minimizes exposure to excessive temperature rise, physical damage or tampering.

8212.3 Position. Containers in storage having individual water capacity greater than $2^1/_2$ pounds (1.3 kg) [nominal 1-pound (0.45 kg) LP-gas capacity] shall be positioned with the pressure-relief valve in direct communication with the vapor space of the container.

8212.4 Separation from exits. Containers stored in buildings in accordance with Sections 8212.8 and 8212.10 shall not be located near exits, stairways, or in areas normally used, or intended to be used, for the safe egress of people.

8212.5 Quantity. Empty containers which have been in LP-gas service shall be considered as full containers for the purpose of determining the maximum quantities of LP-gas allowed in Sections 8212.8 and 8212.10.

8212.6 Storage on roofs. Containers which are not connected for use shall not be stored on roofs.

8212.7 Protection of Valves on Containers in Storage. Container valves shall be protected by screw-on-type caps or collars which shall be securely in place on all containers stored regardless of whether they are full, partially full or empty. Container outlet valves shall be closed or plugged.

8212.8 Storage within Buildings Accessible to the Public. Department of Transportation (DOT) specification cylinders with maximum water capacity of $2^1/_2$ pounds (1.13 kg) used in completely self-contained hand torches and similar applications are allowed to be stored or displayed in a building accessible to the public. The quantity of LP-gas shall not exceed 200 pounds (90.7 kg) except as provided in Section 8212.10.

8212.9 Storage within Buildings not Accessible to the Public.

8212.9.1 Maximum quantity. The maximum quantity allowed in one storage location in buildings not accessible to the public, such as industrial buildings, shall not exceed 735-pound (333.4 kg) water capacity [nominal 300 pounds (136 kg) of LP-gas]. If additional storage locations are required on the same floor within the same building, they shall be separated by a minimum of 300 feet (91.4 m). Storage beyond these limitations shall be in accordance with Section 8212.10.

8212.9.2 Quantities on equipment and vehicles. Containers carried as part of service equipment on highway mobile vehicles need not be considered in the total storage capacity in Section 8212.9.1, provided such vehicles are stored in private garages and do not carry more than three LP-gas containers with a total aggregate LP-gas capacity not exceeding 100 pounds (45.4 kg) per vehicle. Container valves shall be closed.

8212.10 Storage within Rooms Used for Gas Manufacturing.

8212.10.1 General. Storage within buildings or rooms used for gas manufacturing, gas storage, gas-air mixing and vaporization, and compressors not associated with liquid transfer shall be in accordance with Section 8212.10.

8212.10.2 Quantity limits. The maximum quantity of LP-gas shall be 10,000 pounds (4536 kg).

8212.10.3 Construction. The construction of such buildings and rooms shall comply with requirements for Group H Occupancies in the Building Code; U.F.C. Standard 82-1, Chapter 7; and the following:

1. Adequate vents shall be provided to the outside at both top and bottom, located at least 5 feet (1524 mm) from building openings, and

2. The entire area shall be classified for the purposes of ignition source control in accordance with U.F.C. Standard 82-1, Section 3-8.

8212.11 Location of Storage outside of Buildings. Storage outside of buildings, for containers awaiting use or resale, shall be located in accordance with Table 8212-A.

8212.12 Protection of Containers. Containers shall be stored within a suitable enclosure or otherwise protected against tampering.

8212.13 Alternate Location and Protection of Storage. When the provisions of Sections 8212.11 and 8212.12 are impractical at construction sites, or at buildings or structures undergoing major renovation or repairs, the storage of containers shall be as required by the chief.

SECTION 8213 — CONTAINERS NOT IN SERVICE

8213.1 Temporarily Out of Service. Containers whose normal use has been temporarily discontinued shall:

1. Be disconnected from appliance piping,
2. Have container outlets, except relief valves, closed or plugged, and
3. Be positioned with the relief valve in direct communication with container vapor space.

8213.2 Permanently Out of Service. Containers to be placed permanently out of service shall be removed from the site.

SECTION 8214 — PARKING AND GARAGING

8214.1 General. Parking of LP-gas tank vehicles shall be in accordance with Section 8214.

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.

8214.2 Unattended Parking.

8214.2.1 Near residential, educational and institutional occupancies and other high risk areas. Liquefied petroleum gas tank vehicles shall not be left unattended at any time on residential streets or within 500 feet (152.4 mm) 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 chief, present an extreme life hazard.

8214.2.2 Durations exceeding one hour. Liquefied petroleum gas tank vehicles parked at any one point for longer than one hour shall be located as follows:

1. Off of streets, highways, avenues or alleys, and
2. Inside of a bulk plant, or
3. At other approved locations not less than 50 feet (15 240 mm) from buildings other than those approved for the storage or servicing of such vehicles.

8214.3 Garaging. Garaging of tank vehicles used for the transportation of LP-gases shall be as specified in U.F.C. Standard 82-1. Vehicles with LP-gas fuel systems are allowed to be stored or serviced in garages as specified in U.F.C. Standard 82-1, Section 3-6.6.

TABLE 8204-A—LOCATION OF CONTAINERS

CONTAINER CAPACITY (water gallons)	MINIMUM SEPARATION BETWEEN CONTAINERS AND BUILDINGS, PUBLIC WAYS, OR LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON		MINIMUM SEPARATION BETWEEN CONTAINERS[2, 3] (feet)
	Mounded or Underground Containers[1] (feet)	Aboveground Containers[2] (feet)	
× 3.785 for L	× 304.8 for mm		
Less than 125[3, 4]	10	5[5]	None
125 to 250	10	10	None
251 to 500	10	10	3
501 to 2,000	10	25[5, 6]	3
2,001 to 30,000	50	50	5
30,001 to 70,000	50	75	(1/4 of sum of
70,001 to 90,000	50	100	diameters of
90,001 to 120,000	50	125	adjacent containers)

[1]Minimum distance for underground 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 container shall be 10 feet (3048 mm) or more from a building or line of adjoining property which can be built upon.

[2]In applying the distance between buildings and ASME containers of a 125-gallon (473.2 L) or more water capacity, a minimum of 50 percent of this horizontal distance shall also apply to all portions of the building which project more than 5 feet (1524 mm) from the building wall and which 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 upon which the container is installed. Distances to the building wall shall not be less than those prescribed in Table 8204-A.

EXCEPTION: Installations in which the overhanging structure is 50 feet (15 240 mm) or more above the relief-valve discharge outlet.

[3]When underground multicontainer installations are comprised of individual containers having a water capacity of 125 gallons (473.2 L) or more, such containers shall be installed so as to provide access at their ends or sides to facilitate working with cranes or hoists.

[4]At a consumer site, if the aggregate water capacity of a multicontainer installation, comprised of individual containers having a water capacity of less than 125 gallons (473.2 L), is 500 gallons (1892.7 L) or more, the minimum distance shall comply with the appropriate portion of Table 8204-A, applying the aggregate capacity rather than the capacity per container. If more than one such installation is made, each installation shall be separated from other installations by at least 25 feet (7620 mm). Minimum distances between containers need not be applied.

[5]The following shall apply to aboveground containers installed alongside buildings:

1. Containers of less than a 125-gallon (473.2 L) water capacity are allowed next to the building they serve when in compliance with Items 2, 3 and 4.
2. Department of Transportation specification containers shall be located and installed so that the discharge from the container pressure-relief device is at least 3 feet (914 mm) 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 container pressure-relief devices shall be located not less than 5 feet (1524 mm) from exterior sources of ignition, openings into direct-vent (sealed combustion system) appliances or mechanical ventilation air intakes.
3. ASME containers of less than a 125-gallon (473.2 L) 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 at least 5 feet (1524 mm) horizontally from building openings below the level of such discharge and not less than 5 feet (1524 mm) 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 DOT or ASME containers filled at the point of installation shall not be less than 10 feet (3048 mm) from exterior sources of ignition, openings into direct-vent (sealed combustion system) appliances, or mechanical ventilation air intakes.

[6]This distance is allowed to be reduced to not less than 10 feet (3048 mm) for a single container of 1,200-gallon (4542 L) water capacity or less, provided such container is at least 25 feet (7620 mm) from other LP-gas containers of more than 125-gallon (473.2 L) water capacity.

TABLE 8212-A—LOCATION OF CONTAINERS AWAITING USE OR RESALE STORED OUTSIDE OF BUILDINGS

QUANTITY OF LP-GAS STORED	DISTANCES TO A BUILDING OR GROUP OF BUILDINGS, PUBLIC WAY, OR LINE OF PROPERTY THAT CAN BE BUILT UPON (feet)
× 0.45 for kg	× 304.8 for mm
500 lb. or less	0
501 to 2,500 lb.	10[1]
2,501 to 6,000 lb.	15
6,001 to 10,000 lb.	20
Over 10,000 lb.	25

[1]Containers may be located a lesser distance to buildings when approved by the chief.

ARTICLE 83
(NOT USED)

ARTICLE 84 — MOTION PICTURE PROJECTION

SECTION 8401 — SCOPE

The use of ribbon-type cellulose acetate and other safety film in conjunction with electric arc, xenon or other light source projection equipment which develops hazardous gases, dust or radiation and the projection of ribbon-type cellulose nitrate film, regardless of the light source used in projection, shall be in accordance with Article 84.

SECTION 8402 — PROJECTION ROOMS

8402.1 General. Motion picture projection machines shall be operated within a motion picture projection room complying with the Building Code.

8402.2 Safety Film. Projection rooms which are limited to the projection of safety film shall be posted on the outside of each projection room door and within the projection room with a conspicuous sign having 1-inch (25.4 mm) block letters stating SAFETY FILM ONLY IS PERMITTED IN THIS ROOM.

8402.3 Fire Extinguishers. Two approved fire extinguishers with a minimum 10-B:C rating shall be installed and maintained ready for use in projection rooms.

SECTION 8403 — SMOKING

Smoking and other sources of ignition shall be prohibited within projection rooms in which cellulose nitrate film is allowed. Conspicuous NO SMOKING signs shall be posted in the room.

SECTION 8404 — PROJECTION EQUIPMENT

Projection equipment or film which is in a hazardous condition shall not be used.

SECTION 8405 — FILM STORAGE AND USE

8405.1 Cellulose Nitrate. Cellulose nitrate film shall not be used or stored unless within an enclosed film magazine, an approved storage cabinet or a transportation container. Rewinding of cellulose nitrate film shall be performed within an enclosed film rewind machine. Examination of film on an open hand rewind machine shall not involve more than one reel outside of an approved container at any time.

8405.2 Safety Film. Safety film, which is not mounted for projection, shall be stored in approved transportation containers or an approved film cabinet.

ARTICLE 85 — ELECTRICAL EQUIPMENT AND WIRING

SECTION 8501 — SCOPE

Permanent and temporary use of electrical appliances, fixtures, motors and wiring shall be in accordance with Article 85.

EXCEPTION: Low-voltage wiring, such as communications and signal wiring.

Article 85 shall be enforced in cooperation with the authority having jurisdiction for the enforcement of the Electrical Code.

SECTION 8502 — DEFINITIONS

For definitions of APPLIANCE, PORTABLE; APPLIANCE, STATIONARY; EXTENSION CORD; FLEXIBLE CORD; MULTIPLUG ADAPTER; PANEL BOARD, ELECTRICAL; PERMANENT WIRING; POWER TAP; RECEPTACLE; SWITCHBOARD, ELECTRICAL; and TEMPORARY WIRING, see Article 2.

SECTION 8503 — USE OF TEMPORARY WIRING

8503.1 During Construction. Temporary wiring for electrical power and lighting installations is allowed during periods of construction, remodeling, repair or demolition of buildings, structures, equipment or similar activities.

8503.2 During Special Events and Holidays. Temporary wiring for electrical power and lighting installations is allowed for a period not to exceed 90 days for Christmas decorative lighting, carnivals and similar purposes, and for experimental or developmental work.

8503.3 Attachment to Structures. When temporary wiring is attached to a structure, it shall be attached in an approved manner.

SECTION 8504 — ABATEMENT OF ELECTRICAL HAZARDS

When electrical hazards are identified, measures to abate such conditions shall be taken. Identified hazardous electrical conditions in permanent wiring or temporary wiring shall be corrected in cooperation with the authority enforcing the Electrical Code.

Electrical wiring, devices, appliances and other equipment which are modified or damaged and constitute an electrical shock or fire hazard shall not be used.

SECTION 8505 — ELECTRICAL MOTORS

Electrical motors shall be maintained in a manner free from accumulations of oil, dirt, waste and other debris which will interfere with required motor ventilation or create a fire hazard.

SECTION 8506 — EXTENSION CORDS AND FLEXIBLE CORDS

8506.1 General. Extension cords shall not be used as a substitute for permanent wiring.

8506.2 Use with Portable Appliances.

8506.2.1 General. The use of extension cords shall be in accordance with Section 8506.2.

8506.2.2 Applications. Extension cords shall be used only with portable appliances.

8506.2.3 Power supply. Extension cords shall be plugged directly into an approved receptacle, power tap or multiplug adapter and shall, except for approved multiplug extension cords, serve only one portable appliance.

8506.2.4 Ampacity. The ampacity of the extension cords shall not be less than the rated capacity of the portable appliance supplied by the cord.

8506.2.5 Maintenance. The extension cords shall be maintained in good condition without splices, deterioration or damage.

8506.2.6 Grounding. Extension cords shall be grounded when servicing grounded portable appliances.

8506.3 Installation. Extension cords and flexible cords shall not be affixed to structures; extend through walls, ceilings, floors, under doors or floor coverings; or be subject to environmental or physical damage.

SECTION 8507 — MULTIPLUG ADAPTERS

Multiplug adapters, such as multiplug extension cords, cube adapters, strip plugs and other devices, that do not comply with this code or the Electrical Code shall not be used.

SECTION 8508 — POWER TAPS

8508.1 General. The use of power taps shall be in accordance with Section 8508.

8508.2 Design. Power taps shall be of the polarized or grounded type and shall be listed.

8508.3 Power Supply. The power taps shall be directly connected to a permanently installed receptacle.

8508.4 Installation. Power tap cords shall not extend through walls, ceilings, floors, under doors or floor coverings, or be subject to environmental or physical damage.

SECTION 8509 — ACCESS TO SWITCHBOARDS AND PANELBOARDS

8509.1 General. Work space around switchboards and panelboards shall be provided and maintained as required by the Electrical Code. Such space shall not be used for storage.

8509.2 Access. A clear and unobstructed means of access with a minimum width of 30 inches (762 mm) and a minimum height of 78 inches (1981.2 mm) shall be maintained from the operating face of the switchboard or panelboard to an aisle or corridor.

EXCEPTION: Where reduced dimensions are allowed by the Electrical Code.

8509.3 Labeling. Doors into electrical control panel rooms shall be marked with a plainly visible and legible sign stating ELECTRICAL ROOM or similar approved wording. The disconnecting means for each service, feeder or branch circuit originating on a switchboard or panelboard shall be legibly and durably marked to indicate its purpose unless such purpose is clearly evident.

ARTICLE 86 — PESTICIDE STORAGE AND DISPLAY

SECTION 8601 — SCOPE

Pesticide storage and display, in portable containers other than fixed installations on transportation equipment, shall be in accordance with Article 86.

EXCEPTIONS: 1. Toxic and highly toxic materials. See Article 80.

2. Storage in dwellings or private garages of pesticides registered by the Environmental Protection Agency for use around the home. Such pesticides are registered under the Federal Insecticide, Fungicide and Rodenticide Act as amended by the Federal Environmental Pesticide Control Act of 1972 and the Federal Pesticide Act of 1979.

SECTION 8602 — GENERAL

8602.1 Containment of Hose Stream Runoff. Pesticide storage shall be located or constructed so that runoff from firefighting operations will not contaminate streams, ponds, groundwaters, croplands, pasture land or buildings.

8602.2 Flammable or Combustible. Pesticides that are flammable or combustible liquids shall be stored in accordance with Article 79.

8602.3 Oxidizers. Pesticides that are oxidizing agents shall be stored in accordance with Article 80.

8602.4 Storage with Ammonium Nitrate. Pesticides shall not be stored in the same area with ammonium nitrate fertilizer.

8602.5 Storage Methods. Pesticides shall be stored in accordance with the recommendations of the manufacturer. Storage of pesticides shall be arranged according to compatibility. Unless otherwise required by this code, incompatible materials shall be separated by not less than 4 feet (1219 mm) measured horizontally.

8602.6 Location of Storage. Pesticides shall not be stored in basements.

Pesticide storage shall be restricted to a first-story room or area which has direct access to the outside without passing through intervening rooms or corridors.

EXCEPTION: A facility used exclusively for pesticide storage.

8602.7 Storage on Damp Floors. Pesticides in containers which could be damaged by moisture or water shall be stored off the floor.

8602.8 Leaking or Damaged Containers. Leaking or damaged containers of pesticides or materials contaminated by pesticides shall be immediately separated from other materials by adequate space, walls or partitions. Contents of leaking liquid containers shall be transferred to clean, compatible containers; placed into larger clean, compatible containers; or isolated by sand or other absorbent material, dams or berms until disposed of or decontaminated in accordance with regulatory requirements, manufacturer's instructions or recommended industry practice.

8602.9 Toxicity Data. Material safety data sheets for each toxic pesticide shall be available at each storage location.

8602.10 Shelving. Storage and display shelving shall be of stable construction, of sufficient depth and of such arrangement that containers will not be easily displaced. When practical, shelving shall be secured to the wall.

SECTION 8603 — SIGNS

8603.1 Storage Areas. Pesticide storage buildings, storage rooms or storage areas shall be identified by prominent and legible signs in accordance with U.F.C. Standard 79-3.

8603.2 Container Labels. Each group of pesticide containers shall have labels visible to readily permit identification.

SECTION 8604 — FIRE PROTECTION

Storage facilities shall be protected in accordance with Article 10.

SECTION 8605 — EMERGENCY MANAGEMENT

Emergency preplanning and postfire management plans shall be established and displayed to assist in proper action.

SECTION 8606 — DISPLAYS

The quantity of pesticides in rooms or areas accessible to the public shall be limited to that needed for display. Drums and large packages shall be stacked in a safe manner.

SECTION 8607 — STORAGE AREAS

8607.1 Designating Areas. A separate building, room, portion of a building or outside area shall be designated as the pesticide storage area.

8607.2 Security. The storage area shall be secured in a manner which prevents unauthorized entry.

SECTION 8608 — PESTICIDES STORED AS COMPRESSED GASES

8608.1 Sources of Heat. Compressed gas pesticides shall be stored away from heat sources, such as steam pipes, heaters and direct sun.

8608.2 Securing of Cylinders. Compressed gas cylinders shall be secured in accordance with Section 7401.6.4.

8608.3 Closing Containers and Safety Cap. Containers shall be tightly closed and provided with a safety cap when not in use, whether empty or full.

8608.4 Separation from Other Gases. Pesticide containers shall be separated from other compressed gases by pipe railings or other effective means.

ARTICLE 87 — FIRESAFETY DURING CONSTRUCTION, ALTERATION OR DEMOLITION OF A BUILDING

SECTION 8701 — SCOPE

Buildings undergoing construction, alteration or demolition shall be in accordance with Article 87.

SECTION 8702 — PERMITS

For permits to conduct asbestos-removal operations regulated by Section 8706, see Section 105, Permit a.4.

SECTION 8703 — APPROVALS

Approval of the safety precautions required for buildings being constructed, altered or demolished may be required by the chief in addition to other approvals required for specific operations or processes associated with such construction, alteration or demolition.

EXCEPTION: Buildings designated as Group R, Division 3 or Group U do not require approval of safety precautions.

SECTION 8704 — FIRESAFETY DURING CONSTRUCTION

8704.1 General. Buildings under construction shall be in accordance with Section 8704.

8704.2 Access Roads. Fire department access roads shall be established and maintained in accordance with Section 902.

EXCEPTION: When approved by the chief, temporary access roads of a width, vertical clearance and surface which provide access for fire department apparatus are allowed to be used until permanent roads are installed.

8704.3 Water Supply. Water mains and hydrants shall be installed and operational in accordance with Section 903.

EXCEPTION: When approved by the chief, a temporary water supply for fire protection is allowed to be used until permanent fire-protection systems are installed.

8704.4 Fire Protection.

8704.4.1 General. During the construction of a building and until the permanent fire-extinguishing system has been installed and is in service, fire protection shall be provided in accordance with Section 8704.

8704.4.2 Fire extinguishers. Fire extinguishers shall be provided for buildings under construction when required by the chief. The number and type of extinguishers shall be as required by the chief, and the type of extinguisher shall be suitable for the type of fire associated with the hazards present.

8704.4.3 Standpipes.

8704.4.3.1 Where required. Every building four stories or more in height shall be provided with not less than one standpipe for use during construction. Such standpipes shall be installed when the progress of construction is not more than 35 feet (10 668 mm) in height above the lowest level of fire department access. Such standpipe shall be provided with fire department hose connections at accessible locations adjacent to usable stairs and the standpipe outlets shall be located adjacent to such usable stairs. Such standpipe systems shall be extended as construction progresses to within one floor of the highest point of construction having secured decking or flooring.

On each floor there shall be provided a $2^1/_2$-inch (63.5 mm) valve outlet for fire department use. Where construction height requires installation of a Class III standpipe, fire pumps and water main connections shall be provided to serve the standpipe.

8704.4.3.2 Temporary standpipes. Temporary standpipes are allowed to be provided in place of permanent systems if they are designed to furnish 500 gallons (1893 L) of water per minute at 50 pounds per square inch (345 kPa) pressure with a standpipe size of not less than 4 inches (101.6 mm). All outlets shall not be less than 21/2 inches (63.5 mm). Pumping equipment sufficient to provide this pressure and volume shall be available at all times when a Class III standpipe system is required.

8704.4.3.3 Detailed requirements. Standpipe systems for buildings under construction shall be installed as required for permanent standpipe systems.

8704.5 Combustible Debris. Combustible debris shall not be accumulated within buildings. Combustible debris, rubbish and waste material shall be removed from buildings as often as practical. Combustible debris, waste material and trash shall not be burned on the site unless approved.

8704.6 Motor Equipment. Internal-combustion-powered construction equipment shall be used in accordance with the following:

1. Equipment shall be located so that exhausts do not discharge against combustible material,
2. When possible, exhausts shall be piped to the outside of the building,
3. Equipment shall not be refueled while in operation, and
4. Fuel for equipment shall be stored in an approved area outside of the building.

8704.7 Heating Devices. Temporary heating devices shall be of a type approved by the chief, located away from combustible materials, and attended and maintained by competent personnel.

8704.8 Smoking. Smoking shall be prohibited, except in those areas approved by the chief. When required by the chief, a suitable number and type of NO SMOKING signs shall be posted.

8704.9 Cutting and Welding. Cutting and welding operations shall be in accordance with Article 49.

8704.10 Flame-producing Equipment. The use of torches or flame-producing devices for the sweating of pipe joints shall be in accordance with Section 1109.3.2.

8704.11 Flammable Liquids. The storage, use and handling of flammable liquids shall be in accordance with Article 79. Ventilation shall be provided for operations utilizing the application of materials containing flammable solvents.

8704.12 Open-flame Devices. Open-flame devices and other sources of ignition shall not be located in areas where flammable materials are being used.

8704.13 Asphalt and Tar Kettles. Asphalt and tar kettles shall be located and operated in accordance with Section 1105.

8704.14 Temporary Electrical Wiring. Temporary electrical wiring shall be in accordance with Section 8503.

8704.15 Building Access. When required by the chief, access to buildings for the purpose of firefighting shall be provided. Construction material shall not block access to buildings, hydrants or fire appliances.

8704.16 Emergency Telephone. When required by the chief, telephone facilities shall be provided at the construction site for the purpose of emergency notification of the fire department. The street address of the construction site shall be posted adjacent to the telephone together with the fire department telephone number.

8704.17 Fire-protection Plan. When required by the chief, a fire-protection plan shall be established.

SECTION 8705 — ALTERATIONS OF BUILDINGS

8705.1 General. Alterations of buildings shall be in accordance with the Building Code, applicable provisions of Section 8704, and Section 8705.

8705.2 Fire-protection Systems. When the building is protected by fire-protection systems, such systems shall be maintained operational at all times during alteration.

When alteration requires modification of a portion of a fire-protection system, the remainder of the system shall be kept in service. When it is necessary to shut down the entire system, a fire watch shall be kept on site until the system is returned to service.

8705.3 Exits. Required exit components shall be maintained in accordance with Article 12.

EXCEPTION: Approved temporary exiting system or facilities.

8705.4 Fire-resistive Assemblies and Construction. Fire-resistive assemblies and construction shall be maintained in accordance with Section 1112.

SECTION 8706 — FIRESAFETY DURING DEMOLITION

8706.1 General. Demolition of buildings shall be in accordance with Section 8706 and, where applicable, Sections 8704 and 8705.

8706.2 Automatic Sprinkler System. When a building to be demolished contains a sprinkler system, such system shall not be rendered inoperative without approval of the chief.

8706.3 Fire Hose. Suitable fire hose, as required by the chief, shall be maintained at the demolition site. Such hose shall be connected to an approved source of water and shall not impede fire department use of hydrants.

8706.4 Cutting and Welding. Demolition operations involving cutting and welding shall be in accordance with Section 4907.

8706.5 Burning of Combustible Waste. Combustible waste material, trash and rubbish shall not be burned at the demolition site, unless approved. Accumulations of such material shall be removed from the site as often as necessary to minimize the hazards therefrom.

8706.6 Fire Watch. When required by the chief for building demolition which is hazardous in nature, qualified personnel shall be provided to serve as an on-site fire watch. The sole duty of fire-watch personnel shall be to watch for the occurrence of fire.

SECTION 8707 — ASBESTOS REMOVAL

8707.1 General. Operations involving removal of asbestos or asbestos-containing materials from buildings shall be in accordance with Section 8707.

EXCEPTION: Section 8707 does not apply to the removal of asbestos from:

1. Pumps, valves, gaskets and similar equipment.
2. Pipes, ducts, girders or beams which have a length less than 21 linear feet (6400 mm).
3. Wall or ceiling panels which have an area of less than 10 square feet (0.93 m^2) or a dimension of less than 10 linear feet (3048 mm).
4. Floor tiles when the duration of work can be completed in less than four hours.
5. Group R, Division 3 Occupancies.

8707.2 Notification. The chief shall be notified 24 hours prior to the commencement and closure of asbestos-removal operations.

The permit applicant shall notify the building official when asbestos abatement involves the removal of materials which were used as a feature of the building's fire resistance.

8707.3 Plastic Film. Plastic film which is installed on building elements shall be flame resistant as required for combustible decorative material in accordance with Section 1103.3.3.

8707.4 Signs. Approved signs shall be posted at the entrance, exit, decontamination areas and waste-disposal areas for asbestos-removal operations. The signs shall state that asbestos is being removed from the area, that asbestos is a suspected carcinogen and that proper respiratory protection is required. Signs shall have a reflective surface and lettering shall be a minimum of 2 inches (51 mm) high.

ARTICLE 88 — AEROSOL PRODUCTS

SECTION 8801 — GENERAL

8801.1 Scope. Storage and retail display of aerosol products shall be in accordance with Article 88. Aerosols shall be classified as Level 1, 2 or 3 in accordance with U.F.C. Standard 88-1.

EXCEPTIONS: 1. Transportation of aerosols conforming with DOT regulations.

2. Level 1 aerosols in cartons which are clearly marked to identify their classification level are not regulated by Article 88.

For additional requirements for high-piled combustible storage, see Article 81, and for hazardous materials, see Article 80.

8801.2 Definitions.

8801.2.1 General. For definitions of AEROSOL, AEROSOL CONTAINERS, AEROSOL WAREHOUSE, BANDING, BASE PRODUCT, BASEMENT, BUILDING CODE, ENCAPSULATED, EXIT, FIRE DOOR, FLOOR AREA, GENERAL-PURPOSE WAREHOUSE, PROPELLANT, RACK STORAGE, RETAIL DISPLAY AREA, RETAIL SALES OCCUPANCY, SEGREGATED, SHELF STORAGE, SOLID SHELVING and VENT-RELEASE CONTAINER, see Article 2.

8801.2.2 Limited application. For the purpose of Article 88, certain terms are defined as follows:

CARTON is a cardboard or fiberboard box in which multiple units of aerosol products are shipped. A carton completely encloses aerosol products.

WAREHOUSE is a building or portion of a building not accessible to the public which is used for storage, including shipping and receiving.

8801.3 Permits. For permits to handle or store aerosol products, see Section 105, Permit a.1.

8801.4 Identification of Aerosol Classification. Material Safety Data Sheets (MSDS) shall identify the classification level of each aerosol product as set forth in U.F.C. Standard 88-1.

8801.5 Carton Identification. When cartons containing aerosols are not marked to identify the classification level of the contents and the classification level is not otherwise identifiable, the contents shall be treated as Level 3 aerosol products.

SECTION 8802 — STORAGE AND RETAIL DISPLAYS

8802.1 General.

8802.1.1 Applicability. Storage and retail display of Levels 2 and 3 aerosol products in excess of 500 pounds (227 kg) net weight shall be in accordance with Section 8802.

EXCEPTION: Retail display of Levels 2 and 3 aerosols in vent-release containers in quantities less than 500 pounds (227 kg) net weight shall be in accordance with Section 8802.1.9.

8802.1.2 Containers. Containers shall be designed and constructed in accordance with nationally recognized standards. See Article 90, Standards a.4.4 and a.4.5.

8802.1.3 Packaging. Aerosol products in storage shall be packaged in cartons. Banding of aerosol products shall not be used in lieu of cartons or encapsulated storage of aerosol cartons. Fire-retardant cartons of aerosol products shall not be considered as an alternative to the fire-protection requirements in Article 88.

For packaging of aerosol products in retail displays, see Section 8802.2.5.

8802.1.4 Shelf storage. Shelving shall be of substantial construction, adequately braced and anchored. For seismic requirements, see the Building Code.

When storage or retail display is on shelves, the height of such storage or retail display to the top of aerosol containers shall not exceed 8 feet (2438 mm).

8802.1.5 Storage in basements. Aerosol products shall not be stored in basements and shall not be displayed in unprotected basements. See Table 8802.2-A.

8802.1.6 Fire-extinguishing systems. When an automatic fire-extinguishing system is required for the storage or retail display of aerosol products, the design shall be in accordance with Section 8803.

8802.1.7 Storage cabinets. Storage cabinets shall be constructed in accordance with Section 7902.5.9.

8802.1.8 Manual fire alarm system. When a manual fire alarm system is required, the system shall be in accordance with Section 1007. The manual fire alarm system shall be interconnected with the automatic fire sprinkler system such that waterflow from the sprinkler system will activate all automatic door-closing devices and the fire alarm system warning devices.

8802.1.9 Vent-release containers.

8802.1.9.1 General. The display and storage of Levels 2 and 3 aerosols in vent-release containers shall be in accordance with Section 8802.1.9. The display and storage of vent-release containers shall be limited to the ground floor of buildings.

8802.1.9.2 Retail display. Not more than 500 pounds (227 kg) of Levels 2 and 3 aerosols packaged in vent-release containers shall be displayed in a retail sales occupancy. Display of vent-release containers shall be limited to shelf storage.

8802.1.9.3 Storage.

8802.1.9.3.1 Storage less than 1,000 pounds (454 kg). When the storage of Levels 2 and 3 aerosols packaged in vent-release containers is greater than 500 pounds (227 kg), but less than or equal to 1,000 pounds (454 kg), the storage shall be limited to an aerosol warehouse. Storage within such warehouses shall be within an area constructed as a two-hour occupancy separation. Storage shall be arranged as a solid-pile or palletized array.

EXCEPTION: Exterior aerosol storage in accordance with Section 8802.5.

8802.1.9.3.2 Storage of greater than 1,000 pounds (454 kg). When the storage of Levels 2 and 3 aerosols packaged in vent-release containers is greater than 1,000 pounds (454 kg), the exterior aerosol storage provisions of Section 8802.5 shall apply.

8802.1.9.4 Fire protection.

8802.1.9.4.1 Retail display. Protection of Levels 2 and 3 aerosols packaged in vent-release containers is not required.

8802.1.9.4.2 Storage. Protection of Levels 2 and 3 aerosols packaged in vent-release containers greater than 500 pounds (227 kg), but less than or equal to 1,000 pounds (454 kg), shall be in a room protected by an approved automatic deluge sprinkler system.

8802.2 Retail Sales Occupancies.

8802.2.1 General. Retail display and adjacent storage of aerosol products in a retail sales occupancy shall be in accordance with Sections 8802.1 and 8802.2.

8802.2.2 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 listed in Table 8802.2-A.

8802.2.3 Maximum quantities in storage areas. Aerosol products in storage areas adjacent to retail display areas shall not exceed the quantities listed in Table 8802.2-B.

8802.2.4 Stacking of containers. Aerosol containers shall not be stacked more than 6 feet (1829 mm) high from the base of the aerosol array to the top of the aerosol array unless the containers are placed on fixed shelving or otherwise secured in an approved manner.

8802.2.5 Combustible cartons. Aerosol products located in retail display areas shall be removed from combustible cartons.

EXCEPTIONS: 1. Display using a portion of combustible cartons which consists of only the bottom panel and not more than 2 inches (51 mm) of the side panel is allowed.

2. When the retail display area is protected in accordance with Section 8803.2.2, storage of aerosols in combustible cartons is allowed.

8802.2.6 Aisles. Aisles not less than 4 feet (1219 mm) in width shall be maintained on three sides of a retail display area containing aerosol products.

8802.3 General-purpose Warehouses and Storage Rooms.

8802.3.1 General. Storage of aerosol products in Group F, M or S Occupancy general-purpose warehouses or storage rooms shall be in accordance with Sections 8802.1 and 8802.3. General-purpose warehouses used for storing aerosols shall be used only for storage or warehousing operations involving mixed commodities.

8802.3.2 Limited quantity aerosol storage. Quantities of aerosol products stored in Group F, M or S Occupancy general-purpose warehouses or storage rooms shall not exceed quantities listed in Table 8802.3-A, except as provided in Section 8802.3.3.

8802.3.3 Segregated aerosol storage. Solid pile, palletized and rack storage of aerosol products in excess of the quantities indicated in Table 8802.3-A stored within a Group F, M or S Occupancy general-purpose warehouse or the storage room shall be in accordance with the following:

1. The building in which the storage is located is provided with automatic fire sprinkler system protection throughout,

2. Storage conditions, storage arrangements and automatic fire sprinkler system protection shall be in accordance with Table 8802.3-B,

3. Aisles in aerosol product storage areas shall be provided in accordance with Table 8802.3-C,

4. Aerosol product storage shall be separated from flammable and combustible liquids in accordance with Article 79 and Table 8802.3-D, and

5. An approved manual fire alarm system shall be provided throughout the Group F, M or S Occupancy general-purpose warehouse or storage room.

8802.4 Aerosol Warehouses.

8802.4.1 General. Storage of aerosol products in excess of the areas and quantities indicated in Section 8802.3 shall be located within an aerosol warehouse conforming with the Building Code requirements for a Group H, Division 3 Occupancy, Sections 8802.1 and 8802.4.

8802.4.2 Automatic fire sprinkler system protection. Aerosol warehouses shall be protected throughout by automatic fire sprinkler systems designed in accordance with Tables 8803.1-A through 8803.1-F.

8802.4.3 Maximum quantity. The maximum quantity of aerosol products within an aerosol warehouse is not limited.

8802.4.4 Manual fire alarm system. An approved manual fire alarm system shall be provided throughout aerosol warehouses.

8802.4.5 Other storage. Other flammable, combustible and noncombustible commodities stored in an aerosol warehouse shall be in accordance with Section 8802.4.5 and other provisions of this code. The following commodities shall not be stored in an aerosol warehouse:

1. Class I, Class II and Class III-A liquids in nonmetallic containers.
2. Class I, Class II and Class III-A liquids in containers 1 gallon (3.79 L) or greater in size.
3. Flammable solids.
4. Flammable gases.
5. Class 4 physical hazard materials. (See Article 80.)
6. Organic peroxides.

Group A plastics (see Section 8101.4.2.2) stored with aerosol products shall be separated from the aerosol products by aisles not less than 8 feet (2438 mm) in width.

Class I, Class II and Class III-A liquids in individual metal containers less than 1 gallon (3.79 L) in size shall be separated from aerosol product storage by a minimum distance of 20 feet (6096 mm) or by a one-hour fire-resistive occupancy separation. See also Article 79.

8802.4.6 Access. Fire department access roadways and access doors shall be in accordance with Section 8102.5.

8802.4.7 Aisles. Aisles shall be provided as required for segregated aerosol storage in Table 8802.3-C.

8802.5 Exterior Storage.

8802.5.1 General. Exterior storage of aerosol products shall be in accordance with Sections 8802.1 and 8802.5. Temporary storage trailers shall be in accordance with the requirements for exterior storage.

8802.5.2 Distance from storage to exposures. Exterior storage of aerosol products shall be separated from exposures in accordance with Table 8802.5-A.

TABLE 8802.2-A—RETAIL DISPLAY OF LEVELS 2 AND 3 AEROSOL PRODUCTS IN RETAIL SALES OCCUPANCIES, MAXIMUM QUANTITIES

FLOOR	MAXIMUM NET WEIGHT PER FLOOR (Pounds)[1,2] × 0.454 for kg	
	Unprotected[3]	Protected[3,4]
Basement	Not allowed	500
Ground	2,500	10,000
Upper	500	2,000

[1]Total quantity shall not exceed 1,000 pounds (454 kg) net weight in any 100-square-foot (9.29 m^2) retail display area.
[2]When packaged, stored and protected in accordance with Section 8803, quantities shall be limited by Table 8802.3-A.
[3]Per 25,000-square-foot (2322.5 m^2) retail display area.
[4]Minimum Ordinary Hazard Group 2 wet-pipe automatic fire sprinkler system throughout retail sales occupancy.

TABLE 8802.2-B—STORAGE AREAS ADJACENT TO RETAIL DISPLAY OF LEVELS 2 AND 3 AEROSOL PRODUCTS IN RETAIL SALES OCCUPANCIES, MAXIMUM QUANTITIES

FLOOR	MAXIMUM NET WEIGHT PER FLOOR (Pounds) × 0.454 for kg		
	Unseparated[1,2]	Separated	
		Storage Cabinets[2]	1-hour-rated Occupancy Separation
Basement	Not allowed	Not allowed	Not allowed
Ground	2,500	5,000	See Sec. 8802.3
Upper	500	1,000	See Sec. 8802.3

[1]The total aggregate quantity in storage and on retail displays shall not exceed the limits for retail display.
[2]In any 50,000-square-foot (46 451 m^2) area.

TABLE 8802.3-A—LIMITED QUANTITY LEVELS 2 AND 3 AEROSOL PRODUCT STORAGE GENERAL-PURPOSE WAREHOUSES AND STORAGE ROOMS, MAXIMUM QUANTITIES

AEROSOL LEVEL	MAXIMUM NET WEIGHT PER FLOOR (pounds)[1] × 0.454 for kg			
	Palletized or Solid Pile Storage		Rack Storage	
	Unprotected	Protected[2]	Unprotected	Protected[3]
2	2,500	12,000	500	24,000
3	1,000	12,000	500	24,000
Combination 2 and 3	2,500	12,000	500	24,000

[1]In any 50,000-square-foot (46 451 m^2) area.

[2]Automatic fire sprinkler system protection and storage arrangement in accordance with Table 8803.1-A or 8803.1-B for aerosol storage area with sprinkler system extended 20 feet (6096 mm) beyond the aerosol storage area.

[3]Automatic fire sprinkler system protection and storage arrangement in accordance with Tables 8803.1-C through 8803.1-F for aerosol storage area with sprinkler system extended 20 feet (6096 mm) beyond the aerosol storage area.

TABLE 8802.3-B —SEGREGATED LEVELS 2 AND 3 AEROSOL PRODUCT STORAGE GENERAL-PURPOSE WAREHOUSES AND STORAGE ROOMS MAXIMUM STORAGE AREA, SPRINKLER SYSTEM AND STORAGE ARRANGEMENT

STORAGE CONDITION	MAXIMUM AGGREGATE STORAGE AREA	SPRINKLER SYSTEM AND STORAGE ARRANGEMENT
Chain link fence enclosure	10 percent of building area and not more than basic allowable building area	Notes 1, 2 and 3
1-hour-rated occupancy separation	10 percent of building area and not more than basic allowable building area	Note 1
2-hour-rated occupancy separation	20 percent of building area and not more than double basic allowable building area	Note 1

[1]Automatic fire sprinkler system protection shall be provided in aerosol product storage areas in accordance with Tables 8803.1-A through 8803.1-F. Automatic fire sprinkler system protection shall be provided in building areas not used for aerosol product storage in accordance with the Building Code and Article 81 as applicable.

[2]The portion of the automatic fire sprinkler system at ceiling level shall be designed for aerosol storage 20 feet (6096 mm) beyond the aerosol storage area.

[3]Chain link fence enclosures shall be in accordance with the following:

1. The fence shall not be less than 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 or V commodity storage shall not be located within 8 feet (2438 mm) from the fence,
4. Access openings in the fence shall be provided with either self-closing or automatic closing devices as set forth in the Building Code, or a labyrinth opening arrangement which will prevent aerosol containers from rocketing through such openings, and
5. Not less than two exits shall be provided from the fenced enclosure.

TABLE 8802.3-C—SEGREGATED LEVELS 2 AND 3 AEROSOL PRODUCT STORAGE GENERAL-PURPOSE WAREHOUSES AND STORAGE ROOMS AISLE WIDTHS AND DISTANCE TO AISLES

STORAGE CONDITION	MINIMUM AISLE WIDTH	MAXIMUM DISTANCE FROM STORAGE TO AISLE
Solid pile or palletized[1]	4 feet (1219 mm) between piles	20 feet (6096 mm)
Racks with ESFR sprinklers[2]	4 feet (1219 mm) between racks and adjacent Level 2 or 3 aerosol product storage	20 feet (6096 mm)
Racks without ESFR sprinklers[3]	8 feet (2438 mm) between racks and adjacent Level 2 or 3 aerosol product storage	20 feet (6096 mm)

[1]See Tables 8803.1-A and 8803.1-B.

[2]See Tables 8803.1-C and 8803.1-D.

[3]See Tables 8803.1-E and 8803.1-F.

TABLE 8802.3-D—SEGREGATED LEVELS 2 AND 3 AEROSOL PRODUCT STORAGE GENERAL-PURPOSE WAREHOUSES AND STORAGE ROOMS SEPARATION FROM FLAMMABLE AND COMBUSTIBLE LIQUIDS

FLAMMABLE AND COMBUSTIBLE LIQUID CONTAINERS		TYPE OF SEPARATION FROM AEROSOL PRODUCTS	
Size		Distance (feet)	Occupancy Separation Rating
× 3.79 for kg	Type	× 304.8 for mm	
Less than or equal to 1 gallon	Metal	20 feet	1 hour
Greater than 1 gallon	Any approved type	60 feet	2 hour

TABLE 8802.5-A—EXTERIOR STORAGE OF LEVELS 2 AND 3 AEROSOL PRODUCTS DISTANCE TO EXPOSURES

EXPOSURE	MINIMUM DISTANCE FROM AEROSOL STORAGE (feet)
	× 304.8 for mm
Alleys, public ways, streets	20
Buildings	50
Exits to a public way	50
Property lines	20
Other exterior storage	50

[1]A two-hour fire-resistive wall without penetration and extending not less than 30 inches (762 mm) above and to the sides of the Level 2 or 3 aerosol products storage area is allowed in lieu of the required separation distance.

SECTION 8803 — AUTOMATIC FIRE-EXTINGUISHING SYSTEMS AND STORAGE ARRANGEMENTS

8803.1 General. Design and installation of automatic fire-extinguishing systems and the storage arrangements required with such protection for the storage and retail display of aerosol products shall be in accordance with Section 8803.

8803.2 Automatic Fire-extinguishing Systems.

8803.2.1 Retail displays. When an automatic fire-extinguishing system is required for the protected retail display of aerosol products, the system shall be a wet-pipe automatic fire sprinkler system in accordance with the Building Code for not less than an Ordinary Hazard Group 2 Occupancy. The system shall be provided throughout the retail display area. See Sections 8802.1.6 and 8802.2.2.

8803.2.2 Storage. When an automatic fire-extinguishing system is required for the storage of aerosol products in Section 8802, the system shall be a wet-pipe automatic fire sprinkler system in accordance with the applicable provisions of Tables 8803.1-A through 8803.1-F. Protection shall be based on the highest level of aerosol product present. The system shall be designed and installed in accordance with U.F.C. Standards 81-1 and 81-2, and the Building Code, as applicable.

EXCEPTION: When approved by the chief, Level 2 aerosol products in containers with less than 1 ounce (28.3 g) net weight of flammable contents are allowed to be protected as required for Group A plastics (see Section 8101.4.2.2 in accordance with U.F.C. Standards 81-1 and 81-2.

8803.2.3 In-rack sprinkler systems. When racks are used, control valves for in-rack sprinkler systems shall be provided in accordance with U.F.C. Standard 81-2.

8803.2.4 Small hose connections. Small hose connections, when provided, shall be in accordance with Tables 8803.1-A through 8803.1-F and U.F.C. Standard 81-1 or 81-2 as applicable.

8803.3 Draft Curtains.

Draft curtains shall be installed in the following locations:

1. At the interface between the ESFR sprinklered area and the standard sprinklered area, and

2. At the interface between the ordinary temperature-rated sprinklered area and high-temperature-rated sprinklered area.

Draft curtains required by Section 8803.3 shall be constructed of noncombustible material and shall extend at least 4 feet (1219 mm) or 20 percent of the building height, whichever is greater, from the ceiling.

8803.4 Storage Arrangements.

8803.4.1 General. Storage and retail display of aerosol products in solid piles, on shelves, in racks or on pallets shall be in accordance with the applicable provisions of Sections 8802 and 8803.4.

8803.4.2 Containers not in cartons. Retail display and storage of aerosol products outside of cartons on shelves shall be in accordance with Section 8802.2.

8803.4.3 Containers in cartons on pallets, in solid piles and on shelves. Aerosol products in cartons on pallets, in solid piles or on shelves shall be in accordance with Tables 8803.1-A and 8803.1-B.

8803.4.4 Containers in cartons on racks. Aerosol products in cartons on racks shall be in accordance with Tables 8803.1-C through 8803.1-F.

Solid shelving shall not be installed in racks that are protected by a ceiling sprinkler system utilizing ESFR heads.

TABLE 8803.1-A—LEVEL 2 AEROSOL PRODUCTS ARRANGEMENT AND PROTECTION OF PALLETIZED, SOLID-PILE AND SHELF STORAGE[1]

Maximum ceiling height (feet) (× 304.8 for mm)	30	30	25	25
Maximum pile height (feet)[2] (× 304.8 for mm)	5	15	18	20
Sprinklers Type (× 25.4 for mm)	$^1/_2$ inch[3] or $^{17}/_{32}$ inch[3]	ESFR[4]	Large drop 0.64 inch[3]	ESFR[4]
Temperature rating Spacing (sq. ft.) (× 0.093 for m^2) Demand (× 40.75 for gpm/ft^2 to L/min. per m^2) (× 6.89 for psi to kPa)	High 100 Max. 0.30 gpm/sq. ft. over 2,500 sq. ft.	Ordinary 80-100 12 heads at 50 psi	Ordinary 80-100 15 heads at 50 psi	Ordinary 80-100 12 heads at 50 psi
Hose stream demand (gpm)[5] (× 3.79 for L/min.)	500	250	500	250
Water-supply duration (hours)	2	1	2	1

[1]Storage shall be in cartons.

[2]Shelf storage shall not exceed 8 feet (2438 mm).

[3]Conventional $^1/_2$-inch (12.7 mm), $^{17}/_{32}$-inch (13.5 mm) or large drop sprinklers having the faster thermal response characteristics of listed quick-response (QR) sprinklers shall not be used.

[4]ESFR heads shall not be used for shelf storage.

[5]For 2,000-square-foot (185.8 m^2) or smaller Group H, Division 3 aerosol storage rooms, use 250 gallons per minute (946.3 L/min.).

TABLE 8803.1-B—LEVEL 3 AEROSOL PRODUCTS ARRANGEMENT AND PROTECTION OF PALLETIZED AND SOLID-PILE STORAGE[1]

Maximum ceiling height (feet) (× 304.8 for mm)	30	30	25	20
Maximum pile height (feet) (× 304.8 for mm)	5	15	15	10
Sprinklers Type (× 25.4 for mm)	$^1/_2$ inch^2 or $^{17}/_{32}$ inch^2	ESFR	ESFR	Large drop 0.64 inch^2
Temperature rating Spacing (sq. ft.) (0.093 for m^2) Demand (× 40.75 for gpm/ft^2 to L/min. per m^2) (× 6.89 for psi to kPa)	High 100 Max. 0.60 gpm/sq. ft. over 2,500 sq. ft.	Ordinary 80-100 12 heads at 75 psi	Ordinary 80-100 12 heads at 50 psi	Ordinary 80-100 15 heads at 75 psi
Hose stream demand (gpm)[3] (× 3.79 for L/min.)	500	250	250	500
Water-supply duration (hours)	2	1	1	2

[1]Storage shall be in cartons.

[2]Conventional $^1/_2$-inch (12.7 mm), $^{17}/_{32}$-inch (13.5 mm) or large drop sprinklers having the faster thermal response characteristics of listed quick-response (QR) sprinklers shall not be used.

[3]For 2,000-square-foot (185.8 m^2) or smaller Group H, Division 3 aerosol storage rooms, use 250 gallons per minute (947.5 L/min.).

TABLE 8803.1-C—LEVEL 2 AEROSOL PRODUCTS ARRANGEMENT AND PROTECTION OF RACK STORAGE WITH ESFR SPRINKLERS[1]

Maximum ceiling height (feet) (× 304.8 for mm)	30	25
Maximum storage height (feet) (× 304.8 for mm)	15	20
Sprinklers Type Temperature rating Spacing (sq. ft.) (× 0.093 for m^2) Demand (× 6.89 for kPa)	ESFR Ordinary 80-100 12 heads at 50 psi	ESFR Ordinary 80-100 12 heads at 50 psi
Hose stream demand (gpm) (× 3.79 for L/min.)	250	250
Water-supply duration (hours)	1	1

[1]Single and double racks only. Storage shall be in cartons. Solid shelves shall not be installed in racks.

TABLE 8803.1-D—LEVEL 3 AEROSOL PRODUCTS ARRANGEMENT AND PROTECTION OF RACK STORAGE WITH ESFR SPRINKLERS[1]

Maximum ceiling height (feet) (× 304.8 for mm)	30	25
Maximum storage height (feet) (× 304.8 for mm)	15	15
Sprinklers Type Temperature rating Spacing (sq. ft.) (× 0.093 for m^2) Demand (× 6.89 for kPa)	ESFR Ordinary 80-100 12 heads at 75 psi	ESFR Ordinary 80-100 12 heads at 50 psi
Hose stream demand (gpm) (× 3.79 for L/min.)	250	250
Water-supply duration (hours)	1	1

[1]Single and double racks only. Storage shall be in cartons. Solid shelves shall not be installed in racks.

TABLE 8803.1-E—LEVEL 2 AEROSOL PRODUCTS ARRANGEMENT AND PROTECTION OF RACK STORAGE WITH STANDARD SPRINKLERS[1,2]

Maximum clearance from top of storage to ceiling or barrier sprinklers	15 feet (4572 mm)
Ceiling sprinklers Type Temperature rating Spacing (sq. ft.) Demand	 $^{17}/_{32}$ inch (13.5 mm) 286°F. (141°C.) 100 max. (9.3 m^2) 0.30 gpm/sq. ft. (12.2 L/min. per ft^2) over 2,500 sq. ft. (233 m^2)
In-rack sprinklers Type Temperature rating Spacing Demand	 $^1/_2$ inch (12.7 mm) 165°F. (74°C.) or less Sprinklers shall be located at a maximum spacing of 8 feet (2438 mm) on center. One line at each tier except top Locate in longitudinal flue space for double-row racks Sprinklers shall be located at least 2 feet (610 mm) from rack uprights. A minimum clearance of 6 inches (153 mm) shall be maintained between the sprinkler deflectors and the top of storage in every tier. 30 psi (208 kPa) minimum discharge pressure Base on operation of hydraulically most remote: Eight sprinklers if one level only Six sprinklers each for two levels Six sprinklers on top three levels if three or more levels
Hose stream demand (gpm)	500 (1893 L/min.)
Water-supply duration (hours)	2

[1]Storage shall be in cartons.

[2]Use design option 1 in Table 8803.1-F for racks with solid shelves.

TABLE 8803.1-F—LEVEL 2 AEROSOL PRODUCTS IN RACKS WITH SOLID SHELVES AND LEVEL 3 AEROSOL PRODUCTS ARRANGEMENT AND PROTECTION OF RACK STORAGE WITH STANDARD SPRINKLERS[1]

	CEILING PROTECTION						IN-RACK PROTECTION	
	Clearance: Storage to Sprinklers (feet)	Discharge Density (gpm/sq. ft.)	Design Area (sq. ft.)	Maximum Spacing (sq. ft.)	Temp. (°F.)	Orifice (inch)	Minimum Demand (psi)	
OPTION	× 304.8 for mm	× 40.75 for L/min per m^2	× 0.0929 for m^2		−32 × 5/9 for °C.	× 25.4 for mm	× 6.89 for kPa	Arrangement
1	Less than or equal to 5	0.30	2,500	100	286	1/2 or 17/32	30	165°F. (74°C.), 1/2-inch (12.7 mm) or 17/32-inch (13.5 mm) orifice, spaced on a maximum of 8-foot (2438 mm) centers. Longitudinal flue sprinklers shall be located a minimum of 2 feet (610 mm) from rack uprights. A minimum clearance of 6 inches (153 mm) shall be maintained between the sprinkler deflectors and the top of storage in every tier. Face sprinklers shall be provided at every tier and shall be located at a maximum spacing of 8 feet (2438 mm). Face sprinklers shall be located a maximum of 18 inches (457 mm) from the face of storage. Provide staggered face sprinklers on the opposite side of the rack. Base on the operation of the hydraulically most remote: 1. eight sprinklers if one level. 2. six sprinklers each tier if two levels. 3. six sprinklers on top three levels if greater than or equal to three levels.
	Greater than 5 and less than or equal to 15[2]	0.60	1,500 to 2,500	100	286	1/2 or 17/32		
	Greater than 15[3]	0.30	2,500	100	286	1/2 or 17/32		
2	Less than or equal to 15	0.60	2,500	100	286	1/2 or 17/32	30	165°F. (74°C.), 1/2-inch (12.7 mm) or 17/32-inch (13.5 mm) orifice, spaced on a maximum of 8-foot (2438 mm) centers. Longitudinal sprinklers shall be located a minimum of 2 feet (610 mm) from rack uprights. A minimum clearance of 6 inches (153 mm) shall be maintained between the sprinkler deflectors and the top of storage in every tier. Base on the operation of the hydraulically most remote: 1. eight sprinklers if one level. 2. six sprinklers each tier if two levels. 3. six sprinklers on top three levels if greater than or equal to three levels.
	Greater than 15	0.60	2,500	100	286	1/2 or 17/32		

[1]When solid shelves are not present, design options 1 and 2 are both acceptable. When solid shelves are present, design option 1 shall be used. For both options, a minimum water-supply duration of two hours and a combined interior and exterior hose stream demand of 500 gallons per minute (1893 L/min.) are required. Storage shall be in cartons.

[2]The design area shall be interpolated for the noted clearances.

[3]Provide a noncombustible barrier above the top tier of storage. Longitudinal flue sprinklers and face sprinklers need not be provided for the top tier of storage.

PART VIII

STANDARDS

ARTICLE 90 — STANDARDS

SECTION 9001 — GENERAL

9001.1 U.F.C. Standards. The *Uniform Fire Code* standards referred to in various parts of this code, which are also listed in Section 9002 and published in Volume 2 of this code, are hereby declared to be part of this code and are referred to in this code as a "U.F.C. standard." When this Code refers to a standard in the appendix of Volume 2, the standard shall not apply unless specifically adopted.

9001.2 Standard of Duty. The standard of duty established for the recognized standards listed in Section 9003 is that the design, construction and quality of materials of buildings, structures, equipment, processes and methodologies be reasonably safe for life, limb, health, property and public welfare. See also Section 101.3.

9001.3 Recognized Standards. The standards listed in Section 9003 are recognized standards. Compliance with these recognized standards shall be prima facie evidence of compliance with the standard of duty set forth in Section 9001.2.

SECTION 9002 — U.F.C. STANDARDS

U.F.C. STD. AND SEC. NO.	TITLE AND SOURCE
	ARTICLE 2
2-1; 207	Standard Method of Test for Flash Point by Tag Closed Tester
2-2; 207	Standard Method of Test for Flash Point by the Pensky Martens Closed Tester
2-3; 207	Standard Method of Test for Flash Point of Aviation Turbine Fuels by Setaflash Closed Tester
2-4; 207	Standard Method of Test for Flash Point of Liquids by Setaflash Closed Tester
2-5; 223	Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method)
2-6; 207, 7901.1.1 and 7903.1.1	Standard Method of Test for Flash and Fire Points by Cleveland Open Cup
	ARTICLE 10
10-1; 1002.1, 1006.2.7, 1102.5.2.3, 2401.13, 3209, 3407, 4502.8.2, 4503.7.1, 5201.9, 7901.5.3, 7902.5.1.2.1 and 7904.5.1.2	Selection, Installation, Inspection, Maintenance and Testing of Portable Fire Extinguishers
10-2; 1007.2.12.2.3, 1007.3.1, 1007.3.3.5, 5102.3, 6313.3 and 6320.1	Installation, Maintenance and Use of Sprinkler Alarm and Fire Alarm Systems

10-3; 1007.2.9.1.4 and 1007.3.1
Automatic Fire Detectors

10-4; 1001.4
Testing Procedures for Local, Auxiliary, Remote and Proprietary Protective Signaling Systems

ARTICLE 24

24-1; 2401.15 and 2402.1.1
Aircraft Fueling

ARTICLE 52

52-1; 5201.1, 5204.2 and 5204.10.2.3.5
Compressed Natural Gas (CNG) Vehicular Fuel Systems

ARTICLE 62

62-1; 6201 and 6205.1
Ovens and Furnaces

ARTICLE 74

74-1; 7401.1 and 8004.1.16
Industrial and Institutional Bulk Oxygen Systems

74-2; 7404.2.3
Medical Gas and Vacuum Systems

ARTICLE 79

79-1; 7902.2.4.2 and 7902.2.8.2
Foam Fire Protection Systems

79-2; 7902.1.13.4 and 7902.2.6.3.4
Fixed Water Spray Fire Protection Systems

79-3; 209, Table 4703-A, 5103.5.2, 6307.4, 6319, 7401.5.2, 7902.1.3.2, 8001.4.3.3, 8004.1.8, 8004.1.17, 8004.2.2.2, 8004.4.3 and 8603
Identification of the Health, Flammability and Reactivity of Hazardous Materials

79-4; 2402.1.1 and 7904.6.1
Vehicles for Transporting Flammable or Combustible Liquids

79-5; 7902.1.8.1.1 and 7902.5.11.2.4
Portable Flammable or Combustible Liquid Tanks

79-6; 7902.6.10
Interior Lining of Underground Storage Tanks

ARTICLE 80

80-1; 8003.8.1, 8003.8.2 and 8004.1.18
Storage, Dispensing and Use of Silane and its Mixtures

ARTICLE 81

81-1; 8102.8, 8102.9, 8103.2 and 8803.2
High-piled General Storage of Combustibles in Buildings

81-2; 7902.5.11.5.1, 7902.5.12.5.1, 8102.8, 8102.9, 8104.2, 8104.4 and 8803.2
High-piled Rack Storage of Combustibles in Buildings

81-3; 8102.6
Mechanical Smoke-removal Systems

ARTICLE 82

82-1; 5201.3.2, 5203.5.1, 8201, 8203, 8206, 8208, 8211, 8212 and 8214
Liquefied Petroleum Gas Storage and Use

ARTICLE 88

88-1; 8801
Classification of Aerosol Products

APPENDIX

A-II-F-I; 7903.3.3 and A-II-F Sections 4.1, 5.1 and 5.4
Testing Requirements for Protected Motor Vehicle Fuel Storage Tanks

SECTION 9003 — RECOGNIZED STANDARDS

a.1 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
444 N. Capitol Street, Suite 225, Washington, D.C. 20001
a.1.1 Standard Specifications for Highway Bridges

a.2. AMERICAN NATIONAL STANDARDS INSTITUTE
1430 Broadway, New York, NY 10018
ANSI STANDARDS
a.2.1. ANSI A13.1 Scheme for the Identification of Piping Systems
a.2.2. ANSI B31 Guide
a.2.3. ANSI B31.1 Power Piping
a.2.4. ANSI B31.2 Fuel Gas Piping
a.2.5. ANSI B31.3 Chemical Plant and Petroleum Refinery Piping
a.2.6. ANSI/ASME B31.4 Liquid Petroleum Transportation Piping System
a.2.7. ANSI B31.5 Refrigeration Piping
a.2.8. ANSI B31.5a Refrigeration Piping
a.2.9. ANSI B31.8 Gas Transmission and Distribution Piping Systems

a.3. AMERICAN PETROLEUM INSTITUTE
2101 "L" Street, N.W., Washington, DC 20037
API STANDARDS
a.3.1. 12-B Specification for Bolted Tanks for Storage of Production Liquids
a.3.2. 12-D Specification for Field Large Welded Tanks for Storage of Production Liquids
a.3.3. 12-F Specification for Shop Welded Tanks for Storage of Production Liquids
a.3.4. 620 Recommended Rules for Design and Construction of Large Welded, Low Pressure Storage Tanks
a.3.5. 650 Welded Steel Tanks for Oil Storage
a.3.6. 651 Cathodic Protection of Aboveground Petroleum Storage Tanks
a.3.7. 653 Tank Inspection, Repair, Alteration, and Reconstruction
a.3.8. 1529 Standard for Aircraft Fuel Servicing Hose and Couplings
a.3.9. 1615 Installation of Underground Petroleum Storage Systems
a.3.10. 1632 Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems

a.3.11. 2000 Venting Atmospheric and Low Pressure Storage Tanks
a.3.12. 2001 Fire Protection in Refineries
a.3.13. 2003 Protection Against Ignitions Arising out of Static, Lightning, and Stray Currents
a.3.14. 2009 Safe Welding and Cutting Practices in Refineries, Gas Plants, and Petrochemical Plants
a.3.15. 2015 Safe Entry and Cleaning of Petroleum Storage Tanks
a.3.16. 2023 Guide for Safe Storage and Handling of Heated Petroleum: Derived Asphalt Products and Crude Oil Residue
a.3.17. 2028 Flame Arrestors in Piping Systems
a.3.18. 2201 Procedures for Welding or Hot Tapping on Equipment Containing Flammables
a.3.19. 2350 Overfill Protection for Petroleum Storage Tanks

a.4. AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 Race Street, Philadelphia, PA 19103
ASTM STANDARDS
a.4.1. ASTM A 395 Ferritic Ductile Iron Pressure Retaining Castings for Use at Elevated Temperatures
a.4.2. ASTM D 5 Penetration of Bituminous Materials
a.4.3. ASTM D 86 Standard Method of Test for Distillation of Petroleum Products
a.4.4. ASTM D 3061 Tin-Plate Fabricated Aerosol Cans
a.4.5. ASTM D 3063 Pressure in Glass Aerosol Bottles
a.4.6. ASTM D 3064 Standard Terminology Relating to Aerosol Products
a.4.7. ASTM D 3073 Filling and Inspection of Glass Aerosol Containers
a.4.8. ASTM D 4021 Standard Specification for Glass-Fiber-Reinforced Polyester Underground Petroleum Storage Tanks
a.4.9. ASTM E 681 Standard Test Method for Concentration Limits of Flammability of Chemicals
a.4.10. ASTM E 1354 Standard for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter

a.5. AMERICAN SOCIETY OF MECHANICAL ENGINEERS
345 East 47th Street, New York, NY 10017
ASME STANDARDS
a.5.1. ASME Boiler and Pressure Vessel Code
Section I. Power Boilers
Section VIII. Pressure Vessels, Divisions 1 or 2

a.6. ASSOCIATION OF AMERICAN RAILROADS, Bureau of Explosives
1920 "L" Street, N.W., Washington, DC 20036
AAR CIRCULARS
a.6.1. 17-E Tank Car Loading Racks

c.1 COMPRESSED GAS ASSOCIATION, INC.
1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4100
CGA PAMPHLETS
c.1.1. C-7 Guide to the Precautionary Labeling and Marking of Compressed Gas Containers
c.1.2. P-1 Safe Handling of Compressed Gases

f.1. FACTORY MUTUAL ENGINEERING AND RESEARCH
1151 Boston-Providence Turnpike, Norwood, MA 02062
FACTORY MUTUAL DATA SHEETS
f.1.1. 8-33 Rack Storage of Materials

i.1. ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
345 East 47th Street, New York, NY 10017
i.1.1. IES Lighting Handbook

n.1. NATIONAL ASSOCIATION OF CORROSION ENGINEERS
1440 South Creek Drive, Houston, TX 77084
RECOMMENDED PRACTICES
n.1.1. RP-01 Control of External Corrosion of Underground or Submerged Metallic Piping Systems
n.1.2. RP-02 Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems

n.2. NATIONAL FIRE PROTECTION ASSOCIATION
Post Office Box 9101, Batterymarch Park, Quincy, MA 02269
NFPA STANDARDS
n.2.1. 40 Storage and Handling of Cellulose Nitrate Motion Picture Film
n.2.2. 505 Firesafety Standard for Powered Industrial Trucks (Forklifts)
n.2.3. 701 Standard Methods of Fire Tests for Flame-resistant Textiles and Films
n.2.4. 703 Standard for Fire Retardant Impregnated Wood and Fire Retardant Coatings for Building Materials

n.3. NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH)
U.S. Department of Health and Human Services, Public Health Service, Center for Disease Control, 4676 Columbia Pkwy, Cincinnati, OH 45226
n.3.1. NIOSH/OSHA Pocket Guide to Chemical Hazards

s.1. STEEL TANK INSTITUTE
666 Dundee Road, Suite 705, Northbrook, IL 60062
s.1.1. Standard sti-P_3® Specification for Exterior Corrosion Protection of Underground Steel Storage Tanks

u.1. UNDERWRITERS LABORATORIES INC.
333 Pfingsten Road, Northbrook, IL 60062
UL STANDARDS
u.1.1. UL 25 Meters for Flammable and Combustible Liquids and LP Gas
u.1.2. UL 30 Metal Safety Cans
u.1.3. UL 58 Standard for Steel Underground Tanks for Flammable and Combustible Liquids
u.1.4. UL 79 Power Operated Pumps for Petroleum Products Dispensing Systems
u.1.5. UL 80 Standard for Steel Inside Tanks for Oil-burner Fuel
u.1.6. UL 87 Power Operated Dispensing Devices for Petroleum Products
u.1.7. UL 142 Standard for Steel Aboveground Tanks for Flammable and Combustible Liquids
u.1.8. UL 330 Gasoline Hose
u.1.9. UL 525 Flame Arresters for Use of Vents of Storage Tanks for Petroleum Oil and Gasoline

u.1.10. UL 567 Pipe Connectors for Flammable and Combustible Liquids and LP Gas
u.1.11. UL 842 Valves for Flammable Liquids
u.1.12. UL 1313 Nonmetallic Safety Cans for Petroleum Products
u.1.13. UL 1316 Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products
u.1.14. UL 1746 External Corrosion Protection Systems for Steel Underground Storage Tanks
u.1.15. UL 1975 Standard for Fire Tests for Foamed Plastics Used for Decorative Purposes

u.2. UNDERWRITERS LABORATORIES OF CANADA INC.
7 Crouse Road, Scarborough, Ontario, Canada M1R 3A9
ULC STANDARDS
u.2.1. ULC 603.1-M Standard for Galvanic Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids

u.3. UNITED STATES OF AMERICA REGULATIONS
Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402
CODE OF FEDERAL REGULATIONS
u.3.1. Title 29, Section 1910
u.3.2. Title 40, Parts 280 and 281
u.3.3. Title 49, Chapter 1 (DOT Regulations)

PART IX

APPENDICES

Division I

EXISTING BUILDINGS

APPENDIX I-A

LIFE-SAFETY REQUIREMENTS FOR EXISTING BUILDINGS OTHER THAN HIGH RISE

(See U.F.C. Sections 102 and 1202.1)

SECTION 1 — GENERAL

1.1 Purpose. The purpose of Appendix I-A is to provide a reasonable degree of safety to persons occupying existing buildings by providing for alterations to such existing buildings which do not conform with the minimum requirements of the *Uniform Building Code.*

EXCEPTION: Group U Occupancies and occupancies regulated by Appendix I-B, and Group R, Division 3 Occupancies, except that Group R, Division 3 Occupancies shall comply with Section 6.

1.2 Effective Date. Within 18 months after the effective date of Appendix I-A, plans for compliance shall be submitted and approved, and within 18 months thereafter the work shall be completed or the building shall be vacated until made to conform.

SECTION 2 — EXITS

2.1 Number of Exits. Every floor above the first story used for human occupancy shall have access to at least two separate exits, one of which may be an exterior fire escape complying with Section 2.4. Subject to the approval of the chief, an approved ladder device may be used in lieu of a fire escape when the construction feature or location of the building on the property makes the installation of a fire escape impracticable.

EXCEPTION: In all occupancies, second stories with an occupant load of 10 or less may have one exit.

An exit ladder device when used in lieu of a fire escape shall conform with the Building Code (see U.B.C. Standard 10-3) and the following:

1. Serves an occupant load of 10 or less or a single dwelling unit or guest room.
2. The building does not exceed three stories in height.
3. The access is adjacent to an opening as specified for emergency egress or rescue or from a balcony.
4. Shall not pass in front of any building opening below the unit being served.
5. The availability of activating the device for the ladder is accessible only from the opening or balcony served.
6. So installed that it will not cause a person using it to be within 6 feet (1829 mm) of exposed electrical wiring.

2.2 Stair Construction. All required stairs shall have a minimum run of 9 inches (229 mm) and a maximum rise of 8 inches (203 mm) and shall have a minimum width of 30 inches (762 mm), exclusive of handrails. Every stairway shall have at least one handrail. A landing having a minimum 30-inch (762 mm) run in the direction of travel shall be provided at each point of access to the stairway.

EXCEPTION: Fire escapes as provided for in Section 2.4.

Exterior stairs shall be of noncombustible construction.

EXCEPTION: On buildings of Types III, IV and V construction, provided the exterior stairs are constructed of wood not less than 2-inch (51 mm) nominal thickness.

2.3 Corridors. Corridors of Groups A; B; E; F; H; I; M; R, Division 1; and S Occupancies serving as an exit for an occupant load of 30 or more shall have walls and ceilings of not less than one-hour fire-resistive construction as required by the Building Code. Existing walls surfaced with wood lath and plaster in good condition or $^1/_2$-inch (12.7 mm) gypsum wallboard or openings with fixed wired glass set in steel frames are permitted for corridor walls and ceilings and occupancy separations when approved. Doors opening into such corridors shall be protected by 20-minute fire assemblies or solid wood doors not less than $1^3/_4$ inches (45 mm) thick. Where the existing frame will not accommodate the $1^3/_4$-inch-thick (45 mm) door, a $1^3/_8$-inch-thick (35 mm) solid bonded wood core door or equivalent insulated steel door shall be permitted. Doors shall be self-closing or automatic-closing by smoke detection. Transoms and openings other than doors from corridors to rooms shall comply with the Building Code (see U.B.C. Section 1005.8) or shall be covered with a minimum of $^3/_4$-inch (19.1 mm) plywood or $^1/_2$-inch (12.7 mm) gypsum wallboard or equivalent material on the room side.

EXCEPTION: Existing corridor walls, ceilings and opening protection not in compliance with the above may be continued when such buildings are protected with an approved automatic sprinkler system throughout. Such sprinkler system may be supplied from the domestic water system if it is of adequate volume and pressure.

2.4 Fire Escapes.

1. Existing fire escapes which in the opinion of the chief comply with the intent of Section 2.4 may be used as one of the required exits. The location and anchorage of fire escapes shall be of approved design and construction.

2. Fire escapes shall comply with the following:

Access from a corridor shall not be through an intervening room.

All openings within 10 feet (3048 mm) shall be protected by three-fourths-hour fire assemblies. When located within a recess or vestibule, adjacent enclosure walls shall not be of less than one-hour fire-resistive construction.

Egress from the building shall be by a clear opening having a minimum dimension of not less than 29 inches (737 mm). Such openings shall be openable from the inside without the use of a key or special knowledge or effort. The sill of an opening giving access shall not be more than 30 inches (762 mm) above the floor of the building or balcony.

Fire escape stairways and balconies shall support the dead load plus a live load of not less than 100 pounds per square foot (4.78 kN/m^2) and shall be provided with a top and intermediate handrail on each side. The pitch of the stairway shall not exceed 60 degrees with a minimum width of 18 inches (457 mm). Treads shall not be less than 4 inches (102 mm) in width and the rise between treads shall not exceed 10 inches (254 mm). All stair and balcony railings shall support a horizontal force of not less than 50 pounds per lineal foot (729.5 N/m) of railing.

Balconies shall not be less than 44 inches (1118 mm) in width with no floor opening other than the stairway opening greater than $^5/_8$ inch (16 mm) in width. Stairway openings in such balconies shall not be less than 22 inches by 44 inches (599 mm by 1118 mm). The balustrade of each balcony shall not be less than 36 inches (914 mm) high with not more than 9 inches (229 mm) between balusters.

Fire escapes shall extend to the roof or provide an approved gooseneck ladder between the top floor landing and the roof when serving buildings four or more stories in height having roofs with less than 4 units vertical in 12 units horizontal (33.3% slope). Fire escape ladders shall be designed and connected to the building to withstand a horizontal force of 100 pounds per lineal foot (1459 N/m); each rung shall support a concentrated load of 500 pounds (2224 N) placed anywhere on the

rung. All ladders shall be at least 15 inches (381 mm) wide, located within 12 inches (305 mm) of the building and shall be placed flatwise relative to the face of the building. Ladder rungs shall be $^3/_4$ inch (19 mm) in diameter and shall be located 12 inches (305 mm) on center. Openings for roof access ladders through cornices and similar projections shall have minimum dimensions of 30 inches by 33 inches (762 mm by 838 mm).

The lowest balcony shall not be more than 18 feet (5486 mm) from the ground. Fire escapes shall extend to the ground or be provided with counterbalanced stairs reaching to the ground.

Fire escapes shall not take the place of stairways required by the codes under which the building was constructed.

Fire escapes shall be kept clear and unobstructed at all times and maintained in good working order.

2.5 Exit and Fire Escape Signs. Exit signs shall be provided as required by the Building Code.

EXCEPTION: The use of existing exit signs may be continued when approved by the chief.

All doors or windows providing access to a fire escape shall be provided with fire escape signs.

SECTION 3 — ENCLOSURE OF VERTICAL SHAFTS

Interior vertical shafts, including but not limited to stairways, elevator hoistways, service and utility shafts, shall be enclosed by a minimum of one-hour fire-resistive construction. All openings into such shafts shall be protected with one-hour fire assemblies which shall be maintained self-closing or be automatic closing by smoke detection. All other openings shall be fire protected in an approved manner. Existing fusible link-type automatic door closing devices may be permitted if the fusible link rating does not exceed 135°F. (57.2°C.).

EXCEPTIONS: 1. In other than Group I Occupancies, an enclosure will not be required for openings serving only one adjacent floor.

2. Stairways need not be enclosed in a continuous vertical shaft if each story is separated from other stories by one-hour fire-resistive construction or approved wired glass set in steel frames. In addition, all exit corridors shall be sprinklered and the openings between the corridor and occupant space shall have at least one sprinkler head above the openings on the tenant side. The sprinkler system may be supplied from the domestic water supply if of adequate volume and pressure.

3. Vertical openings need not be protected if the building is protected by an approved automatic sprinkler system.

SECTION 4 — BASEMENT ACCESS OR SPRINKLER PROTECTION

An approved automatic sprinkler system shall be provided in basements or stories exceeding 1,500 square feet (139.3 m^2) in area and not having a minimum of 20 square feet (1.86 m^2) of opening entirely above the adjoining ground level in each 50 lineal feet (15 240 mm) or fraction thereof of exterior wall on at least one side of the building. Openings shall have a minimum clear dimension of 30 inches (762 mm).

If any portion of a basement is located more than 75 feet (22 860 mm) from required openings, the basement shall be provided with an approved automatic sprinkler system throughout.

SECTION 5 — STANDPIPES

Any buildings over four stories in height shall be provided with an approved Class I or III standpipe system.

SECTION 6 — SMOKE DETECTORS

6.1 General. Dwelling units and hotel or lodging house guest rooms that are used for sleeping purposes shall be provided with smoke detectors. Detectors shall be installed in accordance with the approved manufacturer's instructions.

6.2 Power Source. Smoke detectors may be battery operated or may receive their primary power from the building wiring when such wiring is served from a commercial source. Wiring shall be permanent and without disconnecting switches other than those required for over-current protection.

6.3 Locations within Dwelling Units. In dwelling units, detectors shall be mounted on the ceiling or wall at a point centrally located in the corridor or area giving access to each separate sleeping area. Where sleeping rooms are on an upper level, the detector shall be placed at the center of the ceiling directly above the stairway. Detectors shall also be installed in basements of dwelling units having stairways which open from the basement into the dwelling. Detectors shall sound an alarm audible in all sleeping areas of the dwelling unit in which they are located.

6.4 Location in Efficiency Dwelling Units and Hotels. In efficiency dwelling units, hotel suites and in hotel sleeping rooms, detectors shall be located on the ceiling or wall of the main room or hotel sleeping room. When sleeping rooms within an efficiency dwelling unit or hotel suite are on an upper level, the detector shall be placed at the center of the ceiling directly above the stairway. When actuated, the detector shall sound an alarm audible within the sleeping area of the dwelling unit, hotel suite or sleeping room in which it is located.

SECTION 7 — SEPARATION OF OCCUPANCIES

Occupancy separations shall be provided as specified in the Building Code (see U.B.C. Section 302). When approved by the chief, existing wood lath and plaster in good condition or $^1/_2$-inch (12.7 mm) gypsum wallboard may be acceptable where one-hour occupancy separations are required.

APPENDIX I-B
LIFE-SAFETY REQUIREMENTS FOR EXISTING HIGH-RISE BUILDINGS
(See U.F.C. Sections 102, 1202.1 and 1303.1)

SECTION 1 — SCOPE

These provisions apply to existing high-rise buildings constructed prior to the adoption of Appendix I-B and which house Group B Offices or Group R, Division 1 Occupancies, each having floors used for human occupancy located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access.

SECTION 2 — GENERAL

Existing high-rise buildings as specified in Section 1 shall be modified to conform with not less than the minimum provisions specified in Table A-I-B-1 and as further enumerated within Appendix I-B.

The provisions of Appendix I-B shall not be construed to allow the elimination of fire-protection systems or a reduction in the level of firesafety provided in buildings constructed in conformance with previously adopted codes.

SECTION 3 — COMPLIANCE DATA

After adoption of Appendix I-B, the chief shall duly notify the owners whose buildings are subject to the provisions of Appendix I-B. Upon receipt of such notice, the owner shall, subject to the following time limits, take necessary actions to comply with the provisions of Appendix I-B.

Plans and specifications for the necessary alterations shall be filed with the chief within the time period established by the local jurisdiction after the date of owner notification. Work on the required alterations to the building shall commence within 30 months of the date of owner notification and such work shall be completed within five years from the date of owner notification.

The chief shall grant necessary extensions of time when 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 upon the showing of good cause and subject to the filing of an acceptable systematic progressive plan of correction with the chief.

SECTION 4 — AUTHORITY OF THE CHIEF

For the purpose of applying the provisions of Appendix I-B, the chief shall have the authority to consider alternative approaches and grant necessary deviations from Appendix I-B as follows:

1. Allow alternate materials or methods of compliance if such alternate materials or methods of compliance will provide levels of fire and life safety equal to or greater than those specifically set forth in Appendix I-B.

2. Waive specific individual requirements if it can be shown that such requirements are not physically possible or practical and that a practical alternative cannot be provided.

SECTION 5 — APPEALS BOARD

Appeals of the determinations of the chief in applying the provisions of this code may be made by an appeal directed to the board of appeals as established by Section 103.1.4 of this code.

SECTION 6 — SPECIFIC PROVISIONS AND ALTERNATES

6.1 Specific Provisions. The following provisions shall apply when required by Table A-I-B-1:

1. **Type of construction.** Buildings classified as Type II-N, III-N or V-N construction shall be equipped with an approved automatic sprinkler system installed in accordance with the Building Code (see U.B.C. Standard 9-1).

EXCEPTION: Installation of meters or backflow preventers for the connection to the water works system need not be provided unless required by other regulations of the authority having jurisdiction.

2. **Automatic sprinklers.** All required exit corridors, stairwells, elevator lobbies, public assembly areas occupied by 100 or more persons and commercial kitchens shall be protected by an approved automatic sprinkler system meeting the design criteria of the Building Code (see U.B.C. Standard 9-1). A minimum of one sprinkler shall be provided on the room side of every corridor opening.

EXCEPTION: Sprinklers may be omitted in stairwells of noncombustible construction.

3. **Fire department communication system.** When it is determined by test that the portable fire department communication equipment is ineffective, a communication system acceptable to the fire department shall be installed within the existing high-rise building to permit emergency communication between fire suppression personnel.

4. **Single-station smoke detectors.** Single-station smoke detectors shall be installed within all dwelling units or guest rooms in accordance with the manufacturer's installation instructions. In dwelling units, the detector shall be mounted on the ceiling or wall at a point centrally located in the corridor or area giving access to each separate sleeping area. When sleeping rooms are located on an upper level, the detector shall be installed at the center of the ceiling directly above the stairway within the unit. In efficiency dwelling units, hotel suites and in hotel guest rooms, detectors shall be located on the ceiling or wall of the main room or hotel sleeping room. When actuated, the detector shall provide an audible alarm in the sleeping area of the dwelling unit, hotel suite or guest room in which it is located.

Such detectors may be battery operated.

5. **Manual fire alarm system.** An approved manual fire alarm system connected to a central, proprietary or remote station service, or an approved manual fire alarm system which will provide an audible signal at a constantly attended location shall be provided.

6. **Occupant voice notification system.** An approved occupant voice notification system shall be provided. Such system shall provide communication from a location acceptable to the fire department and shall permit voice notification to at least all normally occupied areas of the building.

The occupant voice notification system may be combined with a fire alarm system, provided the combined system has been approved and listed for such use. The sounding of a fire alarm signal in any given area or floor shall not prohibit voice communication to other areas or floors. Combination systems shall be designed to permit voice transmission to override the fire alarm signal, but the fire alarm shall not terminate in less than 3 minutes.

7. **Vertical shaft enclosures.** Openings through two or more floors except mezzanine floors, which contain a stairway or elevator shall be provided with vertical shaft enclosure protection as specified herein. Such floor openings, when not enclosed by existing shaft enclosure construction, shall be protected by one-hour fire-resistive-rated shaft enclosure construction. For floor openings which are enclosed by existing shaft enclosure construction having fire-resistive capabilities similar to wood lath and plaster in good condition, $^1/_2$-inch (12.7 mm) gypsum wallboard or approved $^1/_4$-inch-thick (6.4 mm) wired glass is acceptable. Wired glass set in a steel frame may be installed in existing shaft enclosure walls but shall be rendered inoperative and be fixed in a closed position.

Openings through two or more floors for other than stairways or elevators, such as openings provided for piping, ducts, gas vents, dumbwaiters, and rubbish and linen chutes, shall be provided with vertical shaft enclosure protection as specified for stairways and elevators.

EXCEPTION: Openings for piping, ducts, gas vents, dumbwaiters and rubbish and linen chutes of copper or ferrous construction are permitted without a shaft enclosure, provided the floor openings are effectively firestopped at each floor level.

7501.7 Electrical Grounding and Bonding. Containers, systems and equipment used for flammable cryogenic fluids shall be either grounded or bonded or both. Electrical grounding and bonding shall be provided by an approved system and shall be in accordance with the Electrical Code. Suitable means shall be taken to protect the system against corrosion, including corrosion caused by stray electric currents.

7501.8 Warning Labels. Warning labels and signs shall be posted on containers and equipment and at locations prescribed by the chief.

7501.9 Dispensing Areas. Dispensing of flammable cryogenic fluids, liquefied oxygen, liquid oxidizers or toxic/corrosive cryogenics shall be at approved locations.

7501.10 Fire Protection. Provisions shall be made in flammable storage areas for controlling and extinguishing vent line fires.

TABLE 7501.4-A—CLASSIFICATION OF CRYOGENIC FLUIDS

FLAMMABLE	NONFLAMMABLE	CORROSIVE/HIGHLY TOXIC	OXIDIZER
Carbon monoxide Deuterium[1] Ethylene Hydrogen Methane	Air Argon Helium Krypton Neon Nitrogen Xenon	Carbon monoxide Fluorine Nitric oxide	Fluorine Nitric oxide Oxygen

[1]Heavy hydrogen is treated as hydrogen in Article 75.

TABLE 7501.4-B—LOW TEMPERATURE PHYSICAL PROPERTIES OF GASES

NAME	FORMULA	MOLECULAR WEIGHT	NORMAL BOILING POINT			CRITICAL POINT		TRIPLE POINT (MELTING POINT)		SPECIFIC HEAT CP @ 70°F. 14.7 PSIA Btu/ (lb. · mole · °F.)	GAS DENSITY @ 70°F. 14.7 PSIA Lb./Cu. Ft.
			Temp.°F.	Liquid Density Lb./Cu. Ft.	Latent Heat Btu/ Lb.-Mole	Temp.°F.	Pressure PSIA	Temp. °F.	Pressure PSIA		
			$-32 \times 5/9$ for °C.	× 16.02 for kg/m³	× 0.556 for cal/g · mole	$-32 \times 5/9$ for °C.	× 6.89 for kPa	$-32 \times 5/9$ for °C.	× 6.89 for kPa	× 1 for cal/ (g·mole °C.) at 21.1°C. and 101.3 kPa	× 16.02 for kg/m³ at 21.1°C. and 101.3 kPa
Air[1]	[2]	28.96	–317.9	54.56	2,556					7.0	0.07493
Argon[1]	A	39.95	–302.6	86.98	2,804	–187.6	705	–308.9	9.99	4.98	0.1034
Carbon monoxide[3]	CO	28.01	–311.9	49.3	2,597	–220.4	508	–337.1	2.23	6.97	0.0725
Deuterium[3]	D_2	4.03	–417.3	10.7	540	–390.8	239	–426.0	2.48	6.97	0.0104
Fluorine	F_2	38.00	–306.6	93.8	2,815	–200.2	808	(–363.3)		7.49	0.0983
Helium[1]	He	4.00	–452.13	7.798	36	–450.2	33	–455.8[4]	0.735[4]	4.98	0.01034
Hydrogen[1, 3]	H_2	2.02	–422.99	4.418	389	–399.8	188	–434.5	1.044	6.89	0.005209
Krypton[1]	Kr	83.80	–244.0	150.6	3,884	–82.8	796	–250.9	10.62	4.98	0.2172
Methane[3]	CH_4	16.04	–258.6	26.5	3,519	–116.6	670	–296.5	1.69	8.6	0.0416
Neon[1]	Ne	20.18	–410.7	75.35	748	–379.7	395	–415.4	6.27	4.98	0.05215
Nitric oxide[1]	NO	30.01	–241.0	79.3	5,953	–137.2	945	–263.6	3.16	7.1	0.0777
Nitrogen[1]	N_2	28.01	–320.5	50.46	2,405	–232.6	491	–345.9	1.82	6.98	0.07245
Oxygen[1]	O_2	32.00	–297.3	71.27	2,932	–181.1	737	–361.8	0.021	7.02	0.08281

[1]Based on data from the Compressed Gas Association Meeting held June 19, 1962.

[2]Proximate composition of dry air (Mole percent: 78.09 N_2, 20.95 O_2, 0.93 Ar, 0.03 CO_2.)

[3]Flammable.

[4]λ (lambda) point.

SECTION 7502 — CONTAINERS AND OTHER VESSELS

7502.1 Design, Construction and Testing.

7502.1.1 General. Containers used for the storage and handling of cryogenic fluids shall be of approved materials and designed in accordance with nationally recognized standards. See Article 90.

7502.1.2 Metallic. Metallic containers shall be constructed, inspected and tested in accordance with nationally recognized standards. See Article 90.

7502.1.3 Concrete. Concrete containers shall be built in accordance with the Building Code. Barrier materials used in connection with concrete but not functioning structurally shall be materials authorized by nationally recognized standards. See Article 90.

7502.1.4 Shipping. Containers used in transportation shall be built, inspected and tested in accordance with the applicable DOT provisions.

7502.2 Pressure-relief Devices.

7502.2.1 General. Pressure containers shall be protected by a pressure-relief device or devices. If only one pressure-relief device is used, it shall be set to operate at a pressure not to exceed the maximum allowable working pressure. Additional relief devices are allowed to be set to operate at a higher pressure but shall not exceed 150 percent of the maximum allowable working pressure.

7502.2.2 Fire hazard exposures. Containers subject to an exposure fire hazard shall be protected by pressure-relieving devices designed to protect against excessive pressure caused by fire exposure. Such devices shall be set to operate at a pressure not in excess of 110 percent of the maximum allowable working pressure and shall have a relieving capacity sufficient to prevent the pressure from rising more than 20 percent above the maximum working pressure. If only one device is used, it shall be set to operate at a pressure not to exceed the maximum allowable working pressure.

7502.2.3 Accessibility and moisture effects. Relief devices shall be located such that they are readily accessible for inspection and repair and shall be protected against tampering. Relief devices shall be designed or located such that moisture cannot collect and freeze in a manner which would interfere with proper operation of the device.

7502.2.4 Shutoffs between relief valves and containers. Shutoff valves shall not be installed between relief valves and containers.

EXCEPTION: A shutoff valve is allowed on multiple-valve installations where the arrangement of the valves will provide full required flow through the relief devices at all times.

7502.2.5 Outer containers. Outer containers shall be equipped with pressure-relief devices to adequately protect the containers from excessive pressure.

7502.2.6 Vessels other than containers. Heat exchangers and similar vessels shall be protected by a relieving device of sufficient capacity to avoid overpressure in case of internal failure.

7502.2.7 Temperature limits. Safety relief valves shall not be subjected to cryogenic temperatures except when operating.

7502.3 Pressure-relief Vent Piping.

7502.3.1 Size. Relief vent piping shall have an area not less than the area of the relief valve and shall be arranged so as not to unduly restrict the flow.

7502.3.2 Arrangement. Relief devices and relief device vent piping shall be arranged so that escaping gas will discharge unobstructed to the open air and not impinge on personnel, containers, equipment and structures or enter enclosed spaces.

7502.3.3 Moisture control and termination. Vents shall be installed in such a manner as to exclude or remove moisture and condensation and to prevent malfunction due to freezing or icing. Drains shall be so installed as to prevent possible flame impingement on the container, piping, equipment and structures.

7502.4 Insulation. Insulation for containers in oxygen service shall be noncombustible and shall be nonreactive with oxygen-enriched air.

7502.5 Nameplates. Containers shall be identified by the attachment of a nameplate in an accessible place marked as authorized by nationally recognized standards or DOT regulations. See Article 90.

SECTION 7503 — STORAGE

7503.1 Installation of Aboveground Containers.

7503.1.1 Foundation and protection of supports. Containers shall be provided with substantial concrete or masonry foundations, or structural steel supports on firm concrete or masonry foundations. Structural steel supports exceeding 18 inches (457 mm) in height and supporting flammable, corrosive or highly toxic cryogenic fluid containers shall be protected with a protective coating having a two-hour fire-resistive rating in accordance with the Building Code.

7503.1.2 Temporary installations. Temporarily installed portable containers shall be ASME- or DOT-approved mobile containers or shall be provided with substantial noncombustible supports securely anchored on firm, compatible foundations.

Temporarily installed containers of liquid oxygen shall be installed over an approved noncombustible surface.

7503.1.3 Temperature effects on supports. When container supports or foundations are likely to reach cryogenic temperatures, the supports or foundations shall be of a material and design to withstand the low-temperature effects of cryogenic fluid spillage.

Horizontal containers shall be mounted on foundations so as to accommodate expansion and contraction.

7503.1.4 Support design and corrosion protection. Containers shall be supported to prevent the concentration of excessive loads on the supporting portion of the shell. Portions of containers in contact with foundations or saddles shall be protected against corrosion.

7503.1.5 Flooding areas. Containers located in areas that are subject to flooding shall be securely anchored or elevated.

7503.1.6 Protection from damage. Storage containers, piping, valves, regulating equipment and other accessories shall be protected against physical damage and against tampering.

7503.1.7 Securing. Containers subject to shifting or upset shall be secured.

7503.2 Drainage for Aboveground Containers. The area surrounding a container for cryogenic fluids shall be provided with drainage to prevent accidental discharge of fluids from endangering adjacent containers, buildings and equipment or adjoining property.

> **EXCEPTION:** These provisions may be altered or waived when determined by the chief that such container does not constitute a hazard, after consideration of special features such as rock for a heat sink, topographical conditions, nature of occupancy, proximity to buildings on the same or adjacent property, capacity and construction of containers, and character of fluids to be stored.

7503.3 Location of Aboveground Containers with Respect to Exposures.

7503.3.1 General. Cryogenic fluid containers shall be located in accordance with Table 7503.3-A. Containers in excess of the quantity in Table 7503.3-A shall be engineered based on the

exposure hazard. Extrapolations from Table 7503.3-A shall not be used for quantities in excess of those listed.

7503.3.2 Production and transfill plant exposure. Distance for cryogenic containers to exposures at production plants and transfill plants shall be engineered based on the exposure hazard.

7503.4 Installation of Belowground Concrete Containers.

7503.4.1 Frost-heave soils. Suitable tests shall be conducted by qualified personnel at the site to determine whether the soil within the expected freezing zone around the container is of the frost-heave susceptible type. If it is determined that the soil is susceptible to ice-lens formation, select backfill of sufficient width shall be placed around the vessel to prevent excessive pressure from acting on the container or suitable means taken to ensure that the zone of freezing will not extend into the frost-heave susceptible soil.

7503.4.2 Foundations. Belowground concrete containers shall be installed on foundations or supports of concrete, masonry piling, steel or a suitable foundation of aggregate which shall have been designed and constructed in accordance with the Building Code.

7503.4.3 Limiting access. The container storage area shall be fenced or otherwise protected where necessary. A minimum of two access openings shall be provided, and they shall be sufficient in size to accommodate emergency equipment.

7503.5 Installation of Cryogenic In-ground Containers.

7503.5.1 General. Natural materials, such as earth, shall be proven to have adequate chemical and physical properties for the construction and operation of the container at the operating temperature.

7503.5.2 Container base. Containers shall be bottomed out of material naturally impermeable or made impermeable by artificial means.

7503.5.3 Design and construction. Foundations, such as those for the superstructure or roof, shall be properly designed and constructed in accordance with the Building Code.

7503.5.4 Fencing. The container storage area shall be fenced or otherwise protected where necessary. A minimum of two access openings shall be provided and they shall be of sufficient size to accommodate emergency equipment.

7503.6 Location of Belowground and In-ground Containers with Respect to Exposures. The minimum distance from the edge of belowground and in-ground flammable cryogenic containers to the nearest important building, property line or public way or from aboveground flammable or combustible liquid storage shall be in accordance with Table 7503.6-A.

7503.7 Location in Areas Containing Flammable Materials. Containers of cryogenic fluids shall not be located within dikes enclosing flammable or combustible liquid containers, LP-gas containers or compressed gas containers.

TABLE 7503.3-A—MINIMUM DISTANCE FROM CRYOGENIC FLUIDS IN STORAGE

EXPOSURE	DISTANCE IN FEET TO NONFLAMMABLE CRYOGENS[1]	DISTANCE IN FEET TO FLAMMABLE CRYOGENS[1]			DISTANCE IN FEET TO OXIDIZING CRYOGENS[1]		DISTANCE IN FEET TO CORROSIVE AND HIGHLY TOXIC CRYOGENS[1]
	× 304.8 for mm						
	0-75,000 gal.	0-3,500 gal.	3,501-15,000 gal.	15,001-30,000 gal.	0-1,000 gal.	1,001-50,000 gal.	20,000 gal. or less
	× 3.785 for L						
BUILDINGS—							
Type I and Type II-F.R.	1	5	5	5	1	1	5
Types II-N and One-hour	1	25[2]	50[2]	75[2]	1	1	25
Types III, IV and V	1	50[2]	75[2]	100[2]	50[2]	50[2]	50
WALL OPENINGS, AIR INTAKES	1	75 above the system			10	10	25[3]
FLAMMABLE and COMBUSTIBLE LIQUID ABOVEGROUND							
<1,000 gal. (3785 L)	5	50[2]	75[2]	75[2]	25[2, 4]	25[2, 4]	50[2]
>1,000 gal. (3785 L)	5	50[2]	75[2]	100[2]	50[2, 4]	50[2, 4]	50[2]
FLAMMABLE and COMBUSTIBLE LIQUID BELOWGROUND							
From tank	1	20[2]	20[2]	20[2]	15	15	15
From vent or tank fill connection	1	25[2]	25[2]	25[2]	25[2, 4]	25[2, 4]	25[2, 4]
FLAMMABLE GAS							
<25,000 cu. ft. (707.5 m^3)	5	25[2]	25[2]	50[2]	25[2, 4]	25[2, 4]	50[2]
>25,000 cu. ft. (707.5 m^3)	5	50[2]	50[2]	75[2]	25[2, 4]	50[2, 4]	50[2]
FAST-BURNING SOLIDS	5	50[2]	75[2]	100[2]	50[2, 4]	50[2]	50[2]
PLACES OF PUBLIC ASSEMBLY	50	75	75	75	50	50	50[5]
NONAMBULATORY PATIENT AREAS	50	75	75	75	50	50	50[5]
PROPERTY LINES	5	25[2]	50[2]	75[2]	5	5	50[2, 5]
NONFLAMMABLE CRYOGEN	1	5	5	5	5	5	5
FLAMMABLE CRYOGEN	5	5	5	5	75[2, 4]	75[2, 4]	50[2]
OXIDIZER CRYOGEN	5	75[2, 4]	75[2, 4]	75[2, 4]	5	5	50[2, 4]
CORROSIVE AND HIGHLY TOXIC CRYOGEN	5	50[2]	50[2]	50[2]	5	5	5

Footnotes to Table 7503.3-A

[1]Distances shall be increased when required by the chief for cryogenic fluids which are reactive with exposure cryogenic fluids.

[2]The distances do not apply where protective structures having a minimum fire resistance of two hours interrupt the line of sight between uninsulated portions of the cryogen storage installation and the exposure. In such cases, the cryogen installation shall be a minimum distance of 1 foot (304.8 mm), or a greater distance if required for system maintenance, from the protective structure. The protective structure shall be at least 5 feet (1524 mm) from the exposure.

The protective structure, in lieu of distance, protects uninsulated cryogen containers or supports, control equipment enclosures, and system piping, or parts thereof, from external fire exposure. Cryogen containers are well insulated. Such containers can provide line-of-sight protection for uninsulated system components.

Protective structure configuration and dimensions will, therefore, vary depending upon the components of a particular system and their spatial relation to each other and to the exposure. Also, the configuration will allow for natural ventilation to prevent the accumulation of hazardous gas concentrations and shall not have more than two sides at approximately 90-degree directions or three sides with connecting angles of approximately 135 degrees.

[3]For carbon monoxide—50 feet (15 240 mm).

[4]Where it is necessary to locate liquefied oxygen in the vicinity of flammable cryogens, liquefied flammable gas or flammable liquids, suitable protective means shall be taken, such as grading or diversion curbs, to prevent accumulation of liquids within 25 feet (7620 mm) of each other.

[5]For carbon monoxide—75 feet (22 860 mm).

TABLE 7503.6-A—MINIMUM DISTANCE FROM EDGE OF BELOWGROUND AND IN-GROUND FLAMMABLE CRYOGENIC CONTAINERS TO IMPORTANT BUILDINGS, PROPERTY LINES, PUBLIC WAYS OR ABOVEGROUND FLAMMABLE OR COMBUSTIBLE LIQUIDS STORAGE

CONTAINER CAPACITY (Gallons)	MINIMUM DISTANCE (Feet)
× 3.785 for L	× 304.8 for mm
Less than 500	5
More than 500 to 1,000	25
Over 1,000	50

SECTION 7504 — PIPING, PROCESS AND ACCESSORY EQUIPMENT AT MANUFACTURING FACILITIES AND CONSUMER SITES

7504.1 Piping, Materials and Construction.

7504.1.1 General. Piping and materials such as gaskets and thread compound shall be suitable for the intended use through the full range of pressure and temperature to which they will be subjected, maintaining a safety factor of four to one.

7504.1.2 Piping system design. Piping systems shall be designed and constructed to provide adequate allowance for expansion, contraction, vibration, settlement and fire exposure.

7504.1.3 Joints. Joints on container piping and tubing over 2-inch (51 mm) nominal diameter shall be made by welding or with welded flanges. For nonflammable, nontoxic and noncorrosive cryogenic fluids, screwed, welded, silver-brazed or welded-flange joints are allowed.

7504.1.4 Outside piping. Piping outside buildings is allowed to be either buried or aboveground and shall be well supported and protected from physical damage and corrosion.

7504.1.5 Testing. Piping and tubing shall be tested after installation at not less than one and one-half times hydraulically or one and one-fourth times pneumatically the maximum working pressure and shall be proven free of leaks.

7504.2 Valves and Accessory Equipment.

7504.2.1 General. Valves and accessory equipment shall be suitable for the intended use at the temperatures of the application and shall be designed for not less than the maximum pressure and minimum temperature to which they could be subjected, maintaining a safety factor of four to one.

7504.2.2 Shutoffs on containers. Shutoff valves shall be provided on all container connections. Shutoff valves shall be located as close as practical to the containers.

7504.2.3 Containers in excess of 2,000 gallons (7571 L). Liquid and vapor connections on flammable cryogenic fluid containers in excess of a 2,000-gallon (7571 L) water capacity, other than gaging connections under $^1/_2$-inch (12.7 mm) pipe size, shall be equipped with check valves or a remotely controlled, quick-closing valve. Remote valves shall be labeled in a manner approved by the chief. Remote valves shall be located as close as practical to the tank.

7504.2.4 Shutoff on piping. Shutoff valves shall be installed in liquid piping as needed to limit the volume of liquid discharged in event of piping or equipment failure. Relief valves shall be installed between shutoff valves in pipes.

7504.2.5 Identification of container connections. Inlet and outlet connections other than relief valves, liquid-level gaging devices, and pressure gages on containers, shall be labeled or identified by a schematic drawing to designate whether they are connected to vapor or liquid space.

7504.2.6 Vent relief devices for flammables and corrosives. Relief device vent lines for flammable and corrosive cryogens shall be piped to a vent stack which discharges up in the air at a safe distance from personnel.

SECTION 7505 — HANDLING, LOADING AND UNLOADING AREAS

7505.1 General. Loading and unloading shall be performed in a manner which does not create unsafe conditions.

7505.2 Control. Movement of vehicles, starting of engines, and loading and unloading operations shall be controlled by personnel responsible for the loading and unloading area.

7505.3 Oxygen near Fuels. Oxygen shall not be loaded or unloaded in the vicinity of loading or unloading of gaseous or liquid fuel.

7505.4 Parking Vehicles. Parked vehicles shall have wheel chocks in place.

SECTION 7506 — TRANSPORTATION

7506.1 Containers, Tanks and Vessels. Containers, tanks and vessels used for transporting cryogenic fluids shall meet DOT requirements.

7506.2 Vehicles. Vehicles transporting cryogenic fluids and subject to requirements of this code shall:

1. Be placarded at the front, rear and on each side identifying the product. Placards shall have letters not less than 2 inches (50.8 mm) high using approximately a $^{5}/_{8}$-inch (15.9 mm) stroke. Abbreviations shall not be used. In addition to the placard identifying the product, vehicles shall also bear other placards required by DOT, such as FLAMMABLE GAS and OXIDIZER.

2. Be equipped with not less than one portable fire extinguisher, with a minimum rating of 2-A:20-B:C.

3. Be equipped with adequate chock blocks.

ARTICLE 76 — PREVENTION OF DUST EXPLOSIONS

SECTION 7601 — GENERAL

7601.1 Scope. Prevention of dust explosions shall be in accordance with Article 76.

7601.2 Definitions. For the definition of DUST, see Article 2.

7601.3 Permits. For a permit to conduct an operation which produces dust, see Section 105, Permit d.2.

SECTION 7602 — ENCLOSURES

Dust-producing and dust-agitating machinery, such as grinding mills and separators, and elevators, elevator legs, spouts, hoppers and other conveyors shall be provided with casing or enclosures maintained as nearly dust-tight as possible.

SECTION 7603 — SEPARATORS

Approved magnetic or pneumatic separators shall be installed ahead of shellers, crackers, crushers, grinding machines, pulverizers and similar machines in which the entrance of foreign materials could cause sparks to be generated.

SECTION 7604 — DUST COLLECTION

Suitable dust-collecting equipment shall be installed on all dust-producing machinery and interlocked with the machinery power supply so that the machinery cannot be operated without the dust-collection equipment also operating.

SECTION 7605 — HOUSEKEEPING

Accumulation of dust shall be kept at a minimum in the interior of buildings. Accumulated dust on floors and other surfaces shall be collected by vacuum cleaning. Forced-air or similar devices shall not be used to remove dust from surfaces.

SECTION 7606 — ELECTRICAL GROUNDING

Artificial lighting in areas containing dust-producing or dust-agitating operations shall be by electricity with wiring and electrical equipment installed in accordance with the Electrical Code. Machinery and metal parts of crushing, drying, pulverizing and conveying systems shall be electrically grounded in accordance with the Electrical Code.

Static electricity shall be removed from machinery and other component parts by permanent grounds or bonds or both. The design and installation of such grounds shall be in accordance with approved standards.

SECTION 7607 — SMOKING AND OPEN FLAMES

Smoking, carrying matches, use of heating or other devices employing an open flame, and use of spark-producing equipment shall be prohibited in areas containing dust-producing or dust-agitating operations.

SECTION 7608 — EXPLOSION CONTROL

Buildings in which flammable or explosive dusts are manufactured, processed or generated in quantities exceeding the exempt amounts in Section 8001.13 shall be provided with explosion control in accordance with the Building Code.

ARTICLE 77 — EXPLOSIVE MATERIALS

SECTION 7701 — GENERAL

7701.1 Scope. Manufacture, possession, storage, sale, transportation and use of explosive materials shall be in accordance with Article 77. See Appendix VI-E for excerpts from nationally recognized standards for separation distances for explosives.

Explosives class designations in parentheses refer to new classifications used by DOT. See Appendix VI-E for information on explosives class designations.

EXCEPTIONS: 1. The armed forces of the United States, Coast Guard or National Guard.

2. Explosives in forms prescribed by the official United States Pharmacopoeia.

3. The sale, possession or use of Class C (Explosives, Division 1.4—see Appendix VI-E), common fireworks.

4. The possession, transportation, storage and use of small arms ammunition when packaged in accordance with DOT packaging requirements.

5. The possession, storage, transportation and use of not more than 5 pounds (2.27 kg) of commercially manufactured sporting black powder, 20 pounds (9.07 kg) of smokeless powder and 10,000 small arms primers for hand loading of small arms ammunition for personal consumption.

6. The transportation and use of explosive materials by the United States Bureau of Mines, and federal, state and local law enforcement and fire agencies acting in their official capacities.

7. Special industrial explosive devices which in the aggregate contain less than 50 pounds (22.7 kg) of explosive materials.

8. The possession, transportation, storage and use of blank industrial power load cartridges when packaged in accordance with DOT packaging regulations.

9. When preempted by federal regulations.

10. The use and handling of Class B (Explosives, Division 1.2 or 1.3—see Appendix VI-E) fireworks as set forth in Article 78.

7701.2 Definitions.

7701.2.1 General. For definitions of BATF; BLASTING AGENT; BLASTING CAP, BULLET RESISTANT; C.F.R.; DEA; DEFLAGRATION; DETONATION; DETONATOR; DOT; ELECTRIC BLASTING CAP; EXPLOSIVE; EXPLOSIVE MATERIALS; FIREWORKS, CLASS C, COMMON; GUNPOWDER; HIGH EXPLOSIVE; INHABITED BUILDING; INTRAPLANT DISTANCE; LOW EXPLOSIVE; MAGAZINE; MASS-DETONATING EXPLOSIVE; PERCUSSION CAP; SPECIAL INDUSTRIAL EXPLOSIVE DEVICE; SPECIAL INDUSTRIAL HIGH-EXPLOSIVE MATERIAL; SQUIB, ELECTRIC; and TEST BLASTING CAP NO. 8, see Article 2.

7701.2.2 Limited application. For the purpose of Article 77, certain terms are defined as follows:

FIRE RESISTANT is construction to resist the spread of fire.

HARDWOOD is red oak, white oak, hard maple, ash or hickory, each of which is free from knots, wind shakes or similar defects.

PLYWOOD is A-C exterior grade plywood.

SOFTWOOD is Douglas fir, pine or other softwood of equal bullet-resistance free from loose knots, wind shakes or similar defects.

STEEL is general purpose, hot- or cold-rolled, low carbon steel.

7701.3 Permits.

7701.3.1 Required. Where permits are required to be issued by the chief, the chief may grant that authority to the agency having enforcement jurisdiction. Permits shall be obtained:

1. To manufacture, possess, store, sell, display or otherwise dispose of explosive materials at any location.

2. To transport explosive materials.

3. To use explosive materials.

4. To operate a terminal for handling explosive materials.

See Section 105, Permit e.1.

7701.3.2 Unsafe material or practice. Permits for the following materials shall be invalidated and the materials disposed of in an approved, safe manner.

1. Dynamite having an unsatisfactory absorbent or one that permits leakage of a liquid explosive ingredient under any conditions liable to exist during storage.

2. Nitrocellulose in a dry and uncompressed condition in quantity greater than 10 pounds (4.5 kg) net weight in one package.

3. Fulminate of mercury in a dry condition and fulminate of other metals in any condition except as a component of manufactured articles not hereinafter forbidden.

4. Explosive compositions that ignite spontaneously or undergo marked decomposition, rendering the products or their use more hazardous, when subjected for 48 consecutive hours or less to a temperature of 167°F. (75°C.).

5. New explosive materials until approved by DOT, except that permits may be issued to educational, governmental or industrial laboratories for instruction or research purposes.

6. Explosive materials condemned by DOT.

7. Explosives containing an ammonium salt and a chlorate.

7701.4 Bond. Before a permit is issued to use explosive materials, the applicant shall file with the jurisdiction a corporate surety bond in the principal sum of $100,000 or a public liability insurance policy for the same amount for the purpose of the payment of damages to persons or property which arise from, or are caused by, the conduct of an act authorized by the permit upon which a judicial judgment results. The chief is authorized to specify a greater or lesser amount when, in the chief's opinion, conditions at the location of use indicate a greater or lesser amount is required.

EXCEPTION: Government entities shall be exempt from this bond requirement.

7701.5 Notice of New Storage and Manufacturing Sites. When a new explosive material storage or manufacturing location, including a temporary jobsite, is established, the local law enforcement agency, fire department and emergency planning committee shall be notified immediately of the type, quantity and location of explosive materials at the site.

7701.6 Access Road Signs. At the entrance to explosive material manufacturing and storage sites, all access roads shall be posted with the following warning sign or other sign approved by the chief:

DANGER
NEVER FIGHT EXPLOSIVE FIRES
EXPLOSIVES ARE STORED ON THIS SITE
CALL _____

The sign shall be weather resistant with a reflective surface and lettering at least 2 inches (50.8 mm) high.

7701.7 Prohibited and Limited Acts.

7701.7.1 Manufacturing. Explosive materials shall not be manufactured without authorization by the chief.

7701.7.2 Limits established by law. Storage of explosive materials is prohibited within the limits established by law as the limits of districts in which such storage is prohibited (see sample adoption ordinance, Section 6).

7701.7.3 Limits based on location. The chief is authorized to limit the quantity of explosive materials allowed at any location.

7701.8 Seizure of Explosive Materials. The chief is authorized to seize, take, remove or cause to be removed at the expense of the owner explosive materials offered or exposed for sale, stored, possessed, used or transported in violation of Article 77.

SECTION 7702 — STORAGE

7702.1 General.

7702.1.1 Magazines required. Explosive materials shall be stored in magazines in accordance with Section 7702.

A competent person shall be in charge of magazines. The person shall be at least 21 years of age and responsible for compliance with all safety precautions.

7702.1.2 Inspection. Magazines containing explosive materials shall be inspected at intervals of not greater than seven days to determine whether there has been an unauthorized entry or attempted entry into a magazine, or unauthorized removal of a magazine or its contents.

7702.1.3 Security. Magazine doors shall be kept locked when the magazine is unattended.

7702.1.4 Posting safety rules. Current safety rules covering the operations of magazines shall be posted on the interior of each magazine in a visible location.

7702.1.5 Rotating stock. When explosive material is removed from a magazine for use, the oldest usable stocks shall be removed first.

7702.1.6 Manner of storage. Corresponding grades and brands shall be stored together and in such a manner that grades and brand marks are visible. Stocks shall be stored so as to be easily counted and checked.

Packages of explosive materials shall be stacked in a stable manner not exceeding 6 feet (1829 mm) in height.

7702.1.7 Opened stock. Packages of explosive materials which have been opened shall be closed before being placed in a magazine. Packages constructed of materials other than fiberboard or paper shall not be opened in a magazine.

7702.1.8 Damaged material. Packages of damaged explosive materials shall not be unpacked or repacked in or within 50 feet (15 240 mm) of a magazine or inhabited building or in close proximity to other explosive materials.

7702.1.9 Storage with other materials. Magazines shall be used exclusively for the storage of explosive materials and other blasting materials approved by the chief. Tools, other than approved conveyors, shall not be stored in magazines.

7702.1.10 Cleaning. Magazine floors shall be swept regularly and shall be kept clean, dry and free of grit, paper and rubbish. Sweepings from floors of magazines shall be disposed of in accordance with the instructions of the manufacturer.

7702.1.11 Deteriorated material handling. When an explosive material has deteriorated to an extent that it is in an unstable or dangerous condition, or when a liquid has leaked from an explosive material, the person in possession of such explosive material shall immediately contact the material's manufacturer and the chief. The work of destroying explosive materials shall be directed by persons experienced in the destruction of explosive materials. Explosive materials recovered from blasting misfires shall be placed in a magazine until an experienced person has determined the method of disposal.

7702.1.12 Stained floors. Magazine floors stained with liquid shall be dealt with according to instructions obtained from the manufacturer of the explosive materials stored in the magazine.

7702.1.13 Magazine maintenance. When magazines need interior repairs, all explosive materials shall be removed and the floors cleaned before and after making repairs. When making exterior magazine repairs involving the possibility of causing a fire, all explosive materials shall first be removed from the magazine. Explosive materials removed from a magazine under repair shall be placed either in another magazine or placed a safe distance from the magazine, where they shall be properly guarded and protected until repairs have been completed. Upon completion of repairs, the explosive materials shall be promptly returned to the magazine.

7702.1.14 Sources of ignition. Smoking, matches, flame-producing devices, open flames and firearms or cartridges shall not be permitted inside of or within 50 feet (15 240 mm) of magazines.

Where low explosives are stored in magazines, spark-producing tools shall not be used. Such magazines shall be bonded and grounded.

7702.1.15 Yard maintenance. The land within 25 feet (7620 mm) of magazines shall be kept clear of rubbish, brush, dried grass, leaves, dead trees, and live trees less than 10 feet (3048 mm) high. Where conditions warrant, the chief is authorized to require greater distances.

Combustible materials shall not be stored within 50 feet (15 240 mm) of magazines.

7702.1.16 Premises identification. The premises upon which Types 1, 2, 4 and 5 outdoor magazines are located shall be posted with signs reading EXPLOSIVES—KEEP OFF. These signs shall be in contrasting colors with a minimum letter size of 3-inch (76 mm) height with $^1/_2$-inch (12.7 mm) brush stroke. Signs shall be located so that a bullet passing through the sign will not strike a magazine. Signs shall not be attached to outdoor magazines.

7702.1.17 Location. Types 1, 2, 4, and 5 outdoor magazines shall be located in accordance with nationally recognized standards. See Appendix VI-E.

7702.2 Retail Sales.

7702.2.1 General. Indoor storage and display of gunpowder and ammunition for retail sales shall be in accordance with Section 7702.2.

7702.2.1.1 Storage. The maximum quantities, storage conditions, and fire-protection requirements for gunpowder and ammunition stored in a building shall be as follows:

1. Smokeless powder—
   200 pounds (90.7 kg) in a Type 4 magazine, or
   400 pounds (181.4 kg) in separate portable Type 4 magazines in a completely sprinklered building. The quantity of product in a magazine shall not exceed 200 pounds (90.7 kg).
2. Commercially manufactured sporting black powder—
   25 pounds (11.3 kg) in a separate, portable Type 4 magazine.
3. Small arms primers or percussion caps—
   750,000, with not more than 100,000 stored in one pile and piles separated from each other by at least 15 feet (4572 mm), or
   Greater than 750,000, when in accordance with the following:

3.1 The storage room shall not be accessible to unauthorized persons,

3.2 Primers or percussions caps shall be stored in a 1-inch (25.4 mm) nominal thickness wood cabinet or equivalent with self-closing doors with not more than 200,000 primers or caps per cabinet,

3.3 Shelves in cabinets shall be vertically separated by at least 2 feet (6096 mm),

3.4 Cabinets shall be located against walls of the storage room with at least 40 feet (12 192 mm) between cabinets, or with at least 20 feet (6096 mm) between cabinets when barricades are

installed midway between cabinets. Such barricades shall be securely attached to the wall, shall project from the wall at least 10 feet (3048 mm) and shall be at least twice the height of cabinets. Barricade construction shall be of $^1/_4$-inch (6.4 mm) boiler plate or 2 inches (50.8 mm) of wood, brick or concrete block,

3.5 Primers or percussion caps shall be separated from flammable liquids, flammable solids and oxidizing materials by a distance of 25 feet (7620 mm) or by a fire partition having a fire-resistive rating of at least one hour, and

3.6 The building shall be protected by an automatic sprinkler system.

7702.2.1.2 Display. The maximum quantities, storage conditions, and fire-protection requirements for gunpowder and ammunition displayed in a building shall be as follows:

1. Smokeless powder—20 pounds (9.07 kg) in original containers.
2. Black powder—NONE.
3. Small arms primers or percussion caps—

   10,000 in a nonsprinklered building.

   25,000 in a sprinklered building.

7702.2.2 Magazine size. Indoor magazines shall not be of a size greater than the exit door or contain more than 200 pounds (90.7 kg) of explosive materials.

7702.2.3 Powder. The amount of powder stored in an indoor magazine shall not exceed 200 pounds (90.7 kg).

7702.2.4 Combined storage. Black powder shall not be stored with small arms primers or percussion caps.

7702.2.5 Bulk repackaging. The bulk repackaging of powder, primers or percussion caps shall not be performed in retail stores.

7702.2.6 Repackaging of damaged containers. Damaged containers shall not be repackaged.

EXCEPTION: Repackaging of damaged containers of smokeless powder into an original size and type container when approved by the chief.

7702.2.7 Separation. Buildings containing gunpowder or ammunition in accordance with Section 7702.2 need not be located as required by Section 7702.3.3.

7702.3 Storage Magazines.

7702.3.1 General. Explosive materials, including special industrial high-explosive materials, shall be stored in magazines which meet the requirements of Section 7702.3.

7702.3.2 Classification and use of magazines. Magazines shall be classed as Type 1, 2, 3, 4 or 5. Magazines shall be constructed and used in accordance with Table 7702.3-A.

TABLE 7702.3-A—TYPES OF MAGAZINES REQUIRED FOR STORAGE OF EXPLOSIVE MATERIALS[1]

MATERIALS	MAGAZINE TYPES[2]				
	1	2	3	4	5
High explosives (Explosives, Division 1.1) (Dynamite; cap-sensitive water gels; slurries; emulsions; cast boosters)	X	X	X		
Class A (Explosives, Division 1.1) detonators	X	X	X		
Detonating cords (Explosives, Division 1.1, 1.2 or 1.4)	X	X	X		
Class C (Explosives, Division 1.4) detonators[3]	X	X	X	X	
Low explosives [Black powder, Class B (Explosives, Division 1.3) composite solid propellants, Class B (Explosives, Division 1.2 or 1.3) special fireworks and Class C (Explosives, Division 1.4) common fireworks]	X	X	X	X	
Safety fuse, electric squibs, igniters and igniter cord (Explosives, Division 1.4)[4]	X	X	X	X	
Blasting agents (Explosives, Division 1.5)	X	X	X	X	X

[1]See Appendix VI-E for explosive materials classification.

[2]Any of the types indicated by "X" are allowed.

[3]Includes electric detonators with leg wires 4 feet (1219.2 mm) long or longer or detonators with empty plastic tubing 12 feet (3657.6 mm) long or longer that contain not more than 1 gram of explosives, excluding ignition and delay charges.

[4]Detonators shall not be stored in the same magazine with other explosive materials, except that Class C (Explosives, Division 1.4) detonators and those described in Footnote 3 are allowed to be stored with safety fuse, electric squibs, igniters or igniter cord in Type 1, 2, 3 or 4 magazines.

7702.3.3 Location. Site magazines for the storage of high explosives and blasting agents shall be located in accordance with nationally recognized standards. See Appendix VI-E. Magazines for the storage of low explosives shall be located in accordance with nationally recognized standards. See Appendix VI-E. The ground around outdoor magazines shall be graded such that water drains away from the magazines.

7702.3.4 Bullet-resistant construction.

7702.3.4.1 General. Magazines which are required to be bullet resistant shall be constructed using a method specified in Section 7702.3.4. Steel and wood dimensions indicated are actual thicknesses. Concrete block and brick dimensions indicated are the manufacturer's represented thicknesses.

7702.3.4.2 Specified construction. The following methods are acceptable as bullet-resistant construction:

1. Exterior of $^5/_8$-inch (15.9 mm) steel, lined with an interior of any type of nonsparking material.

2. Exterior of $^1/_2$-inch (12.7 mm) steel, lined with an interior of not less than $^3/_8$-inch (9.5 mm) plywood.

3. Exterior of $^3/_8$-inch (9.5 mm) steel, lined with an interior of 2 inches (50.8 mm) of hardwood.

4. Exterior of $^3/_8$-inch (9.5 mm) steel, lined with an interior of 3 inches (76.2 mm) of softwood or $2^1/_4$ inches (57.2 mm) of plywood.

5. Exterior of $^1/_4$-inch (6.4 mm) steel, lined with an interior of 3 inches (76.2 mm) of hardwood.

6. Exterior of $^1/_4$-inch (6.4 mm) steel, lined with an interior of 5 inches (127 mm) of softwood or $5^1/_4$ inches (133.4 mm) of plywood.

7. Exterior of $^1/_4$-inch (6.4 mm) steel, lined with an intermediate layer of 2 inches (50.8 mm) of hardwood and an interior lining of $1^1/_2$ inches (38.1 mm) of plywood.

8. Exterior of $^3/_{16}$-inch (4.8 mm) steel, lined with an interior of 4 inches (101.6 mm) of hardwood.

9. Exterior of $^3/_{16}$-inch (4.8 mm) steel, lined with an interior of 7 inches (177.8 mm) of softwood or $6^3/_4$ inches (171.4 mm) of plywood.

10. Exterior of $^3/_{16}$-inch (4.8 mm) steel, lined with an intermediate layer of 3 inches (76.2 mm) of hardwood and an interior lining of $^3/_4$-inch (19.1 mm) of plywood.

11. Exterior of $^1/_8$-inch (3.2 mm) steel, lined with an interior of 5 inches (127 mm) of hardwood.

12. Exterior of $^1/_8$-inch (3.2 mm) steel, lined with an interior of 9 inches (228.6 mm) of softwood.

13. Exterior of $^1/_8$-inch (3.2 mm) steel, lined with an intermediate layer of 4 inches (101.6 mm) of hardwood and an interior lining of $^3/_4$-inch (19.1 mm) plywood.

14. Exterior of any type of fire-resistant material which is structurally sound, lined with an intermediate layer of 4 inches (101.6 mm) of solid concrete block or 4 inches (101.6 mm) of solid brick or 4 inches (101.6 mm) of solid concrete, and an interior lining of $^1/_2$-inch (12.7 mm) plywood placed securely against the masonry lining.

15. Standard 8-inch (203.2 mm) concrete block with voids filled with a well-tamped sand/cement mixture.

16. Standard 8-inch (203.2 mm) solid brick.

17. Exterior of any type of fire-resistant material which is structurally sound, lined with an intermediate 6-inch (152.4 mm) space filled with well-tamped dry sand or a well-tamped sand/cement mixture.

18. Exterior of $^1/_8$-inch (3.2 mm) steel, lined with a first intermediate layer of $^3/_4$-inch (19.1 mm) plywood, a second intermediate layer of $3^5/_8$ inches (92.1 mm) of a well-tamped dry sand or sand/cement mixture and an interior lining of $^3/_4$-inch (19.1 mm) plywood.

19. Exterior of any type of fire-resistant material, lined with a first intermediate layer of $^3/_4$-inch (19.1 mm) plywood, a second intermediate layer of $3^5/_8$ inches (92.1 mm) of a well-tamped dry sand or sand/cement mixture, a third intermediate layer of $^3/_4$-inch (19.1 mm) plywood, and a fourth intermediate layer of 2 inches (50.8 mm) of hardwood or not less than 0.068 inch (1.7 mm) of steel and an interior lining of $^3/_4$-inch (19.1 mm) plywood.

20. Eight-inch-thick (203.2 mm) solid concrete.

7702.3.4.3 Tested construction. Methods of construction other than those specified in Section 7702.3.4.2 are acceptable as bullet-resistant construction when tested as prescribed herein. Tests to determine bullet resistance shall be conducted on test panels or empty magazines which shall resist five out of five shots placed independently of each other in an area 3 feet by 3 feet (914.4 mm by 914.4 mm). For ceilings and roofs, the bullet shall be fired at an angle of 45 degrees from the perpendicular. For walls and doors, the bullet shall be fired perpendicular to the wall or door. See BULLET RESISTANT in Section 203.

7702.3.5 Type 1 magazines.

7702.3.5.1 General. Type 1 magazines shall be constructed in accordance with the Building Code and Section 7702.3.5.

A Type 1 magazine shall be a permanent structure such as a building, igloo, tunnel or dugout. It shall be bullet resistant, fire resistant, weather resistant, theft resistant and ventilated.

7702.3.5.2 Walls. Walls shall be bullet resistant as specified in Section 7702.3.4.

7702.3.5.3 Floors. Floors shall be constructed of wood or other suitable nonsparking materials.

7702.3.5.4 Foundations. Foundations shall be constructed of brick, concrete, cement block, stone or wood posts. If piers or posts are used in lieu of a continuous foundation, the space under the buildings shall be enclosed with fire-resistant materials.

7702.3.5.5 Bullet-resistant roofs or ceilings. Where it is possible for a bullet to be fired directly through the roof and into the magazine at such an angle that the bullet could strike the explosives within, the magazine roof shall be bullet resistant as specified in Section 7702.3.4 or shall be protected by one of the following methods:

1. A sand tray having a depth of 4 inches (101.6 mm) of sand and located at the top of the inner walls covering the entire ceiling area, except that portion necessary for ventilation.

2. Either not less than 0.033-inch (0.84 mm) (20 gage) steel with 4 inches (101.6 mm) of hardwood or not less then 0.043-inch (1.1 mm) (18 gage) aluminum with 7 inches (177.8 mm) of hardwood.

7702.3.5.6 Doors. Doors shall be bullet resistant as specified in Section 7702.3.4. Hinges and hasps shall be attached to the doors by welding, riveting, or bolting with nuts on the inside of the door. Hinges and hasps shall be installed in such a manner that they cannot be removed when the doors are closed and locked.

7702.3.5.7 Locks. Each door shall be equipped with two mortise locks, two padlocks fastened in separate hasps and staples, a combination of a mortise lock and a padlock, a mortise lock that requires two keys to open, or a three-point or equivalent-type lock that secures the door to the frame at more than one point. Padlocks shall be steel having at least five tumblers and at least a $^3/_8$-inch (9.5 mm) diameter case-hardened shackle. Padlocks shall be protected by not less than $^1/_4$-inch (6.4 mm) steel hoods constructed in a manner which prevents sawing or lever action on the locks, hasps and staples.

EXCEPTION: Magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

7702.3.5.8 Ventilation. Ventilation shall be provided to prevent dampness and heating of stored explosive materials. Ventilation openings shall be screened to prevent the entrance of sparks. Ventilation openings in side walls and foundations shall be offset or shielded for bullet-resistant purposes. Magazines having foundation and roof ventilators with the air circulating between the side walls and the floors and between the side walls and the ceiling shall have a wooden lattice or equivalent to prevent the packages of explosive materials from being stacked against the side walls and blocking the air circulation.

7702.3.5.9 Exposed metal. Sparking material shall not be exposed to contact with the stored explosive materials. Ferrous metal nails in the floor and side walls, which could be exposed to contact with explosive materials shall be blind nailed, countersunk or covered with a nonsparking latticework or other nonsparking material.

7702.3.6 Type 2 magazines. Type 2 magazines shall be constructed in accordance with Section 7702.3.6.

A Type 2 magazine shall be a box, trailer, semitrailer or other mobile facility.

A Type 2 magazine shall be bullet resistant, fire resistant, weather resistant, theft resistant and ventilated.

Walls, ceiling and roof construction, hinges, hasps, locks, ventilation, and interior construction shall be constructed as required for Type 1 magazines.

Type 2 magazines shall be supported to prevent the floor from having direct contact with the ground. Magazines less than 1 cubic yard (0.76 m^3) in size shall be fastened to a fixed object to prevent theft of the entire magazine.

Vehicular magazines shall be immobilized by removing the wheels, locking with a kingpin locking device or other approved methods.

7702.3.7 Type 3 magazines. Type 3 magazines shall be constructed in accordance with Section 7702.3.7.

A Type 3 magazine shall be a "day box" or other portable magazine. Type 3 magazines shall be theft resistant, fire resistant and weather resistant.

Type 3 magazines shall be constructed of not less than 0.097-inch (2.5 mm) (12 gage) steel lined with at least $^1/_2$-inch (12.7 mm) plywood or masonite. Doors shall overlap sides by at least 1 inch (25.4 mm).

Hinges and hasps shall be attached by welding, riveting or bolting with nuts on the inside. Type 3 magazines shall have one steel padlock having at least five tumblers and a case-hardened shackle of at least $^3/_8$-inch (9.5 mm) diameter.

Explosive materials shall not be left unattended in a Type 3 magazine. When Type 3 magazines will be left unattended, explosive materials shall first be moved to a Type 1 or 2 magazine.

7702.3.8 Type 4 magazines. Type 4 magazines shall be constructed in accordance with the Building Code and Section 7702.3.8.

A Type 4 magazine shall be a permanent, portable or mobile structure, such as a building, igloo, box, semitrailer or other mobile container, which shall be fire resistant, theft resistant and weather resistant.

Outdoor magazines shall be constructed of masonry, metal-covered wood, fabricated metal or a combination of these materials. Doors shall be metal or solid wood covered with metal.

Permanent magazines shall be constructed as required for Type 1 magazines with respect to foundations, floors, ventilation and locking devices. Vehicular magazines shall be immobilized when unattended as required for Type 2 magazines.

7702.3.9 Type 5 magazines. Permanent Type 5 magazines shall be constructed in accordance with the Building Code and Section 7702.3.9. Temporary Type 5 magazines shall be constructed in accordance with Section 7702.3.9.

A Type 5 magazine shall be a building, igloo, box, bin, tank, semitrailer, bulk-trailer, tank trailer, bulk truck, tank truck or other mobile container.

Outdoor Type 5 magazines shall be weather resistant and theft resistant.

Construction shall be of wood, wood covered with metal, masonry, fabricated metal or a combination of these materials. Doors shall be metal or solid wood.

Permanent Type 5 magazines shall be constructed as required for Type 1 magazines with respect to foundations, floors, ventilation and locking devices.

Vehicular magazines shall be immobilized when unattended, as required for Type 2 vehicular magazines.

Over-the-road trucks and semitrailers used for temporary storage shall have each door locked with one steel padlock having at least five tumblers and a case-hardened shackle of at least $^3/_8$-inch (9.5 mm) diameter. The door hinges and lock hasp shall be securely fastened to the magazine and the door frame.

> **EXCEPTION:** Magazine doors that are adequately secured on the inside by means of a bolt, lock or bar that cannot be actuated from the outside.

Type 5 storage magazines in trailers shall display BLASTING AGENT (Explosives, Division 1.5) placards, as required by Section 7703.2.10, on the trailer when any quantity of blasting agents (Explosives, Division 1.5—see Appendix VI-E) is contained therein.

7702.3.10 Indoor magazines. Indoor magazines shall be constructed in accordance with Section 7702.3.10.

Indoor magazines shall be fire resistant and theft resistant. Indoor magazines constructed of wood shall have sides, bottoms and lids or doors constructed of 2-inch (50.8 mm) wood and shall be well braced at corners. The magazines shall be covered on the exterior with steel not less than 0.016

inch (0.41 mm) (26 gage) thick. Indoor magazines constructed of metal shall have sides, bottoms and lids or doors constructed of not less than 0.097-inch (2.5 mm) (12 gage) steel and shall be lined with a minimum of $^1/_2$-inch (12.7 mm) of nonsparking material.

EXCEPTION: Type 5 indoor magazines used for the storage of blasting agents (Explosives, Division 1.5—see Appendix VI-E) need not be fire resistant.

Indoor magazines need not be bullet resistant or weather resistant if the buildings in which they are stored provide protection from the weather and bullet penetration.

Hinges and hasps shall be attached to doors or lids by welding, riveting or bolting with nuts on the inside so that doors or lids cannot be removed when closed and locked.

Each magazine shall be equipped with a steel padlock, which need not be protected by a steel hood, having at least five tumblers with a case-hardened shackle of at least $^3/_8$-inch (9.5 mm) diameter.

Indoor magazines shall have substantial wheels or casters to facilitate removal from a building in case of emergency.

Magazines shall be painted red and the lid or door shall bear in conspicuous white lettering, at least 3 inches (76.2 mm) high, EXPLOSIVES—KEEP FIRE AWAY.

The indoor storage of high explosives shall not exceed 50 pounds (22.7 kg). Detonators shall be stored in a separate magazine from other explosive materials and the total number of detonators stored shall not exceed 5,000.

Indoor magazines containing blasting agents in excess of 50 pounds (22.7 kg) shall be located in accordance with nationally recognized standards. (See Appendix VI-E.)

Indoor storage magazines shall not be located in residences or dwellings.

SECTION 7703 — USE, HANDLING AND TRANSPORTATION

7703.1 Use and Handling.

7703.1.1 Hours of operation. Blasting operations shall be conducted during daylight hours.

EXCEPTION: When other times are approved by the chief.

7703.1.2 Personnel qualifications. The person in charge of the handling and use of explosive materials shall be at least 21 years of age and possess a valid explosive-use permit issued by the chief.

EXCEPTION: Persons 18 years of age or older are allowed to use and handle explosive materials under the direct personal supervision of a person who possesses a valid explosive-use permit.

7703.1.3 Intoxicants. Explosive materials shall not be handled by persons under the influence of intoxicants, narcotics or DEA-controlled substances.

7703.1.4 Smoking. Smoking and carrying matches while handling explosive materials or while within 50 feet (15 240 mm) of where explosive materials are being used are prohibited.

7703.1.5 Sources of ignition. The use of matches, lighters, spark-producing devices or the presence of any open flames is prohibited within 50 feet (15 240 mm) of areas where explosives are being used.

EXCEPTION: The lighting of safety fuse in conjunction with approved blasting operations.

7703.1.6 Utilities notification. When blasting is being conducted in the vicinity of gas, electric, water, fire alarm, telephone, telegraph or stream utilities, the blaster shall notify the appropriate representative of such utilities at least 24 hours in advance of blasting specifying the location and intended time of such blasting.

EXCEPTION: In an emergency, advance notification may be waived by the chief.

7703.1.7 Other regulations. Blasting operations shall be conducted in accordance with federal, state and local regulations.

7703.1.8 Blasting safeguards. Before a blast is fired, the person in charge shall make certain that surplus explosive materials are in a safe place, that persons and vehicles are at a safe distance or under sufficient cover, and that a loud warning signal has been sounded.

7703.1.9 Premature detonation safeguards. Precautions shall be taken to prevent the premature detonation of explosive materials from lightning, radio frequency energy, extraneous electricity or static electricity caused by dust or snow storms, low humidity or mechanical conditions. Such precautions shall include:

1. The suspension of blasting operations and removal of persons from the blasting area during the approach and progress of a thunderstorm,

2. The posting of signs prohibiting the use of mobile radio transmitters on roads within 1,000 feet (304.8 m) of blasting operations where electric detonators are being used, and

3. Periodic checks for static electricity or stray currents in areas where these factors could exceed safe operating limits.

7703.1.10 Nonsparking tools. Tools used for the opening of containers of explosive materials shall be made of nonsparking materials.

EXCEPTION: Slitters of metal are allowed for opening paper, plastic or fiberboard containers.

7703.1.11 Exposure protection. When blasting is performed in a congested area or in close proximity to a building, structure, railway, highway or other installation that could be damaged by material being thrown into the air, the blast shall be covered with an adequate blasting mat.

7703.1.12 Disposal of packaging. Empty boxes and paper, plastic or fiber packing material which have previously contained explosive materials shall not be reused, and shall be disposed of in a manner approved by the chief.

7703.1.13 Abandonment. Explosive materials shall not be abandoned.

7703.2 Transportation.

7703.2.1 Public conveyance. Explosive materials shall not be carried or transported in or upon a public conveyance or vehicle carrying passengers for hire.

7703.2.2 Vehicle construction. Vehicles used for transporting explosive materials shall be strong enough to carry the load without difficulty and shall be in good mechanical condition. If vehicles do not have a closed body, a portable, magazine-type container that is reasonably weather and theft resistant, and securely fastened to the vehicle body, shall be used to contain the explosive materials. Vehicles used for the transportation of explosive materials shall have tight floors and any exposed, spark-producing metal on the inside of the body shall be covered with wood or other nonsparking material to prevent contact with explosive materials.

EXCEPTION: Exposed spark-producing metal need not be covered in vehicles in which only blasting agents (Explosives, Division 1.5—see Appendix VI-E) or oxidizing materials are being transported.

7703.2.3 Authorization. Explosive materials shall be transported on vehicles authorized by the chief or DOT.

7703.2.4 Fire protection. Vehicles used for transporting explosive materials shall be equipped with fire extinguishers according to the following schedule:

1. Vehicle—Gross vehicle weight less than 14,000 pounds (6350.2 kg).	At least two multipurpose dry-chemical extinguishers having a combined capacity of not less than 4-A:20-B:C.

2. Vehicle—Gross vehicle weight 14,000 pounds (6350.2 kg) or greater; tractor/semitrailer units.	At least two multipurpose dry-chemical extinguishers having a combined capacity of not less than 4-A:70-B:C.

7703.2.5 Fire extinguisher maintenance and placement. Fire extinguishers shall be securely mounted on vehicles at well-separated, accessible locations. Extinguishers shall be checked periodically to verify that they are filled and in operating condition.

7703.2.6 Vehicle inspection. Vehicles used to transport explosive materials shall be inspected by the person to whom a permit has been issued for such vehicles in order to determine that:

1. Electric wires are insulated and securely fastened,
2. The engine chassis and body are reasonably clean and free of excessive grease and oil,
3. The fuel tanks and fuel lines are securely fastened and not leaking,
4. Brakes, lights, horn, windshield wipers and steering mechanism are functioning properly,
5. Tires are properly inflated and free from defects, and
6. The vehicle is in proper condition for transporting explosive materials.

7703.2.7 Nonsparking tools. Spark-producing metal tools shall not be carried in the cargo compartment of a vehicle transporting explosive materials.

7703.2.8 Sources of ignition. Smoking, carrying matches or other flame-producing devices, carrying firearms or loaded cartridges while in or near a vehicle transporting explosive materials, and driving, loading or unloading any such vehicle in a careless or reckless manner are prohibited.

EXCEPTION: As allowed by Department of Defense or DOT regulations.

7703.2.9 Personnel qualifications. Vehicles transporting explosive materials shall be in the custody of drivers who are physically fit; careful; capable; reliable; able to read and write the English language; not addicted to the use or under the influence of intoxicants, narcotics or DEA-controlled substances; and are not less than 21 years of age. They shall be familiar with federal, state and local traffic regulations, and the provisions of Article 77 governing the transportation of explosive materials.

7703.2.10 Placarding. Vehicles transporting explosive materials shall display placards, lettering or numbering required by DOT.

7703.2.11 Detonator identification. When detonators are transported on the same motor vehicle with other explosive materials, they shall be packaged, labeled, placarded and loaded in accordance with DOT regulations.

7703.2.12 Transportation routes. Vehicles transporting explosive materials shall be routed to avoid congested traffic and heavily populated areas. The chief is authorized to designate such routes of travel and the times of use.

7703.2.13 Vehicular tunnels. Explosive materials shall not be transported through completed vehicular tunnels which prohibit the transport of explosive materials.

7703.2.14 Unattended vehicles. Vehicles transporting explosive materials shall not be left unattended.

7703.2.15 Passengers. Unless authorized by the chief, persons other than the driver and one assistant, who is at least 18 years of age, shall not ride on vehicles transporting explosive materials.

7703.2.16 Delivery conditions. Delivery of explosive materials shall be made only to authorized persons and into approved storage, handling or use areas.

7703.2.17 Vehicle storage and repair. Vehicles containing explosive materials shall not be taken into a garage or repair shop for repairs or storage.

7703.3 Explosive Materials Terminals.

7703.3.1 Quantities at terminals. The chief is authorized to designate the location and specify the maximum quantity of explosive materials allowed to be loaded, unloaded, reloaded or temporarily retained at each terminal where such operations are permitted.

7703.3.2 Other regulations. Shipments of explosive materials delivered to carriers shall be in accordance with DOT regulations.

7703.3.3 Placarding. Vehicles, while in the terminal, shall continue to exhibit the placarding required by DOT regulations.

7703.3.4 Notification. Carriers shall immediately notify consignees of arrival of explosive materials at terminals.

7703.3.5 Terminal requirements. Truck terminals where explosive materials are loaded, unloaded or transferred shall be in accordance with the following conditions:

1. There shall not be aboveground storage tanks of flammable or combustible liquids or other hazardous materials on the terminal property which would present a significant exposure hazard to the operation of the terminal or to adjacent properties,

2. The terminal property shall be sufficiently large that docking or vehicle storage areas containing explosives shall be a minimum of 75 feet (22 860 mm) from adjoining property lines,

3. Adequate access to adjoining streets shall be provided to and from the terminal property. Local routes between terminals and those to and from state-approved routes shall be as prescribed by the chief,

4. Explosives shall be kept in vehicles except during transferring or loading operations,

5. Specific areas of docks shall be designated for the holding of explosive materials for not more than 72 hours during loading or transferring operations. A minimum distance shall be specified and maintained between this designated area and other materials on the dock. Combustible storage and flammable and combustible liquids shall be kept the greatest possible distance from this designated area,

6. At all times, a guard shall be on duty on the terminal property. The guard shall be capable of driving all equipment in the area. At times when there are a substantial number of vehicles carrying explosive materials in the terminal, additional persons capable of driving shall be provided,

7. Adequate security against unauthorized persons entering the terminal area shall be provided. In metropolitan areas, this shall include a fence and gates,

8. The terminal shall be adequately lighted for normal observation of all vehicles containing explosive materials,

9. Approved fire-protection appliances shall be provided for the loading dock near the designated explosive materials area and near the parked vehicles,

10. An approved, isolated area of the terminal property shall be designated for vehicles containing explosive materials,

11. Vehicles containing special inherent hazards shall be kept separated from the area designated for the parking of explosive materials vehicles, and

12. Shipments of explosive materials shall be transported without unnecessary delay. Delays shall not exceed 72 hours.

7703.4 Blasting Agents.

7703.4.1 Transportation and storage. Blasting agents (Explosives, Division 1.5) shall be transported in accordance with DOT regulations and stored in accordance with federal, state and local regulations.

7703.4.2 Ammonium nitrate storage. Ammonium nitrate stored at a closer distance to the blasting agent (Explosives, Division 1.5) storage area than provided in Section 7703.4.3 shall be calculated in accordance with nationally recognized standards. See Appendix VI-E.

7703.4.3 Intraplant separation. Minimum intraplant separation distances between mixing units and the ammonium nitrate storage areas and blasting agent (Explosives, Division 1.5) storage areas shall be in accordance with nationally recognized standards. See Appendix VI-E.

7703.5 Safety Precautions for Blasting Agents.

7703.5.1 Mixing facilities. Buildings or other facilities used for mixing blasting agents (Explosives, Division 1.5) shall be located away from inhabited buildings, passenger railways and public highways in accordance with nationally recognized standards. See Appendix VI-E.

EXCEPTION: Bulk mixing and delivery equipment for shot service delivery.

7703.5.2 Production quantities. Not more than eight hours' production of blasting agents (Explosives, Division 1.5) or the limit determined by nationally recognized standards (see Appendix VI-E), whichever is less, shall be located in or near the building used for mixing blasting agents (Explosives, Division 1.5). Larger quantities shall be stored in magazines.

7703.5.3 Construction. Buildings or other facilities used for the mixing of blasting agents (Explosives, Division 1.5) shall be designed and constructed in accordance with the Building Code.

7703.5.4 Compounding and mixing. Compounding and mixing of approved formulations of blasting agents (Explosives, Division 1.5) shall be conducted in accordance with federal, state and local regulations.

7703.5.5 Sources of ignition. Smoking and open flames shall be prohibited in or within 50 feet (15 240 mm) of buildings or facilities used for the mixing of blasting agents (Explosives, Division 1.5).

7703.5.6 Disposal of oxidizer bags. Empty oxidizer bags shall be disposed in a manner approved by the chief.

SECTION 7704 — MANUFACTURING, ASSEMBLING AND TESTING

7704.1 General. Manufacture, assembly, testing and loading of explosives, ammunition, blasting agents (Explosives, Division 1.5—see Appendix VI-E) and fireworks shall be in accordance with Section 7704.

EXCEPTIONS: Section 7704 does not apply to the hand loading of small arms ammunition prepared for personal use and not for resale.

2. Section 7704 does not apply to the mixing and loading of blasting agents (Explosives, Division 1.5—see Appendix VI-E) at blasting sites provided all necessary safety precautions are taken.

7704.2 Required Information.

7704.2.1 General. Prior to manufacturing, assembling, testing or loading explosives, ammunition, blasting agents (Explosives, Division 1.5—see Appendix VI-E) or fireworks, the chief shall be furnished with the following information:

1. The exact location of the place of manufacture,

2. The kind of explosives, ammunition, blasting agents (Explosives, Division 1.5—see Appendix VI-E) or fireworks to be manufactured or processed and the property of hazardous materials to be used,

3. The names and addresses of individual owners, partners or officers of the corporation,

4. A plot plan of the operating premises with the operating buildings indicated in which greater than 1 pound (0.45 kg) of explosives is manufactured, handled, used or stored. The maximum

amount of explosives greater than 1 pound (0.45 kg) to be used in each building, number of persons in each operating building, barricade locations and dimensions, and the location and capacity of storage magazines, and

5. A copy of the general safety rules which the manufacturer will enforce, including plans for emergency procedures in the event of fire or explosion.

7704.2.2 Retention of plans. A copy of the plans of the plant shall be kept in the office on the premises of each explosive, ammunition, blasting agents (Explosives, Division 1.5—see Appendix VI-E) or fireworks manufacturing plant and shall be made available to the chief upon request.

7704.3 Training. Workers who handle explosives or explosive charges or dispose of explosives shall be trained in the hazards of the materials and processes in which they are to be engaged and in the safety rules governing such materials and processes.

7704.4 Emergency Procedures. Approved emergency procedures shall be developed for each plant. Such procedures shall include personal instruction in any emergency that could be anticipated. Personnel shall be made aware of an emergency warning signal.

7704.5 Intraplant Separation of Operating Buildings. Mass-detonating explosives and fireworks manufacturing buildings, including those where explosive charges are assembled, manufactured, prepared or loaded, shall be separated from all other buildings, including magazines, within the confines of the manufacturing plant by a distance not less than those shown in Table 7704.5-A.

TABLE 7704.5-A—MINIMUM INTRAPLANT SEPARATION BETWEEN OPERATING BUILDINGS CONTAINING MASS-DETONATING EXPLOSIVES OR FIREWORKS MANUFACTURING[1]

EXPLOSIVE OR FIREWORKS (pounds) × 0.454 for kg		MINIMUM DISTANCE (feet)	EXPLOSIVE OR FIREWORKS (pounds) × 0.454 for kg		MINIMUM DISTANCE (feet)
Over	Not Over	× 304.8 for mm	Over	Not Over	× 304.8 for mm
	50	60	20,000	25,000	530
50	100	80	25,000	30,000	560
100	200	100	30,000	35,000	590
200	300	120	35,000	40,000	620
300	400	130	40,000	45,000	640
400	500	140	45,000	50,000	660
500	600	150	50,000	55,000	680
600	700	160	55,000	60,000	700
700	800	170	60,000	65,000	720
800	900	180	65,000	70,000	740
900	1,000	190	70,000	75,000	770
1,000	1,500	210	75,000	80,000	780
1,500	2,000	230	80,000	85,000	790
2,000	3,000	260	85,000	90,000	800
3,000	4,000	280	90,000	95,000	820
4,000	5,000	300	95,000	100,000	830
5,000	6,000	320	100,000	125,000	900
6,000	7,000	340	125,000	150,000	950
7,000	8,000	360	150,000	175,000	1,000
8,000	9,000	380	175,000	200,000	1,050
9,000	10,000	400	200,000	225,000	1,100
10,000	15,000	450	225,000	250,000	1,150
15,000	20,000	490			

[1]When a building or magazine containing explosives is provided with barricades, the intraline distances shown are allowed to be reduced by one half.

7704.6 Buildings and Equipment.

7704.6.1 Construction. Operating buildings or rooms which exceed the exempt amounts of explosives specified in the Building Code shall be constructed in accordance with the Building Code.

7704.6.2 Explosive dust. Explosive dust shall not be exhausted to the atmosphere.

When collecting explosive dust, a "wet" collector system shall be used. Wetting agents shall be compatible with the explosives.

Explosive dusts shall be removed from the collection chamber as often as necessary to prevent overloading. The entire system shall be cleaned at a frequency that will eliminate hazardous concentrations of explosive dusts in pipes, tubing or ducts.

7704.6.3 Intrinsically safe ventilation system. Squirrel cage blowers shall not be used for exhausting hazardous fumes, vapors or gases. Nonferrous fan blades shall be used for fans located within the ductwork and through which hazardous materials are exhausted. Motors shall be located outside the duct.

7704.6.4 Workstation protection. Workstations shall be separated by distance, barrier or other approved alternates so that fire in one station will not ignite material in the next workstation. When necessary, each operator shall be protected by a personnel shield located between the operator and the explosive device or explosive material being processed. This shield and its support shall be a tested design to withstand a blast from the maximum amount of explosives allowed behind it.

7704.7 Operations.

7704.7.1 Remote processing. When the type of material and processing warrants, mechanical operations involving explosives in excess of 1 pound (0.45 kg) shall be performed at isolated stations or at intraplant distances, and machinery shall be controlled from remote locations behind substantial barricades or at separations so that workers can remain at a safe distance while machinery is operating.

7704.7.2 Static control. The working area where the screening, grinding, blending and other processing of static-sensitive explosives or pyrotechnic materials are done shall be provided with approved static controls.

7704.7.3 Explosive containers. Bulk explosives shall be kept in approved nonsparking containers when not being used or processed. Explosives shall not be stored or transported in open containers.

7704.7.4 Allowable quantities. The quantity of explosives at a workstation shall not exceed the quantity posted on the load limit signs established by the intraplant distances. See Table 7704.5-A.

7704.7.5 Waste receptacles. Approved receptacles with covers shall be provided for each location for disposing of waste material and debris. These waste receptacles shall be emptied and cleaned as often as necessary but not less than once each day or at the end of each shift.

7704.7.6 Posting of pertinent information. General safety rules and operating instructions governing the particular operation or process carried on at that location shall be available at each location.

7704.7.7 Posted limits. Personnel and explosive limits shall be posted.

7704.7.8 Maintenance. Regular maintenance and repair work shall not be performed in an explosive area until explosives are removed and the area is made safe.

EXCEPTION: Minor adjustments or emergency repairs to secure immediate safety.

7704.7.9 Spills. Spilled or dropped explosives shall be cleaned up at once.

7704.7.10 Contaminated materials. Shipping containers, cleaning rags and other materials contaminated with explosives shall be removed daily and disposed in an approved, safe manner.

7704.7.11 Storage. Fireworks, explosives and explosive charges shall not be stored near sources of heat.

EXCEPTION: Approved curing or drying operation.

7704.8 Explosive Materials Testing Sites.

7704.8.1 Location. Detonation of explosive materials or ignition of fireworks for testing purposes shall be performed only in isolated areas at special sites where distance; protection from missiles, shrapnel or flyrock by barricades, bunkers or adequate shelter; and other safeguards to assure adequate protection to prevent injury to personnel or damage to property are provided. See Section 7704.9.

7704.8.2 Personal protective equipment. Protective clothing and equipment shall be provided to protect persons engaged in the testing, ignition or detonation of explosive materials.

7704.8.3 Test site safeguards. When tests are being conducted or explosives are being detonated, only authorized persons shall be present. Areas where explosives are regularly or frequently detonated or burned shall be fenced and posted with adequate warning signs. Adequate warning devices shall be used before burning or detonating explosives to warn persons who might approach from any direction that they are approaching a danger zone.

7704.9 Disposal of Waste Explosive Materials.

7704.9.1 Disposal site safeguards. Sites for the destruction of explosive materials and fireworks shall be located in accordance with nationally recognized standards. See Appendix VI-E. When possible, barricades shall be utilized between the destruction site and inhabited buildings.

7704.9.2 Reuse of site. Unless an approved burning site has been thoroughly saturated with water and has passed a safety inspection, 48 hours shall elapse between the completion of a burn and the placement of scrap explosive materials for a subsequent burn.

7704.9.3 Personnel safeguards. Once an explosive burn operation has started, personnel shall relocate to a safe location where adequate protection from air blast and flying debris is provided. Personnel shall not return to the burn area until the person in charge has inspected the burn site and determined that it is safe for personnel to return.

7704.9.4 Standby personnel. When required by the chief, standby personnel shall be provided until such time as the site is determined to be safe. See Section 2501.19.

ARTICLE 78 — FIREWORKS AND PYROTECHNIC SPECIAL EFFECTS MATERIAL

SECTION 7801 — GENERAL

7801.1 Scope. Fireworks and temporary storage, use and handling of pyrotechnic special effects material used in motion pictures, television, and theatrical and group entertainment productions shall be in accordance with Article 78.

7801.2 Definitions.

7801.2.1 General. For the definitions of AERIAL SHELL; BINARY EXPLOSIVE; BREAK (Aerial Shell); DESIGNATED LANDING AREA; EXPLOSIVE; EXPLOSIVE MATERIALS; FIREWORKS; FIREWORKS, CLASS C COMMON; FIREWORKS, SPECIAL; FIXED GROUND PIECE; GROUND PIECE; HIGH EXPLOSIVE; LOW EXPLOSIVE; MORTAR; PYROTECHNIC OPERATOR; PYROTECHNIC SPECIAL EFFECTS MATERIAL; READY BOX; and SAFETY CAP, see Article 2.

7801.2.2 Limited application. For the purpose of Article 78, certain terms are defined as follows:

DISPLAY is an outdoor display of aerial shells or ground display pieces.

TEMPORARY STORAGE is storage of pyrotechnic special effects material on site for a period of time of 72 hours or less.

7801.3 Permits.

7801.3.1 Fireworks.

7801.3.1.1 Manufacturing. The manufacturing of fireworks is prohibited except under special permits as required by local and state regulations. See Section 105, Permit e.1.

7801.3.1.2 Displays. Permits are required to conduct a fireworks display. See Section 105, Permit f.2. Permit application shall be made not less than 14 days prior to the scheduled date of the display. The permit application shall include a diagram of the grounds on which the display is to be held showing the point at which the fireworks are to be discharged; the location of buildings, highways and other lines of communication; the lines behind which the audience will be restrained; and the location of nearby trees, telegraph or telephone lines and other overhead obstructions. At the time of permit application, the chief shall be consulted regarding requirements for standby fire apparatus.

7801.3.2 Pyrotechnic special effects material. A permit is required to manufacture, compound, store or use pyrotechnic special effects material. A permit for use shall be granted only to a pyrotechnic operator. See Section 105, Permit p.3.

SECTION 7802 — FIREWORKS

7802.1 General. Storage, use and handling of fireworks shall be in accordance with Section 7802.

EXCEPTIONS: 1. The use of fireworks by railroads or other transportation agencies for signaling or illumination.

2. The sale or use of blank cartridges for theatrics, signaling or ceremonial purposes.

3. The use of fireworks by the United States Armed Forces.

7802.2 Seizure of Fireworks. The chief is authorized to seize, take, remove or cause to be removed at the expense of the owner all stocks of fireworks offered or exposed for sale, stored or held in violation of Article 78.

7802.3 Prohibition. The storage, use and handling of fireworks are prohibited.

EXCEPTIONS: 1. Storage and handling of fireworks are allowed as required for explosives in Article 77.

2. The use of fireworks for display is allowed as set forth in Section 7802.4.

7802.4 Displays.

7802.4.1 General. Fireworks displays shall be in accordance with Section 7802.4. Only Class C (Explosives, Division 1.4—see Appendix VI-E), common and special fireworks (Explosives, Division 1.2 or 1.3) are allowed to be used. When special fireworks (Explosives, Division 1.2 or 1.3—see Appendix VI-E) are used, see Section 7703.

7802.4.2 Pyrotechnic operator. Fireworks display operations shall be under the direct supervision of a pyrotechnic operator. The pyrotechnic operator shall be responsible for all aspects of a display related to pyrotechnics.

7802.4.3 Bond. The permittee shall furnish a bond or certificate of insurance in an amount deemed adequate by the chief for the payment of damages which could be caused either to a person or persons or to property by reason of the permitted display and arising from acts of the permittee, agents, employees or subcontractors.

7802.4.4 Mortars for aerial shell displays.

7802.4.4.1 Site criteria. Mortars for aerial displays shall be separated from spectator viewing areas, vehicles and buildings as set forth in Table 7802.3-A.

EXCEPTION: The chief is authorized to modify separation distance requirements based on characteristics of specific sites.

The designated landing area shall be a large, clear, open area approved by the chief. Spectators, vehicles and combustible materials shall not be allowed within the designated landing area. The designated landing area shall not be within 100 feet (30 480 mm) of tents, canopies and membrane structures.

7802.4.4.2 Construction. Mortars shall be approved for use with the aerial shells to be fired. Mortars shall be constructed of heavy cardboard, paper or metal other than cast iron.

7802.4.4.3 Inspection. Prior to placement, mortars shall be inspected for defects such as dents, bent ends, damaged interiors and damaged plugs. Mortars found to be defective shall not be used.

7802.4.4.4 Positioning. Mortars shall be positioned so that aerial shells are directed over the designated landing area and away from ground pieces. Mortars shall not be angled toward spectator viewing areas.

The trajectory of aerial shells shall be arranged such that a minimum clearance of 25 feet (7620 mm) is maintained from potential obstructions.

Seamed metal mortars shall be placed such that the seam of a mortar faces to the side rather than to the top or bottom.

7802.4.4.5 Securing. Mortars shall be buried to a depth of not less than two thirds of their length, either in the ground or in aboveground troughs or drums. In soft ground, wood not less than 2 inches (50.8 mm) nominal thickness or rock slabs shall be placed beneath mortars which will be used more than once to prevent their sinking or being driven into the ground during firing.

EXCEPTION: Approved securely positioned mortar racks are allowed for the firing of single-break shells 6 inches (152.4 mm) or less in diameter.

7802.4.4.6 Mortar separation. Mortars that are buried in the ground, in troughs or in drums shall be separated from adjacent mortars by a distance equal to or greater than the diameter of the mortar.

EXCEPTION: Electrically fired mortars.

7802.4.4.7 Moisture protection. In damp ground, a weather-resistant bag shall be placed under the bottoms of mortars prior to placement in the ground to protect mortars from moisture. Weather-resistant bags shall be placed over the open end of mortars in damp weather to keep moisture from accumulating on the inside surface of mortars.

7802.4.4.8 Ground burst protection. Sand bags, dirt boxes or other suitable protection shall be placed around mortars on the up-range side to protect the operator from ground bursts.

7802.4.4.9 Paper mortars.

7802.4.4.9.1 Convolute. Paper mortars constructed of convolute wound paper shall be approved for the size aerial shells being discharged having a maximum double break.

7802.4.4.9.2 Spiral wound. Spiral-wound paper mortars shall not be used for greater than 3-inch (76.2 mm) diameter aerial shells with a maximum double break.

7802.4.4.10 Grouping mortars. Mortars of the same diameter, which are to be reloaded during a display, shall be grouped together such that various sizes are not intermixed. Groups shall be separated.

7802.4.4.11 Loose gravel and rocks. Loose gravel, rocks and other loose solid objects shall be removed from the area around mortars to prevent such materials from being thrown from ground bursts during firing.

7802.4.4.12 Cleaning tool. When mortars are to be fired more than once during a display, a cleaning tool shall be available for the cleaning of debris from mortars as necessary. For metal mortars, the tool shall be nonsparking.

TABLE 7802.3-A—MINIMUM MORTAR SEPARATION DISTANCES

MORTAR DIAMETER (inches)	MINIMUM SEPARATION FROM SPECTATOR VIEWING AREAS, VEHICLES AND BUILDINGS (feet)
× 25.4 for mm	× 0.3048 for m
less than 3	140
3	210
4	280
5	350
6	420
7	490
8	560
10	700
12	840
greater than 12	Approved by the chief

7802.4.5 Ground pieces.

7802.4.5.1 Location. Ground pieces shall be located not less than 150 feet (45 720 mm) from spectators and vehicles; not less than 100 feet (30 480 mm) from tents, canopies or membrane structures; not less than 100 feet (30 480 mm) from mortars; and outside of the designated landing area.

EXCEPTIONS: 1. Fixed ground pieces are allowed not less than 75 feet (22 860 mm) from spectators and vehicles.

2. Electrically fired ground pieces are allowed in the designated landing area.

7802.4.5.2 Combustibles. The area beneath ground pieces shall be free of dry grass and combustibles.

7802.4.5.3 Securing. Poles for ground pieces shall be securely placed and braced.

7802.4.6 Electrical fire units.

7802.4.6.1 General. Electrical firing units shall be in accordance with Section 7802.4.6.

7802.4.6.2 Wiring. Electrical wiring associated with an electrical firing unit shall be prevented from contacting metal objects in contact with the ground.

7802.4.6.3 Power supply. AC-powered electrical firing units shall be isolated from the power source using an isolation transformer.

7802.4.6.4 Security. Electrical firing units shall require operation of a key-operated switch or other similar device to prevent unauthorized operation.

EXCEPTION: Hand-held electrical firing units connected to fireworks only during a display.

7802.4.6.5 Manually activated firing units. Manually activated electrical firing units shall require two or more distinct actions to apply electric current to an electric match.

7802.4.6.6 Automatic-firing units. Automatic-sequencing-type electrical firing units shall include a momentary contact switch which must be held to cause application of current to an electric match and which will immediately disconnect current to all electric matches upon release.

7802.4.6.7 Testing of firing circuits. The pyrotechnic operator shall ensure that personnel are kept at a safe distance from fireworks which are connected to electrical firing units during testing. Electrical firing units with integral test circuits shall be designed to limit the maximum current output during a test to 0.05 ampere or to 20 percent of the no-fire current of electric matches, whichever is less. Multitesters shall not be used for testing unless the maximum current output has been measured and determined not to exceed the current output limits for integral test circuits.

7802.4.7 Inspection. Fireworks shall be inspected upon delivery to the display site by the pyrotechnic operator. Aerial shells having tears, leaks or broken fuses or showing signs of having been wet shall be properly disposed of.

7802.4.8 Supervision. Fireworks shall not be left unattended or allowed to become wet at the display site.

7802.4.9 Display operation.

7802.4.9.1 General. Display operation shall be in accordance with Section 7802.4.9.

7802.4.9.2 Fire protection. When required by the chief, the pyrotechnic operator shall provide portable fire extinguishers for the discharge area and arrange for standby fire apparatus for protection down range.

7802.4.9.3 Monitors. The pyrotechnic operator shall employ monitors whose sole duty shall be the enforcement of crowd control around the display area. Unauthorized persons shall not be allowed to enter the discharge site until the site has been inspected after the display by the pyrotechnic operator.

7802.4.9.4 Barriers. The chief is authorized to require rope barriers, fences, signs or other devices to be installed around the display area to aid in crowd control.

7802.4.9.5 Display discontinued. If the chief or the pyrotechnic operator determines that there is a lack of crowd control or that the crowd is in danger, the display shall be immediately discontinued. If at any time high winds or wet weather creates a danger, the display shall be postponed until weather conditions are acceptable to the chief.

7802.4.9.6 Illumination. Display operators shall use only flashlights or electric lighting for illumination.

7802.4.9.7 Smoking and open flames. Smoking and use of open flames are prohibited in the aerial shell storage area. NO SMOKING OR OPEN FLAME signs shall be conspicuously posted.

7802.4.9.8 Aerial shells.

7802.4.9.8.1 General. Aerial shell operations shall be in accordance with Section 7802.4.9.8.

7802.4.9.8.2 Ready boxes. Ready boxes shall be located not less than 25 feet (7620 mm) in an upwind direction from mortars.

7802.4.9.8.3 Paper mortars. Paper mortars shall not be reloaded during the same display.

7802.4.9.8.4 Transporting. Aerial shells shall be carried to mortars by the shell body. For the purpose of loading mortars, aerial shells shall be held by the thick portion of the fuse and carefully lowered into mortars.

7802.4.9.8.5 Proper fit. Aerial shells shall be checked for proper fit in mortars prior to discharge. The pyrotechnic operator shall inspect all aerial shells to be certain that they are properly seated in mortars prior to firing. Aerial shells that do not fit properly shall not be fired.

7802.4.9.8.6 Safety cap. The safety cap protecting a fuse shall not be removed until immediately before an aerial shell is to be fired.

7802.4.9.8.7 Ignition. Aerial shells shall be ignited by lighting the tips of fuses with a fuse, torch, portfire, electrical ignition source or similar device. Operators shall not place any part of their bodies over the throat of a mortar.

7802.4.9.8.8 Trajectory. The first aerial shell fired shall be carefully observed to determine that its trajectory will carry it into the intended firing range and that the aerial shell will function over and debris will drop into the designated landing area. Mortars shall be reangled or reset if necessary at any time during the display to properly maintain trajectories over the designated landing area.

7802.4.9.8.9 Defective aerial shells. If an aerial shell fails to ignite in a mortar, the mortar shall be left alone for a minimum of 15 minutes, then carefully flooded with water. Immediately following the display, and not less than 5 minutes after flooding the mortar, the mortar shall be emptied into a bucket of water and properly disposed of. Damaged aerial shells shall not be repaired or dismantled.

7802.4.9.8.10 Range inspection. The entire firing range shall be inspected immediately following a display and prior to allowing public access for the purpose of locating unexploded aerial shells. Such shells shall not be handled within 15 minutes of their firing. Such shells shall then be doused with water, allowed to stand for not less than 5 minutes and placed in a bucket of water.

When the firing range cannot be thoroughly inspected due to darkness, the site shall be reinspected the following morning.

7802.4.9.8.11 Record. The pyrotechnic operator shall keep a record of aerial shells that fail to ignite or fail to function.

SECTION 7803 — PYROTECHNIC SPECIAL EFFECTS MATERIAL

7803.1 General. Temporary storage, use and handling of pyrotechnic special effects material used in motion picture, television, theatrical and group entertainment productions shall be in accordance with Section 7803. Permanent storage of pyrotechnic special effects material shall be in accordance with Article 77.

7803.2 Classification of Materials. Pyrotechnic special effects material shall be classified in accordance with DOT regulations and procedures.

EXCEPTION: On-site pyrotechnic special effects material need not be classified for storage or use.

7803.3 Construction of Magazines. Magazines used for the storage of pyrotechnic special effects material shall be constructed in accordance with Section 7702.3.

7803.4 Storage.

7803.4.1 Class C, common fireworks. Class C (Explosives, Division 1.4—see Appendix VI-E), common fireworks shall be stored in accordance with the requirements for low explosives in Article 77.

7803.4.2 Other pyrotechnic special effects material.

7803.4.2.1 General. Storage of pyrotechnic special effects material other than Class C (Explosives, Division 1.4—see Appendix VI-E), common fireworks shall be in accordance with the requirements of Sections 7702 and 7803.4.2.

Containers of explosive materials shall be closed when stored.

7803.4.2.2 Storage magazines.

7803.4.2.2.1 Within buildings. Explosives stored within a building shall not exceed 50 pounds (22.7 kg). Low explosives stored within a building shall be stored in a Type 2 or 4 magazine. High explosives shall be stored in a Type 2 magazine.

Detonators shall be stored in a separate Type 2 magazine.

7803.4.2.2.2 Outside of buildings. Pyrotechnic special effects material which is to be stored outdoors shall be stored in a Type 2 or 4 magazine. Pyrotechnic special effects material which is classified as a high explosive, including detonating cord and detonators that will mass detonate, such as fuse caps, shall be stored in a Type 2 magazine.

When a Type 4 magazine is used for outdoor storage, such storage shall be in a constantly attended location or, if unattended, shall have wheels removed or the magazine immobilized by kingpin locking devices or by other approved security measures. When a quantity in excess of 50 pounds (22.7 kg) of explosive materials is stored outside of a building, such storage shall be located in accordance with nationally recognized standards. See Appendix VI-E.

7803.4.3 Storage against walls. Explosive materials within a magazine shall not be placed directly against interior walls and shall not interfere with ventilation. To prevent contact of stored explosive materials with walls, a nonsparking lattice-work or other nonsparking material is allowed to be used.

7803.4.4 Marking of containers. Containers of explosive materials shall be stored such that identifying marks are visible. Stocks of explosive materials shall be stored so they can be easily counted and checked upon inspection.

7803.4.5 Unpacking and repacking containers. Containers of explosive materials shall not be unpacked or repacked inside a magazine or within 50 feet (15 240 mm) of a magazine, and shall not be unpacked or repacked close to other explosive materials.

EXCEPTION: Unpacking and repacking of fiberboard and other nonmetallic containers.

7803.4.6 Tools. Tools used for opening or closing containers of explosive materials shall be of nonsparking materials. A wood wedge and a fiber, rubber or wooden mallet shall be used for opening or closing wood containers of explosive materials. Metal tools, other than nonsparking transfer conveyors, shall not be stored in magazines containing high explosives.

EXCEPTION: Metal slitters are allowed to be used for opening fiberboard containers.

7803.5 Smoking and Open Flames. Controls on smoking and open flames shall be in accordance with Sections 7702.1.14, 7703.1.4 and 7703.1.5.

7803.6 Housekeeping. Housekeeping shall be in accordance with Article 77.

7803.7 Pyrotechnic Operators. A pyrotechnic operator shall obtain required permits and be responsible for notifying the chief prior to using the pyrotechnic special effects material. The pyrotechnic operator shall have the authority and responsibility for the storage, use and handling of the pyrotechnic special effects material. The authority of the pyrotechnic operator shall not be assumed by anyone and shall be superseded only by the chief.

7803.8 Use of Pyrotechnic Special Effects Material.

7803.8.1 General precautions.

7803.8.1.1 Demonstration and approval. When required by the chief, a test shall be conducted to demonstrate the safe use of pyrotechnic special effects material prior to normal use.

The use of pyrotechnic special effects material shall be approved by the pyrotechnic operator in charge.

7803.8.1.2 Preparation. The company or producer shall allocate sufficient time to the pyrotechnic operator to prepare for the transportation, packing, storing and daily securing, and to dispose of or otherwise handle pyrotechnic special effects material in a safe manner.

7803.8.1.3 Crowd control. Onlookers shall be kept at a safe distance from the area where the pyrotechnic special effects material is discharged and so restrained until the area is cleared.

7803.8.2 Smoke control. When pyrotechnic special effects material is fired within a building, the quantity of smoke developed shall not obscure the visibility of exit signs or paths of egress travel.

The maximum density of smoke shall be approved by the chief, and the pyrotechnic operator shall ensure that the maximum density is not exceeded.

When required by the chief, provisions shall be made to confine smoke generated by pyrotechnic special effects material to an approved area and to remove such smoke from the building.

7803.8.3 Binary explosives. When binary explosives are used, the compounding and firing shall be performed by a pyrotechnic operator. Firing shall be subject to the conditions described in the permit.

7803.8.4 Surplus materials. Surplus material shall be properly stored until it can be disposed of in a safe manner.

7803.9 Standby Personnel and Equipment. When necessary for the preservation of life or property, the chief is authorized to require the attendance of standby personnel and fire equipment as set forth in Section 2501.19.

ARTICLE 79 — FLAMMABLE AND COMBUSTIBLE LIQUIDS

SECTION 7901 — GENERAL

7901.1 Scope.

7901.1.1 General. Storage, use, dispensing, mixing and handling of flammable and combustible liquids shall be in accordance with Article 79.

EXCEPTIONS: 1. As otherwise provided in other laws or regulations.

2. Transportation of flammable and combustible liquids when in accordance with DOT regulations on file with and approved by DOT.

3. Alcoholic beverages in retail sales or storage uses, provided the liquids are packaged in individual containers not exceeding 4 liters.

4. Medicines, foodstuffs and cosmetics containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solution not being flammable, in retail sales or storage uses when packaged in individual containers not exceeding 4 liters.

5. Storage and use of fuel-oil tanks and containers connected to oil-burning equipment. Such storage and use shall be in accordance with Article 61 and the Mechanical Code.

6. Refrigerant liquids and refrigerant oils within an approved closed-cycle refrigeration system complying with the Mechanical Code. See Article 63.

7. Storage and display of aerosol products. See Article 88.

8. Materials which are solid at 100°F. (37.8°C.) or above.

9. Storage of liquids that have no fire point when tested in accordance with U.F.C. Standard 2-6.

10. Liquids without flash points that can be flammable under some conditions, such as certain halogenated hydrocarbons and mixtures containing halogenated hydrocarbons.

7901.1.2 Material classification. Flammable and combustible liquids shall be classified in accordance with Article 2 and as set forth in Table 7901.1-A.

7901.2 Definitions.

7901.2.1 General. For definitions of ATMOSPHERIC TANK; AUTOMATIC FIRE CHECK; BOILING POINT; BOILOVER; CLASSIFIED PRODUCT; CLOSED CONTAINER; COMBUSTIBLE LIQUID; CONDENSATE TANKS; DIP TANK; DISPENSING; DOT; FIRE POINT; FIXED ROOF TANK; FLAME ARRESTER; FLAMMABLE LIQUID; FLASH POINT; LABELED; LIQUID; LIQUID STORAGE ROOM; LIQUID STORAGE WAREHOUSE; LISTED; LOW-PRESSURE TANK; PORTABLE TANK; REMOTE SOLVENT RESERVOIR; RETAIL SALES OCCUPANCY; UNSTABLE (Reactive) LIQUID; USE (Material); USE, CLOSED SYSTEM; USE, OPEN SYSTEM; see Article 2.

7901.2.2 Limited application. For the purpose of Article 79, certain terms are defined as follows:

CONTAINER is a vessel of 60 U.S. gallons (227.1 L) or less capacity used for transporting or storing flammable or combustible liquids. Pipes, piping systems, engines and engine fuel tanks are not considered to be containers.

FLOATING ROOF TANK is a tank which incorporates either:

1. A pontoon or double-deck metal floating roof in an open-top tank, or

2. A fixed metal roof with ventilation at the top and roof eaves and containing a metal floating roof or cover meeting the following requirements:

2.1 A pontoon or double-deck metal floating roof, or

2.2 A metal floating cover supported by liquid-tight metal pontoons or floats which provide sufficient buoyancy to prevent sinking of the cover when one half of the pontoons or floats is punctured.

An internal metal floating pan, roof or cover which does not meet the requirements of Item 2, or one which uses plastic foam, except for seals, for flotation, even if capsulated in metal or fiberglass, shall be treated as a fixed roof tank.

MIXING is the combining, blending or bringing together within the same container, tank or vessel flammable or combustible liquids or other materials whereby flammable vapors could be liberated to the atmosphere.

OUTDOOR AREA is a single, contiguous property exterior to buildings or without buildings thereon which is under the ownership or control of a single person. See also definition of PERSON in Section 217.

STORAGE is the keeping, retention or leaving of flammable or combustible liquids in closed containers, tanks or similar vessels.

7901.3 Permits and Plans.

7901.3.1 Permits. See also Section 105, Permits f.3.1. through f.3.7. A permit is required to:

1. Install, operate, repair or modify pipelines, equipment or facilities where flammable or combustible liquids are produced, processed, dispensed, stored, handled or used.

2. Store, handle, transport, dispense, mix, blend or use flammable or combustible liquids in excess of quantities specified in Section 105.

3. Remove, abandon, place temporarily out of service or otherwise dispose of a flammable or combustible liquids tank.

4. Install, construct, alter or operate tank vehicles, equipment, tanks, plants, terminals, wells, refineries and similar facilities where flammable and combustible liquids are produced, processed, transported, stored, dispensed or used.

5. Change the type of contents stored in a flammable or combustible liquid tank to a material other than that for which the tank was designed and constructed.

7901.3.2 Plans. Plans shall be submitted with each application for a permit to store more than 5,000 gallons (18 925 L) of liquids outside of buildings in drums or tanks. The plans shall indicate the method of storage, quantities to be stored, distances from buildings and property lines, accessways, fire-protection facilities, and provisions for spill control, drainage control and secondary containment.

7901.4 Electrical.

7901.4.1 General. Electrical wiring and equipment shall be installed and maintained in accordance with the Electrical Code and as otherwise required by Article 79.

7901.4.2 Class I liquids. Areas where Class I liquids are stored, handled or dispensed shall have electrical installations in accordance with Article 79.

7901.4.3 Heated liquids. Areas where Class I, II or III liquids which are heated above their flash points are stored, handled or dispensed shall have electrical installations in accordance with Article 79. See also Table 7901.1-A, Footnote 1.

7901.4.4 Classification. Areas shall be delineated and classified for electrical equipment in accordance with Table 7901.4-A. A classified area shall not extend beyond an unpierced floor, wall, roof or other solid partition.

7901.4.5 Special hazards. Wiring and electrical equipment located within 25 feet (7620 mm) of any portion of a loading rack shall be designed, operated and installed such that it does not create an ignition hazard. The chief shall determine the extent of the Class I electrical equipment location when a condition is not covered by the Electrical Code.

7901.5 Fire Protection.

7901.5.1 General. Fire protection for the storage, use, dispensing, mixing, handling and onsite transportation of flammable and combustible liquids shall be in accordance with Articles 9, 10 and 79, and the Building Code.

Fire protection in plants and portions of plants in which flammable liquids are produced on a commercial scale from crude petroleum, natural gasoline or other hydrocarbon sources shall be in accordance with nationally recognized standards. See Article 90, Standard a.3.12.

7901.5.2 Special fire-extinguishing equipment. Special fire-extinguishing equipment such as equipment utilizing foam, inert gas or dry chemical shall be provided as the need is indicated by the special hazards of operation, dispensing and storage. See Section 1001.9.

7901.5.3 Portable fire extinguishers. Portable fire extinguishers shall be provided in accordance with U.F.C. Standard 10-1 and as otherwise required by Article 79.

7901.5.4 Hose lines. Hose lines shall be provided in accordance with Section 1001.9, Article 79 and the Building Code.

7901.6 Construction and Site Requirements. Buildings, or portions thereof, in which flammable or combustible liquids are stored, dispensed, used, mixed or handled shall be constructed in accordance with the Building Code.

Fire apparatus access roads and water supply shall be provided for all portions of facilities and uses in accordance with Sections 902.2 and 903.

7901.7 Unauthorized Releases.

7901.7.1 General. Flammable and combustible liquids and petroleum waste products shall not be discharged or released on sidewalks, streets, highways, drainage canals, ditches, storm drains, sewers, flood-control channels, lakes, rivers, tidal waterways or the ground. Unauthorized discharge or release of such products shall be handled as set forth in Section 8001.5.2.

EXCEPTIONS: 1. Materials and products intended for use in weed abatement, pest control, erosion control, paving and similar applications when applied in accordance with the manufacturer's instructions, label directions and nationally recognized standards.

2. Materials released in accordance with federal, state or local government regulations or permits of the jurisdictional air quality management board with a national pollutant discharge elimination system permit, with waste discharge requirements established by the jurisdictional water quality control board, or with local sewer pretreatment requirements for publicly owned treatment works.

7901.7.2 Housekeeping. Maintenance and operating practices shall be in accordance with established procedures which will tend to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly.

7901.7.3 Leaking containers. Where flammable or combustible liquids are stored in containers, provisions shall be made and maintained for the detection of leakage. Leaking containers shall be taken to a safe location in an area not accessible to the public and the contents transferred to a liquid-tight container.

7901.7.4 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 chief 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 chief not to exceed 60 days. See Appendix II-H.

7901.7.5 Waste control. Waste liquids shall be kept in a sump, tank or receptacle approved for this purpose.

7901.8 Spill Control, Drainage Control and Secondary Containment.

7901.8.1 General. Buildings, rooms and areas shall be provided with a means to control spillage and to contain or drain spillage and fire-protection water as set forth in Section 7901.8.

7901.8.2 Spill control. When spill control is required, floors of rooms, buildings or areas containing flammable or combustible liquids shall be sloped; constructed with sumps and collection systems; recessed a minimum of 4 inches (101.6 mm); provided with a liquid-tight, raised sill to a minimum height of 4 inches (101.6 mm) to prevent the flow of liquids to adjoining areas; or otherwise constructed to contain a spill from the largest single container or tank. Except for surfacing, the sill shall be constructed of noncombustible material, and the liquid-tight seal shall be compatible with the material being stored. When raised sills are provided, they are not required at perimeter openings which are provided with an open-grate trench across the opening that connects to an approved drainage-control system.

7901.8.3 Drainage control.

7901.8.3.1 General. When drainage control is required, rooms, buildings or areas shall be provided with a drainage system to direct the flow of liquids to an approved location or treatment system, or shall be provided with secondary containment for the flammable or combustible liquids and fire-protection water.

7901.8.3.2 Sizing. Drains shall be sized to carry the sprinkler system design flow rate over the sprinkler system design area. The slope of drains shall not be less than 1 percent. Materials used to construct drainage systems shall be compatible with the stored materials.

7901.8.3.3 Incompatible materials. Incompatible materials shall be separated from each other in drainage systems.

EXCEPTION: Incompatible materials are allowed to be combined when they have been rendered acceptable for discharge by an approved means into the public sewer.

7901.8.3.4 Neutralizers and treatment systems. Drainage systems for spillage and fire-protection water which are directed to a neutralizer or treatment system shall comply with the following:

1. The system shall be designed to handle the maximum worst-case spill from the single largest container plus the volume of fire-protection water from the system over the minimum design area for a water flow duration of 20 minutes, and

2. Overflow control from the neutralizer or treatment system shall be provided to direct liquid leakage and fire-protection water to a safe location away from buildings, material or fire-protection control valves, means of egress, adjoining properties or fire apparatus access roadways.

7901.8.4 Secondary containment.

7901.8.4.1 General. When secondary containment is required:

1. Drains shall be directed to a containment system or other location designed as secondary containment for flammable or combustible liquids and fire-protection water, or

2. The room, building or area shall be designed to provide secondary containment of flammable and combustible liquids and fire-protection water through the use of recessed floors or liquid-tight, raised sills.

7901.8.4.2 Sizing. Secondary containment shall be designed to retain the spill from the largest single container plus the design flow rate of the sprinkler system for the area of the room or area in which the storage is located or the sprinkler system design area, whichever is smaller. The containment capacity shall be capable of containing the water flow from a discharge having a duration of 20 minutes.

If the storage area is open to rainfall, the secondary containment shall be designed to accommodate the volume of a 24-hour rainfall as determined by a 25-year storm.

7901.8.4.3 Overflow. Overflow control from the secondary containment system shall be provided to direct liquid leakage and fire-protection water to a safe location away from buildings, material or fire-protection control valves, means of egress, fire apparatus access roadways, adjoining properties or storm drains.

7901.8.4.4 Monitoring.

7901.8.4.4.1 Method. A monitoring method capable of detecting hazardous material leakage from the primary containment into the secondary containment shall be provided. When visual inspection of the primary containment is not practical, other approved means of monitoring are allowed. When secondary containment is subject to the intrusion of water, a monitoring method for detecting such water shall be provided. When monitoring devices are provided, they shall be connected to distinct visual or audible alarms.

7901.8.4.4.2 Testing. Leak-detecting devices shall be tested annually by the owner or occupant of the property on which they are located. Test results shall be maintained on the premises and available to the chief on request.

7901.8.5 Containment pallets. When used as a substitute for spill control, drainage control and secondary containment as set forth in Section 7902.3.4, containment pallets shall comply with all of the following:

1. A liquid-tight sump, accessible for visual inspection, shall be provided,
2. The sump shall be designed to contain not less than 66 gallons (249.8 L),
3. Exposed surfaces shall be compatible with the material stored, and
4. Containment pallets shall be protected to prevent collection of rain water within the sump.

7901.9 Labeling and Signs.

7901.9.1 General. The chief is authorized to require warning signs for the purpose of identifying the hazards of storing or using flammable liquids.

7901.9.2 Style. Warning signs shall be of a durable material with red lettering on a white background and shall read DANGER—FLAMMABLE LIQUIDS. Letters shall not be less than 3 inches (76.2 mm) in height and $^1/_2$ inch (12.7 mm) in stroke.

7901.9.3 Location. Signs shall be posted in locations as required by the chief. Piping containing liquids shall be identified in accordance with nationally recognized standards. See Article 90, Standard a.2.1.

7901.9.4 Warning labels. Warning labels shall be in accordance with the Federal Hazardous Substance Labeling Act and applicable state laws. Flammable liquids, and flammable and liquid compounds and mixtures manufactured, packaged or offered for sale shall be conspicuously marked or labeled in legible type which is in contrast by typography, layout or color with any other printed matter on the label.

EXCEPTION: Foods, drugs or cosmetics subject to the Federal Food, Drug and Cosmetic Act.

7901.10 Sources of Ignition. In locations where flammable vapors could be present, precautions shall be taken to prevent ignition by eliminating or controlling sources of ignition. Adequate grounding and bonding shall be provided to prevent the accumulation of static electricity wherever Class I or II liquids are transferred or dispensed. See also Section 1109.

Open flames and high-temperature devices shall not be used in a manner which creates a hazardous condition. Heating equipment shall be of a type approved for hazardous locations.

EXCEPTION: Energy-consuming equipment listed for use with the material stored.

Protection against ignitions arising out of static, lightning and stray currents in petroleum industry operations shall be in accordance with nationally recognized standards. See Article 90, Standard a.3.13.

7901.11 Piping, Valves and Fittings.

7901.11.1 Materials and design.

7901.11.1.1 General. Piping, valves, fittings and related components intended for use with flammable and combustible liquids shall be designed and fabricated from suitable materials having ade-

quate strength and durability to withstand the pressures, structural stresses and exposures to which they can be subjected. Such equipment shall be in accordance with nationally recognized engineering standards, be listed for the application or be approved by the chief. See Article 90, Standards a.2.2, a.2.3, a.2.4, a.2.5, a.2.6, u.1.10, u.1.11. Nonmetallic piping, if used, shall be installed in accordance with the manufacturer's installation instructions.

7901.11.1.2 Low melting point materials. Low melting point materials, such as aluminum, copper and brass; materials which soften on fire exposure, such as nonmetallic materials; or nonductile materials, such as cast iron, used underground shall be within their pressure and temperature limitations. When such materials are used outdoors in aboveground piping systems or within buildings, they shall be either:

1. Suitably protected against fire exposure,

2. Located such that leakage resulting from failure would not unduly expose persons, buildings or structures, or

3. Located where leakage can readily be controlled by operation of accessible remotely located valves.

7901.11.2 Protection from vehicles. Guard posts or other approved means shall be provided to protect piping, valves or fittings subject to vehicular damage. When guard posts are installed, the posts shall be in accordance with Section 8001.9.3.

7901.11.3 Protection from corrosion and galvanic action. Piping, related fluid-handling components and supports for both underground and aboveground applications where subject to external corrosion shall be fabricated from noncorrosive materials, coated or provided with corrosion protection as specified in Section 7902.6.15. Dissimilar metallic parts which promote galvanic action shall not be joined.

7901.11.4 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 properly control the flow of liquid in normal operation and in the event of physical damage or fire exposure.

Connections to pipelines, transmission pipelines, or piping by which equipment, such as tank cars, tank vehicles or marine vessels, discharges liquid into storage tanks shall be provided with check valves for automatic protection against backflow.

Manual drainage-control valves shall be located remote from the tanks, diked area, drainage system and impounding basin to assure their operation in a fire condition.

7901.11.5 Connections. Connections to an aboveground tank located below normal liquid level shall be provided with internal or external control valves located as close as practical to the shell of the tank. Except for liquids whose chemical characteristics are incompatible with steel, such valves, when external, and their connections to the tank shall be of steel.

7901.11.6 Piping supports. Piping systems shall be substantially supported and protected against physical damage and excessive stresses arising from settlement, vibration, expansion or contraction, or exposure to fire. The supports shall be protected against exposure to fire by:

1. Draining product away from the piping system at a minimum slope of not less than 1 percent,

2. Providing protection with a fire-resistive rating of not less than two hours, or

3. Other approved methods.

7901.11.7 Flexible joints.

7901.11.7.1 General. Flexible joints shall be listed and approved and shall be installed on underground liquid, vapor and vent piping at the following locations:

1. Where piping connects to underground tanks,
2. Where piping ends at pump islands and vent risers, and
3. At points where differential movement in the piping can occur.

7901.11.7.2 Fiberglass-reinforced plastic piping. Fiberglass-reinforced plastic (FRP) piping need not be provided with flexible joints in locations where both of the following conditions are present:

1. Piping does not exceed 4 inches (101.6 mm) in diameter, and
2. Piping has a straight run of not less than 4 feet (1219 mm) on one side of the connection when 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 aboveground.

7901.11.8 Pipe joints. Joints shall be liquid tight and shall either be welded, flanged or threaded. Threaded joints shall be made up tight with a suitable thread sealant or lubricant. Joints in piping systems used for Class I liquids shall be welded when located in concealed spaces within buildings.

Nonmetallic joints shall be approved and shall be installed in accordance with the manufacturer's instructions.

Pipe joints which are dependent on the friction characteristics or resiliency of combustible materials for mechanical continuity or liquid tightness of piping shall only be used outside of buildings aboveground or belowground. When used aboveground outside of buildings, the piping shall either be secured to prevent disengagement at the fitting, or controllable by remote valves.

7901.11.9 Bends. Pipe and tubing shall not be bent in excess of 90 degrees or at a radius less than five diameters of the nominal trade size of the pipe or tube when the radius is measured from the inside edge of the pipe or tube.

7901.11.10 Testing. Unless tested in accordance with the applicable sections of nationally recognized standards for pressure piping (see Article 90, Standard a.2.3), 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 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 all joints and connections. For a minimum of 10 minutes, there shall not be 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.

Existing piping shall be tested in accordance with Section 7901.11.10 when the chief 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.

7901.12 Powered Industrial Truck Operation. Powered industrial trucks shall be listed and labeled for use in the environment intended and shall be in accordance with nationally recognized standards. See Article 90, Standard n.2.2.

TABLE 7901.1-A—CLASSIFICATION OF FLAMMABLE AND COMBUSTIBLE LIQUIDS (See Sections 7901.1.2 and 7901.4.3)

CLASSIFICATION[1]	FLASH POINT (FAHRENHEIT) 0.556 × ($t_{°F}$ – 32) for °C.	VAPOR PRESSURE (ABSOLUTE) × 6.89 for kPa	BOILING POINT (FAHRENHEIT) 0.556 × ($t_{°F}$ – 32) for °C.
Class I			
I-A	Less than 73 degrees	Less than or equal to 40 psi	Less than 100 degrees
I-B	Less than 73 degrees	Less than or equal to 40 psi	Greater than or equal to 100 degrees
I-C	Greater than 73 degrees and less than or equal to 100 degrees	Less than or equal to 40 psi	N/A
Class II	Greater than 100 degrees and less than 140 degrees	N/A	N/A
Class III			
III-A	Greater than or equal to 140 degrees and less than 200 degrees	N/A	N/A
III-B	Greater than or equal to 200 degrees	N/A	N/A
Crude Petroleum	Less than 150 degrees	N/A	N/A

N/A = Not applicable to classification.

[1]When heated, sprayed or mixed, Class II or III liquids can assume the characteristics of lower flash point liquids. Under such conditions the appropriate provisions of Article 79 for the actual flash point shall apply. For construction requirements, see the Building Code.

When flammable or combustible liquids present multiple hazards, all hazards shall be addressed. See Section 8001.1.3.

For the purpose of Article 79, unstable liquids shall be treated as Class I-A liquids.

TABLE 7901.4-A—CLASS I ELECTRICAL EQUIPMENT LOCATIONS[1] (See Section 7901.4.4)

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 (457.2 mm) above grade level within a horizontal radius of 10 feet (3048 mm) from a loose-fill connection and within a horizontal radius of 5 feet (1524 mm) from a tight-fill connection.
Vent—Discharging upward	1	Within 3 feet (914.4 mm) of open end of vent, extending in all directions.
	2	Area between 3 feet (914.4 mm) and 5 feet (1524 mm) of open end of vent, extending in all directions.
Drum and container filling		
Outdoor or indoor with adequate ventilation	1	Within 3 feet (914.4 mm) of vent and fill opening, extending in all directions.
	2	Area between 3 feet (914.4 mm) and 5 feet (1524 mm) from vent of fill opening, extending in all directions. Also up to 18 inches (457.2 mm) above floor or grade level within a horizontal radius of 10 feet (3048 mm) from vent or fill opening.

(Continued)

TABLE 7901.4-A—CLASS I ELECTRICAL EQUIPMENT LOCATIONS[1]—(Continued)
(See Section 7901.4.4)

Pumps, bleeders, withdrawal fittings, meters and similar devices		
Indoor	2	Within 5 feet (1524 mm) of any edge of such devices, extending in all directions. Also up to 3 feet (914.4 mm) above floor or grade level within 25 feet (7620 mm) horizontally from any edge of such devices.
Outdoor	2	Within 3 feet (914.4 mm) of any edge of such devices, extending in all directions. Also up to 18 inches (457.2 mm) 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 a Division 1 or 2 classified area	2	Entire pit.
Drainage ditches, separators, impounding basins		
Indoor		Same as pits.
Outdoor	2	Area up to 18 inches (457.2 mm) above ditch, separator or basin. Also up to 18 inches (457.2 mm) above grade within 15 feet (4572 mm) horizontal from any edge.
Tank vehicle and tank car[2]		
Loading through open dome	1	Within 3 feet (914.4 mm) of edge of dome, extending in all directions.
	2	Area between 3 feet (914.4 mm) and 15 feet (4572 mm) from edge of dome, extending in all directions.
Loading through bottom connections with atmospheric venting	1	Within 3 feet (914.4 mm) of point of venting to atmosphere, extending in all directions.
	2	Area between 3 feet (914.4 mm) and 15 feet (4572 mm) from point of venting to atmosphere, extending in all directions. Also up to 18 inches (457.2 mm) above grade within a horizontal radius of 10 feet (3048 mm) from point of loading connection.
Office and Rest Rooms	Ordinary	If there is any 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.
Loading through closed dome with atmospheric venting	1	Within 3 feet (914.4 mm) of open end of vent, extending in all directions.
	2	Area between 3 feet (914.4 mm) and 15 feet (4572 mm) from open end of vent, extending in all directions. Also within 3 feet (914.4 mm) of edge of dome, extending in all directions.
Loading through closed dome with vapor control	2	Within 3 feet (914.4 mm) 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 (914.4 mm) of point of connection, extending in all directions. Also up to 18 inches (457.2 mm) above grade within a horizontal radius of 10 feet (3048 mm) from point of connection.
Storage and repair garage for tank vehicles	1	Pits or spaces below floor level.
	2	Area up to 18 inches (457.2 mm) above floor or grade level for entire storage or repair garage.

TABLE 7901.4-A—CLASS I ELECTRICAL EQUIPMENT LOCATIONS[1]—(Continued)
(See Section 7901.4.4)

Garages for other than tank vehicles	Ordinary	If there is any 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	If there is any 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 (1524 mm) of any edge of such equipment, extending in all directions.
	2	Area between 5 feet (1524 mm) and 8 feet (2438 mm) of any edge of such equipment, extending in all directions. Also, area up to 3 feet (914.4 mm) above floor or grade level within 5 feet (1524 mm) to 25 feet (7620 mm) horizontally from any edge of such equipment.[3]
Outdoor equipment where flammable vapor/air mixtures could exist under normal operations	1	Area within 3 feet (914.4 mm) of any edge of such equipment, extending in all directions.
	2	Area between 3 feet (914.4 mm) and 8 feet (2438 mm) of any edge of such equipment extending in all directions. Also, area up to 3 feet (914.4 mm) above floor or grade level within 3 feet (914.4 mm) to 10 feet (3048 mm) horizontally from any edge of such equipment.
Tank—Aboveground	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.
Shell, ends or roof and dike area	2	Area between 10 feet (3048 mm) from shell, ends or roof of tank. Area inside dikes to level of top of dike.
Vent	1	Area within 5 feet (1524 mm) of open end of vent, extending in all directions.
	2	Area between 5 feet (1524 mm) and 10 feet (3048 mm) from open end of vent, extending in all directions.
Floating roof	1	Area above the roof and within the shell.

[1]Locations as classified in the Electrical Code.

[2]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.

[3]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.

SECTION 7902 — STORAGE

7902.1 General.

7902.1.1 Applicability. Storage of flammable and combustible liquids in containers, cylinders and tanks shall be in accordance with Sections 7901 and 7902.

For motor vehicle fuel-dispensing stations, see Article 52.

7902.1.2 Change of tank contents. Tanks subject to change in contents shall be in accordance with Section 7902.1.8. Prior to a change in contents, the chief is authorized to require testing of a tank.

7902.1.3 Labeling and signs.

7902.1.3.1 Smoking and open flames. Signs shall be posted in storage areas prohibiting open flames and smoking. See also Section 7901.9.

7902.1.3.2 Label or placard. Tanks over 100 gallons (378.5 L) in capacity permanently installed or mounted and used for the storage of Class I, II or III-A liquids shall bear a label or placard identifying the material therein in accordance with U.F.C. Standard 79-3.

EXCEPTIONS: 1. Tanks of 300 gallons (1135.5 L) capacity or less located on private property and used for heating and cooking fuels in single-family dwellings.

2. Tanks located underground.

7902.1.4 Sources of ignition. Smoking and open flames are prohibited in storage areas. See also Section 7901.10.

7902.1.5 Explosion control. Explosion control, equivalent protection devices or suppression systems, or a barricade shall be provided in accordance with the Building Code when Class I liquids are stored inside buildings in excess of the exempt amounts, or where explosive vapor-air mixtures could develop under normal operating conditions.

EXCEPTION: Class I-B and I-C liquids when provided with continuous ventilation at the rate set forth in Section 8003.1.8.

See also Sections 7902.5.11.7, 7902.5.12.7, 7903.2.3.4.3 and 7903.2.3.5.3.

7902.1.6 Separation from incompatible materials and accumulation of combustibles. Storage of flammable and combustible liquids shall be separated from incompatible hazardous materials in accordance with Section 8001.9.8.

Grass; weeds; combustible materials; and waste Class I, II and III-A liquids shall not be accumulated in an unsafe manner at a storage site.

7902.1.7 Abandonment and status of tanks.

7902.1.7.1 General. Tanks taken out of service as a result of a property's being abandoned or its use being changed shall be removed or abandoned in place in accordance with Section 7902.1.7.2.3 or 7902.1.7.3.3. The time schedules stipulated shall not apply.

In other cases, tanks taken out of service shall be safeguarded or removed in accordance with Section 7902.1.7.

7902.1.7.2 Underground tanks.

7902.1.7.2.1 Temporarily out of service. Underground tanks temporarily out of service shall have the fill line, gage opening, vapor return and pump connection secure against tampering. Vent lines shall remain open and be maintained in accordance with Sections 7902.1.10 and 7902.2.6.

7902.1.7.2.2 Out of service 90 days. Underground tanks not used for a period of 90 days shall be safeguarded in accordance with the following or removed in accordance with Section 7902.1.7.4:

1. Flammable or combustible liquids shall be removed from the tank,

2. All piping, including fill line, gage opening, vapor return and pump connection, shall be capped or plugged and secured from tampering, and

3. Vent lines shall remain open and be maintained in accordance with Sections 7902.1.10 and 7902.2.6.

7902.1.7.2.3 Underground tanks out of service for one year. Underground tanks which have been out of service for a period of one year shall be removed from the ground in accordance with Section 7902.1.7.4 and the site shall be restored in an approved manner. When the chief determines that the removal of the tank is not necessary, abandonment in place is allowed.

7902.1.7.2.4 Tanks abandoned in place. Tanks abandoned in place shall be abandoned as follows:

1. Flammable and combustible liquids shall be removed from the tank and connected piping,
2. The suction, inlet, gage, vapor return and vapor lines shall be disconnected,
3. The tank shall be filled completely with an inert solid material approved by the chief,
4. Remaining underground piping shall be capped or plugged, and
5. A record of tank size, location and date of abandonment shall be retained.

7902.1.7.2.5 Reinstallation of underground tanks. Tanks which are to be reinstalled for flammable or combustible liquid service shall comply with all of the provisions of Article 79 and shall be tested in a manner approved by the chief.

7902.1.7.3 Aboveground tanks.

7902.1.7.3.1 Temporarily out of service. Aboveground tanks temporarily out of service shall have all connecting lines isolated from the tank and secured against tampering.

7902.1.7.3.2 Out of service 90 days. Aboveground tanks not used for a period of 90 days shall be safeguarded in accordance with Section 7902.1.7.2.2 or removed in accordance with Section 7902.1.7.4.

7902.1.7.3.3 Aboveground tanks out of service one year. Aboveground tanks which have been out of service for a period of one year shall be removed in accordance with Section 7902.1.7.4.

EXCEPTION: Tanks located at refineries, bulk plants and terminals that are in operation.

7902.1.7.4 Removing tanks.

7902.1.7.4.1 General. Removal of aboveground and underground tanks shall be in accordance with all of the following:

1. Flammable and combustible liquids shall be removed from the tank and connecting piping,
2. Piping at tank openings which 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 when the chief determines that removal is not practical. Abandoned piping shall be capped and safeguarded as required by the chief.
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, and
5. Tanks shall be purged of vapor and inerted prior to removal.

7902.1.7.4.2 Disposal. Tanks shall be disposed of in accordance with federal, state and local regulations.

7902.1.8 Design, construction and general installation requirements for tanks, containers and equipment.

7902.1.8.1 Portable tanks, containers and equipment.

7902.1.8.1.1 General. Portable tanks, containers and equipment used or intended to be used for the storage of flammable or combustible liquids shall be of an approved type. Containers and portable tanks shall be designed and constructed in accordance with nationally recognized standards. See Article 90, Standards u.1.2 and u.1.12 and U.F.C. Standard 79-5. The capacity of individual containers and portable tanks for liquids shall be in accordance with Table 7902.1-A.

EXCEPTION: Medicines, beverages, foodstuffs and cosmetics when packaged according to commonly accepted practices for retail sales.

7902.1.8.1.2 Use of tank cars and tank vehicles as storage tanks. Tank cars and tank vehicles shall not be used as storage tanks.

7902.1.8.1.3 Plastic containers. Plastic containers shall not be used for storage of Class I or II liquids unless such containers are listed and approved for such storage or the containers are stored in liquid storage rooms or liquid storage warehouses. See Sections 7902.5.11 and 7902.5.12.

See also Section 7902.5.10.2.2 for additional limitations.

7902.1.8.2 Tanks.

7902.1.8.2.1 General. The design, fabrication and construction of tanks shall be in accordance with recognized good engineering practice and nationally recognized standards. See Article 90, Standards a.3.1, a.3.2, a.3.3, a.3.4, a.3.5, a.4.8, u.1.3, u.1.5, u.1.7 and u.1.13.

7902.1.8.2.2 Use of tank cars and tank vehicles as storage tanks. Tank cars and tank vehicles shall not be used as storage tanks.

7902.1.8.2.3 Pressure limitations for tanks. Tanks shall be designed for the pressures to which they are subjected as follows:

1. Atmospheric tanks shall not exceed operating pressures of 1 psig (6.89 kPa) and shall not exceed 2.5 psig (17.2 kPa) under emergency venting conditions. Such tanks shall not be used for the storage of a liquid at a temperature at or above its boiling point,

2. Low-pressure tanks and pressure vessels are allowed to be used as atmospheric tanks.

3. Pressure vessels are allowed to be used as low-pressure tanks,

4. The normal operating pressure of any tank or pressure vessel shall not exceed the design pressure, and

5. Unless otherwise approved by the chief, fired and unfired pressure vessels shall be designed and constructed in accordance with nationally recognized standards. See Article 90, Standards a.3.4 and a.5.1.

7902.1.8.2.4 Locations subject to flooding. Where a tank is located in an area that is subject to flooding, uplift protection shall be provided. See Appendix II-B.

7902.1.8.2.5 Acceptance testing. Prior to being put into service, tanks shall be tested in accordance with nationally recognized standards.

7902.1.8.2.6 Product compatibility. Tank construction materials shall be compatible with the liquid to be stored. The chief is authorized to require that evidence be submitted to substantiate that the properties of the liquid are compatible with the tank.

7902.1.8.2.7 Use of combustible materials in tank construction. Tanks constructed of combustible materials shall be subject to the approval of the chief and limited to:

1. Installation underground,

2. Case where required by the properties of the liquid stored,

3. Storage of Class III-B liquids aboveground in areas not potentially exposed to a spill or leak of Class I or II liquid, or

4. Storage of Class III-B liquids inside a building protected by an approved automatic fire-extinguishing system.

7902.1.8.2.8 Use of concrete in tank construction. Unlined concrete tanks are allowed for storing liquids having a gravity of 40 degrees API or heavier. Concrete tanks with special linings are allowed for other services, provided the design is in accordance with approved engineering practices. See also Section 7902.1.8.2.11.

7902.1.8.2.9 Tank linings. Tanks are allowed to have combustible or noncombustible linings.

7902.1.8.2.10 Tanks containing liquids with high specific gravity and low temperature liquids. Special engineering consideration shall be used if the specific gravity of the liquid to be stored exceeds that of water or if the tank is designed to contain liquids at a liquid temperature below 0°F. (–17.8°C.).

7902.1.8.2.11 Existing oil storage reservoirs. Existing oil storage reservoirs with a concrete lining and with a combustible roof covering and built prior to the adoption of requirements set forth in Section 7902.1.8 are allowed to be continued for the storage of petroleum products with a flash point in excess of 150°F. (65.6°C.).

7902.1.9 Seismic design. In areas subject to earthquakes, the tank supports and connections shall be designed to resist damage as a result of seismic activity in accordance with the Building Code.

7902.1.10 Tank vents for normal venting.

7902.1.10.1 General. Tank vents for normal venting shall be installed and maintained in accordance with Section 7902.1.10. See Section 7902.2.6 for emergency vents.

7902.1.10.2 Vent lines. Vent lines from tanks shall not be used for purposes other than venting unless approved by the chief.

7902.1.10.3 Vent line flame arresters and venting devices. Vent line flame arresters and venting devices shall be installed in accordance with their listings.

Use of flame arresters in piping systems shall be in accordance with nationally recognized standards. See Article 90, Standard a.3.17.

7902.1.10.4 Vent pipe outlets. Vent pipe outlets for tanks storing Class I, II, or III-A 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 adjacent ground level. Vapors shall be discharged upward or horizontally away from closely 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 at least 5 feet (1524 mm) from building openings or property lines of properties that can be built on.

7902.1.10.5 Installation of vent piping. Vent piping shall be constructed in accordance with Section 7901.11. 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 as to not be subject to physical damage or vibration.

7902.1.10.6 Manifolding. Tank vent piping shall not be manifolded unless required for special purposes such as vapor recovery, vapor conservation or air pollution control. Manifolded vent pipes shall be adequately sized to prevent system pressure limits from being exceeded when manifolded tanks are subject to the same fire exposure.

Vent piping for tanks storing Class I liquids shall not be manifolded with vent piping for tanks storing Class II or III liquids unless positive means are provided to prevent the vapors from Class I liquids from entering tanks storing Class II or III liquids, to prevent contamination and possible change in classification of the less volatile liquid.

7902.1.10.7 Vent sizing. Tank venting systems shall be provided with sufficient capacity to prevent blowback of vapor or liquid at the fill opening while the tank is being filled. Vent pipes shall not be less than $1^1/_4$-inch (31.8 mm) nominal inside diameter. The capacity of the vent shall be based on the filling or withdrawal rate, whichever is greater, and the vent line length. Unrestricted vent piping sized in accordance with Table 7902.1-B is acceptable to prevent back-pressure development in tanks from exceeding 2.5 psig (17.2 kPa). Where tank-venting devices are installed in vent lines, their flow capacities shall be determined in accordance with nationally recognized standards. See Article 90, Standard a.3.11.

7902.1.10.8 Additional requirements for aboveground tanks.

7902.1.10.8.1 General. Atmospheric storage tanks shall be adequately vented to prevent the development of vacuum or pressure sufficient to distort the roof of a cone roof tank or exceed the design pressure in the case of other atmospheric tanks as a result of filling or emptying and atmospheric temperature changes.

Normal vents shall be sized in accordance with nationally recognized engineering standards or shall be at least as large as the filling or withdrawal connection, whichever is larger, but not less than $1^1/_4$-inch (31.8 mm) nominal inside diameter. See Article 90, Standard a.3.11.

If a tank or pressure vessel has more than one fill or withdrawal connection and simultaneous filling or withdrawal can be made, the vent size shall be based on the maximum anticipated simultaneous flow.

7902.1.10.8.2 Low-pressure tanks and pressure vessels. Low-pressure tanks and pressure vessels shall be adequately vented to prevent pressure or vacuum from exceeding the design pressure of the tank or vessel as a result of filling or emptying and atmospheric temperature changes. Protection shall also be provided to prevent over pressure from pumps discharging into the tank or vessel when the pump discharge pressure can exceed the design pressure of the tank or vessel.

7902.1.10.8.3 Vent outlets and drains. For tanks designed to vent at pressures greater than 2.5 psig (17.2 kPa), vent outlets and drains shall discharge in a manner which prevents localized overheating of or flame impingement on any part of the tank.

7902.1.10.8.4 Tanks and pressure vessels containing Class I liquids. Tanks and pressure vessels storing Class I-A liquids shall be equipped with venting devices which shall normally be closed, except when venting under pressure or vacuum conditions. Tanks and pressure vessels storing Class I-B or I-C liquids shall be equipped with venting devices which shall be normally closed except when venting under pressure or vacuum conditions, or with listed flame arresters.

EXCEPTIONS: 1. Tanks of 3,000-barrel (476 960 L) capacity or less containing crude petroleum in crude producing areas are allowed to have open vents.

2. Outside aboveground atmospheric tanks under 1,000-gallon (3785 L) capacity are allowed to have open vents.

3. Flame arresters or venting devices with integral flame arresters need not be provided for Class I-B and I-C liquids where conditions are such that their use could, in case of obstruction, result in tank damage.

Liquid properties justifying the omission of such devices include, but are not limited to, condensation, corrosiveness, crystallization, polymerization, freezing or plugging. When any of these conditions exist, consideration shall be given to heating, use of devices employing special materials of construction, the use of liquid seals or inerting in accordance with nationally recognized standards for explosion-prevention systems. See Section 101.3.

4. Vent pipes 2 inches (50.8 mm) or less in nominal inside diameter and longer than 10 feet (3048 mm) are allowed to have open vents.

5. Tanks storing gasoline are allowed to have open vents provided the vent pipes do not exceed a 3-inch (76.2 mm) nominal inside diameter.

7902.1.10.9 Additional requirements for underground tanks.

7902.1.10.9.1 General. Tank-venting systems located on underground tanks shall be in accordance with Section 7902.1.10.9.

7902.1.10.9.2 Vent pipes, outlets and devices. Vent pipes shall not be obstructed by devices provided for vapor recovery or other purposes unless the tank and associated piping and equipment are otherwise protected to limit back-pressure development to less than the maximum working pressure of the tank and equipment by providing pressure/vacuum vents, rupture discs or other tank-venting devices installed in the tank vent lines. Vent outlets and devices shall be protected to minimize the possibility of blockage from weather, snow, dirt or insect nests.

7902.1.10.9.3 Tanks containing Class I liquids. Tanks containing Class I-A liquids shall be equipped with pressure/vacuum venting devices with integral flame arresters which shall be normally closed except when venting under pressure or vacuum conditions. Tanks storing Class I-B or I-C liquids shall be equipped with pressure/vacuum venting devices or with listed flame arresters.

EXCEPTIONS: 1. Vent pipes 2 inches (50.8 mm) or less in nominal inside diameter and longer than 10 feet (3048 mm) shall not be obstructed by devices that will reduce their capacity and, thus, cause extensive back pressure.

2. Tanks storing gasoline are not required to have pressure/vacuum venting devices except as required for excessive back pressure, or flame arresters, provided the vent does not exceed a 3-inch (76.2 mm) nominal inside diameter.

7902.1.10.9.4 Condensate tanks. Condensate tanks, if utilized, shall be installed and maintained in a manner which will preclude the blocking of the vapor-return piping by liquid. Condensate tanks shall be located such that they will not be subjected to physical damage. The vent pipe shall enter the

tank through the top of the tank. The lower end of vent pipes shall not extend into the tank more than 1 inch (25.4 mm).

7902.1.10.9.5 Manifolding. Manifolded vent pipes shall be adequately sized to prevent system pressure limits from being exceeded when manifolded tanks are filled simultaneously. Float-type check valves installed in tank openings connected to manifold vent piping to prevent product contamination are allowed, provided that the static head imposed at the bottom of the tank will not exceed 10 psig (68.9 kPa) if the fill or vent pipe is filled with liquid when the valves are closed.

EXCEPTION: For motor vehicle fuel-dispensing stations, the capacity of manifolded vent piping shall be sufficient to discharge vapors generated when two manifolded tanks are simultaneously filled.

7902.1.11 Tank vents for emergency venting.

7902.1.11.1 Stationary aboveground tanks. Stationary aboveground tanks shall be provided with emergency venting. For requirements, see Section 7902.2.6.

7902.1.11.2 Portable tanks. Portable tanks shall be provided with one or more devices installed in the top with sufficient emergency venting capacity to limit internal pressure under fire-exposure conditions to 10 psig (68.9 kPa) or 30 percent of the bursting pressure of the tank, whichever is greater. The total venting capacity shall not be less than that specified in Sections 7902.2.6.3.1 and 7902.2.6.3.3. At least one pressure-actuated vent having a minimum capacity of 6,000 cubic feet (169.9 m^3) of free air per hour at 14.7 psia (101.3 kPa) and 60°F. (15.6°C.) shall be used. It shall be set to open at not less than 5 psig (34.5 kPa). If fusible vents are used, they shall be actuated by elements that operate at a temperature not exceeding 300°F. (148.9°C). When used for paints, drying oils and similar materials where plugging of the pressure-actuated vent can occur, fusible vents or vents of the type that soften to failure at a maximum of 300°F. (148.9°C.) under fire exposure are allowed for the entire emergency venting requirement.

7902.1.12 Tank openings other than vents.

7902.1.12.1 Inside buildings.

7902.1.12.1.1 General. Connections for tank openings shall be liquid tight. Openings to tanks shall be located outside of buildings at a location free from sources of ignition and not less than 10 feet (3048 mm) away from building openings or of lines of property that can be built on. Such openings shall be provided with a liquid-tight cap which shall be closed when not in use and shall be properly identified.

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 (152.4 mm) of the bottom of the tank, and it shall be installed in a manner which avoids excessive vibration.

7902.1.12.1.2 Vapor recovery. Tank openings provided for the 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 pipe connected to a vapor-processing system. Openings designed for combined fill and vapor recovery shall also 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.

7902.1.12.1.3 Valves for tank connections. Connections to tanks inside of buildings through which liquid can normally flow shall be provided with an internal or an external valve located as close as practical to the shell of the tank.

For connections to tanks containing Class I or II liquids inside of buildings, such valve or an additional adjacent valve shall be either:

1. Normally closed and remotely activated,
2. Automatic-closing and heat-activated, or

3. As an alternate to valving an approved device on each liquid-transfer connection below the liquid level, except for connections used for emergency disposal, to provide for quick cutoff of flow in the event of fire in the vicinity of the tank is allowed.

7902.1.12.1.4 Overflow protection. Tanks storing Class I, II and III-A liquids inside buildings shall be equipped with a device or other means to prevent overflow into the building. Suitable devices include, but are not limited to, a float valve, a preset meter on the fill line, a valve actuated by the weight of the tank contents, a low head pump which is incapable of producing overflow or a liquid-tight overflow pipe at least one pipe size larger than the fill pipe discharging by gravity back to the outside source of liquid or to an approved location.

7902.1.12.1.5 Piping, valves and fittings. Connections, fittings and other appurtenances shall be installed in accordance with Section 7901.11.

7902.1.12.1.6 Manual gaging. Openings for manual gaging, if independent of the fill pipe, shall be provided with a liquid-tight cap or cover. Covers shall be kept closed when not gaging. 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.

7902.1.12.2 Underground.

7902.1.12.2.1 Piping, valves and fittings. Connections, fittings and other appurtenances shall be installed in accordance with Section 7901.11.

7902.1.12.2.2 Manual gaging. Openings for manual gaging, if independent of the fill pipe, shall be provided with a liquid-tight cap or cover. Covers shall be kept closed when not gaging. 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.

7902.1.12.2.3 Fill pipe and discharge lines. Fill pipe and discharge lines shall enter tanks only through the top. Fill lines shall be sloped toward the tank. Underground tanks for Class I liquids having a capacity of more than 1,000 gallons (3785 L) shall be equipped with a tight fill device for connecting the fill hose to the tank.

Overfill protection shall be provided in accordance with Section 7902.6.5.

For Class I liquids other than crude oil, gasoline and asphalt, the fill pipe shall be designed and installed in a manner which will minimize the possibility of generating static electricity by terminating within 6 inches (152.4 mm) of the bottom of the tank.

7902.1.12.2.4 Location of connections that are made or broken. Filling, withdrawal and vapor-recovery connections for Class I, II and III-A liquids which are made and broken shall be located outside of buildings at a location 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.

7902.1.12.2.5 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 drybreak connection, or other approved device, unless the opening is pipe-connected to a vapor-processing system. Openings designed for combined fill and vapor recovery shall also 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.

7902.1.12.3 Exterior aboveground. Openings for manual gaging on tanks storing Class I liquids shall be provided with a vapor-tight cap or cover. Such covers shall be closed when not gaging. See also Section 7902.2.7.

7902.1.13 Supports, foundations and anchorage.

7902.1.13.1 General. Supports, foundations and anchorage for aboveground tanks shall be in accordance with Section 7902.1.13.

7902.1.13.2 Tanks at grade. Tanks shall rest on the ground or on foundations made of concrete, masonry, piling or steel. Tank foundations shall be designed to minimize the possibility of uneven settling of the tank and to minimize corrosion in any part of the tank resting on the foundation.

7902.1.13.3 Tanks above grade. Tanks shall be securely supported. Supports for tanks storing Class I, II or III-A liquids shall be of concrete, masonry or protected steel. Single wood timber supports, not cribbing, laid horizontally, are allowed for outside aboveground tanks when the bottom of the tank is not more than 12 inches (304.8 mm) above grade.

7902.1.13.4 Fire protection of steel supports. Steel supports or piling for aboveground tanks storing Class I, II or III-A liquids shall have a fire-resistance rating of not less than two hours, except that solid web steel saddles need not be protected if the bottom of the tank is less than 12 inches (304.8 mm) above grade. At the discretion of the chief, water-spray protection in accordance with U.F.C. Standard 79-2 or the Building Code or equivalent may be used. See U.B.C. Standard 9-1.

7902.1.13.5 Design of supports. The design of the supporting structure for tanks shall be in accordance with well-established engineering principles of mechanics and shall be in accordance with the Building Code.

7902.1.14 Stairs, platforms and walkways. Stairs, platforms and walkways shall be of noncombustible construction and shall be designed and constructed in accordance with the Building Code.

7902.2 Stationary Aboveground Tanks Outside of Buildings.

7902.2.1 General. Stationary aboveground tanks outside of buildings shall be in accordance with Sections 7902.1 and 7902.2.

7902.2.2 Tank locations.

7902.2.2.1 Locations where aboveground tanks are prohibited. Storage of Class I and II liquids in aboveground tanks outside of buildings is prohibited within the limits established by law as the limits of districts in which such storage is prohibited. (See sample adoption ordinance, Section 4.)

7902.2.2.2 Location of tanks with pressures 2.5 psig (17.2 kPa) or less. Aboveground tanks operating at pressures not exceeding 2.5 psig (17.2 kPa) for storage of Class I, II or III-A liquids, which are designed with a weak roof-to-shell seam or equipped with emergency venting devices limiting pressures to 2.5 psig (17.2 kPa), shall be located in accordance with Table 7902.2-A.

EXCEPTIONS: 1. Vertical tanks having a weak roof-to-shell seam and storing Class III-A liquids are allowed to be located at one half the distances specified in Table 7902.2-A, 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. See Sections 7902.2.2.4 and 7902.2.2.5.

7902.2.2.3 Location of tanks with pressures exceeding 2.5 psig (17.2 kPa). Aboveground tanks for the storage of Class I, II or III-A 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 7902.2-B.

EXCEPTION: Liquids with boilover characteristics and unstable liquids. See Sections 7902.2.2.4 and 7902.2.2.5.

7902.2.2.4 Location of tanks for boilover liquids. Aboveground tanks for storage of liquids with boilover characteristics shall be located in accordance with Table 7902.2-C.

7902.2.2.5 Location of tanks for unstable liquids. Aboveground tanks for the storage of unstable liquids shall be located in accordance with Table 7902.2-D.

7902.2.2.6 Location of tanks for Class III-B liquids. Aboveground tanks for the storage of Class III-B liquids, excluding unstable liquids, shall be located in accordance with Table 7902.2-E, except when located within a diked area or drainage path for a tank or tanks storing Class I or II

liquids. When a Class III-B liquid storage tank is within the diked area or drainage path for a Class I or II liquid, distances required by Section 7902.2.2.2 shall apply.

7902.2.2.7 Reduction of separation distances to adjacent property. Where two tank properties of diverse ownership have a common boundary, the chief is authorized to, with the written consent of the owners of the two properties, apply the distances in Sections 7902.2.2.2 through 7902.2.2.6 assuming a single property.

7902.2.3 Separation and orientation of tanks.

7902.2.3.1 Separation between adjacent tanks containing stable liquids. The separation between tanks containing stable liquids shall be in accordance with Table 7902.2-G. When 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 chief is authorized to require greater separation than that specified in Table 7902.2-G or other means to make tanks in the interior of the pattern accessible for firefighting purposes.

7902.2.3.2 Separation between adjacent tanks containing unstable liquids. The separation between tanks containing unstable liquids shall not be less than one half the sum of their diameters.

7902.2.3.3 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 III-A liquid storage tank shall be 20 feet (6096 mm) except in the case of Class I, II or III-A 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 7902.2.3.1 shall apply.

Suitable means shall be provided to prevent the accumulation of Class I, II or III-A liquids under adjacent LP-gas containers such as by dikes, diversion curbs or grading. When flammable or combustible liquid storage tanks are within a diked area, the LP-gas containers shall be outside the diked area and at least 10 feet (3048 mm) away from the center line of the wall of the diked area.

EXCEPTIONS: 1. Liquefied petroleum gas containers of 125-gallon (473 L) or less capacity installed adjacent to fuel-oil supply tanks of 660-gallon (2498 L) or less capacity.

2. Horizontal separation is not required between aboveground LP-gas containers and underground flammable and combustible liquid tanks.

7902.2.3.4 Orientation of horizontal pressure tanks. Where end failure of horizontal pressure tanks and vessels can expose property, the tank shall be placed with the longitudinal axis parallel to the nearest important exposure.

7902.2.4 Foam fire protection.

7902.2.4.1 Required systems. When required by the chief, foam fire protection shall be provided for aboveground tanks, other than pressure tanks operating at or above 1 psig (6.89 kPa), when 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 (139.4 m^2), and is

1. Used for the storage of Class I or II liquids,

2. Used for 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, or

4. Considered by the chief as presenting 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; and degree of private fire protection to be provided and facilities of the fire department to cope with flammable liquid fires.

7902.2.4.2 Installation. Where foam fire protection is required, installation shall be in accordance with U.F.C. Standard 79-1.

7902.2.4.3 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 immediately 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 not exceed two hours, and
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.

7902.2.5 Inerting of tanks with 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 inerting system is provided on the tank.

7902.2.6 Emergency relief venting for stationary tanks.

7902.2.6.1 General. Stationary tanks shall be equipped with adequate additional venting that will relieve excessive internal pressure caused by exposure to fires.

EXCEPTION: Tanks larger than 12,000-gallon (45 420 L) capacity storing Class III-B liquids and not within the diked area or the drainage path of Class I or II liquids do not require emergency relief venting.

7902.2.6.2 Type of venting device. Aboveground storage tanks shall be provided with construction or devices that will relieve excessive internal pressure caused by exposure fires.

In a vertical tank, construction methods such as floating roofs, lifter roofs, weak roof-to-shell seams or other approved pressure-relieving construction are allowed as methods providing emergency relief venting. Weak roof-to-shell seams shall be constructed to fail before any other seam.

Devices such as self-closing manhole covers, covers using long bolts that allow the cover to lift under internal pressure, and an additional or larger relief valve or valves are allowed for emergency relief venting. Such devices shall be approved relief- or pressure/vacuum-venting devices or other devices approved by the chief.

7902.2.6.3 Venting sizing.

7902.2.6.3.1 General. Where emergency relief venting is provide solely by pressure-relieving devices, the total venting capacity of both normal and emergency vents shall be enough to prevent rupture of the shell or bottom of the tank, if vertical, or of the shell or heads, if horizontal. If unstable liquids are stored, the effects of heat or gas resulting from polymerization, decomposition, condensation or self-reactivity shall be taken into account.

The total capacity of both normal and emergency venting devices shall not be less than that derived from Table 7902.2-H, except as provided in Sections 7902.2.6.3.3 and 7902.2.6.3.4. The wetted area of the tank shall be calculated on the basis of 55 percent of the total exposed area of a sphere or spheroid, 75 percent of the total exposed area of a horizontal tank and the first 30 feet (9144 mm) above grade of the exposed shell area of a vertical tank.

See Appendix VI-B for the square footage of typical tank sizes.

7902.2.6.3.2 Tanks and storage vessels over 1 psig (6.89 kPa). For tanks and storage vessels designed for pressures over 1 psig (6.89 kPa), the total rate of venting shall be determined in accordance with Table 7902.2-H, except that when the exposed wetted area of the surface is greater than 2,800 square feet (260.1 m^2), the total rate of venting shall be in accordance with Table 7902.2-I or calculated by the following formula:

$$CFH = 1{,}107\ A^{0.82}$$

For **SI:** $$CMH = 220\ A^{0.82}$$

WHERE:

CFH = venting requirement, in cubic feet of free air per hour ($CMH = m^3/hr$).

A = exposed wetted surface, in square feet (m^2).

The foregoing formula is based on $Q = 21{,}000\ A^{0.82}$ (For **SI:** $Q = 43{,}198\ A^{0.82}$).

7902.2.6.3.3 Emergency relief vents. The total emergency relief venting capacity for a specific stable liquid can be determined by the following formula:

$$CFH = \frac{1{,}337\ V}{L\sqrt{M}}$$

For **SI:** $$CMH = \frac{743.4\ V}{L\sqrt{M}}$$

WHERE:

CFH = venting requirement, in cubic feet of free air per hour ($CMH = m^3/hr$).

V = cubic feet (m^3) of free air per hour from Table 7902.2-H.

L = latent heat of vaporization of specific liquid, in Btus per pound (cal/g).

M = molecular weight of specific liquids.

7902.2.6.3.4 Reductions in required venting for stable liquids. For tanks containing stable liquids, a reduction in the required airflow rate in Sections 7902.2.6.3.1 and 7902.2.6.3.3 is allowed. Such reduction shall be calculated by multiplying the required airflow rate in Section 7902.2.6.3.1 or 7902.2.6.3.3 by the appropriate factor listed in the following schedule when protection is provided as indicated. Only one factor can be used for any one tank.

1. 0.5 For drainage in accordance with requirements for remote impounding in Section 7902.2.8.2 for tanks over 200 square feet (18.6 m^2) of wetted area.
2. 0.3 For water spray in accordance with U.F.C. Standard 79-2 and drainage in accordance with requirements for remote impounding in Section 7902.2.8.2.
3. 0.3 For insulation in accordance with the following:

3.1 Remain in place under fire-exposure conditions,

3.2 Withstand dislodgement when subjected to hose stream impingement during fire exposure, and

EXCEPTION: The requirement may be waived by the chief where use of solid hose streams is not contemplated or would not be practical.

3.3 Maintain a maximum conductance value of 4.0 Btus per hour per square foot per degree Fahrenheit [81.8 kJ/(hr × m^2 × °C.)] when the outer insulation jacket or cover is at a temperature of 1,660°F. (904°C.) and when the mean temperature of the insulation is 1,000°F. (538°C.).

4. 0.15 For water spray with insulation in accordance with U.F.C. Standard 79-2 and drainage in accordance with requirements for remote impounding in Section 7902.2.8.2.

7902.2.6.4 Venting device capacity.

7902.2.6.4.1 Identification. Commercial tank-venting devices shall bear a stamp indicating the opening pressure, the pressure at which the valve reaches the full-open position and the flow capacity at the latter pressure. If the start-to-open pressure is less than 2.5 psig (17.2 kPa) and the pressure at full-open position is greater than 2.5 psig (17.2 kPa), the flow capacity at 2.5 psig (17.2 kPa) shall also be stamped on the venting device. The flow capacity shall be expressed in cubic feet per hour of air at 60°F. and 14.7 psia (m^3 of air/hr at 15.6°C. and 101.3 kPa).

7902.2.6.4.2 Determination of capacity. The flow capacity of tank-venting devices under 8 inches (203 mm) in nominal pipe size shall be determined by actual test of each type and size of vent. These flow tests shall be conducted by a qualified impartial outside agency or by the manufacturer when certified by a qualified impartial observer. Calculation of the flow capacity of tank-venting devices 8 inches (203 mm) nominal pipe size and larger, including manhole covers with long bolts or equivalent, is allowed provided that the opening pressure is actually measured, the rating pressure and corresponding free orifice area are stated, the word "calculated" appears on the nameplate, and the computation is based on a flow coefficient of 0.5 applied to the rated orifice area.

Calculations shall be performed using the following formula:

$$CFH = 1.667 C_f A \sqrt{P_t - P_a}$$

For **SI:**

$$CMH = 0.1467 C_f A \sqrt{P_t - P_a}$$

WHERE:

CFH = venting requirement in cubic feet of free air per hour ($CMH = m^3/hr$).
C_f = 0.5 (the flow coefficient)
A = the orifice area in square inches (mm^2).
P_t = the absolute pressure inside the tank in inches of water (kPa).
P_a = the absolute atmospheric pressure outside the tank in inches of water (kPa).

7902.2.6.5 Termination of vent outlets.

7902.2.6.5.1 General. Emergency vents shall not discharge inside a building.

7902.2.6.5.2 Tanks with pressures exceeding 2.5 psig (17.2 kPa). The outlets of vents and vent drains on tanks equipped with emergency venting that allows pressures to exceed 2.5 psig (17.2 kPa) shall be arranged to discharge in a manner which prevents localized overheating of, or flame impingement on, any part of the tank if vapors from such vents are ignited.

7902.2.7 Tank openings other than vents.

7902.2.7.1 General. Connections to aboveground tanks through which liquid can normally flow shall be provided with internal or external valves located as close as practical to the shell of the tank. See also Section 7902.1.12.

Connections below the liquid level through which liquid does not normally flow shall be provided with a liquid-tight closure, such as a valve, plug or blind, or a combination of these.

7902.2.7.2 Fill pipe openings. For top-loaded tanks, metallic fill pipes shall be designed and installed to minimize the generation of static electricity by terminating the pipe within 6 inches (152.4 mm) of the bottom of the tank and shall be installed to avoid excessive vibration.

For Class I-B and I-C liquids, other than crude oils and asphalts, fill pipes shall be designed and installed in a manner which minimizes the possibility of generating static electricity.

Filling and withdrawal connections for Class I, II and III-A liquids which are made and broken shall be located outside of buildings at a location away from sources of ignition and not less than 5 feet (1524 mm) away from building openings. Such connections for any liquid shall be closed, liquid tight when not in use and properly identified.

7902.2.7.3 Openings for vapor recovery. Vapor-recovery systems shall be in accordance with Section 5202.12.

7902.2.7.4 Piping, valves and fittings. Connections, fittings or other appurtenances shall be installed in accordance with Section 7901.11.

7902.2.8 Drainage control and diking.

7902.2.8.1 General. 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.

EXCEPTION: The chief is authorized to alter or waive these requirements when determined by the chief 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.

7902.2.8.2 Drainage system. Where protection of adjacent tanks, adjoining property or waterways is by means of a natural or constructed drainage system, such system shall comply with the following:

1. Drainage shall be provided at a slope of not less than 1 percent away from the tank toward an impounding basin or an approved means of disposal. This termination area and the route of the drainage system shall be so located that a fire occurring in the drainage system will not endanger pumps, manifolds, control valves, electrical equipment, public utilities, fire-protection equipment, tanks, adjoining property or fire apparatus access roads, and

2. Impounding basins and approved means of disposal shall be designed to retain a spill from the largest capacity tank draining into a basin plus the design discharge from fire-protection systems including monitor nozzles, as specified in U.F.C. Standard 79-1, Chapter 3, which flow into a basin. Impounding basins and the route of a drainage system shall be located such that a fire occurring in a drainage system will not endanger pumps, manifolds, control valves, electrical equipment, public utilities, fire-protection equipment, tanks, adjoining properties or fire apparatus access roads.

7902.2.8.3 Diked areas.

7902.2.8.3.1 General. Where protection of adjacent tanks, adjoining property or waterways is accomplished by retaining the liquid around the tank by means of a diked area, such diked areas shall comply with Section 7902.2.8.3.

7902.2.8.3.2 Volumetric capacity. The volumetric capacity of the diked area shall not be 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.

7902.2.8.3.3 Walls. Walls of the diked area shall be of earth, steel, concrete or solid masonry designed to be liquid tight and to withstand a full hydrostatic head. Earthen walls 3 feet (914.4 mm) or more in height shall have a flat section at the top not less than 2 feet (609.6 mm) wide. The slope shall be consistent with the angle of repose of the material of which the walls are constructed.

The walls of the diked area shall be restricted to an average height of 6 feet (1828.8 mm) above the interior grade, except when dikes are higher than an average of 6 feet (1828.8 mm) above interior grade, provisions shall be made for normal and necessary emergency access to tanks, valves and other equipment and safe egress from the diked enclosure, as follows:

1. Where the average height of the dike containing Class I liquids is over 12 feet (3657.6 mm) measured from interior grade or where the distance between a tank and the top inside edge of the dike wall is less than the height of the dike wall, provisions shall be made for normal operation of valves and for access to tank roofs without entering below the top of the dike. These provisions are allowed to be met through the use of remotely operated valves, elevated walkways or similar arrangements,

2. Piping passing through dike walls shall be designed to prevent excessive stresses as a result of settlement or fire exposure, and

3. The minimum distance between tanks and the toe of the interior dike walls shall be 5 feet (1524 mm), and diked areas containing two or more tanks shall comply with Section 7902.2.8.3.4.

7902.2.8.3.4 Diked areas containing two or more tanks. Diked areas containing two or more tanks shall be subdivided by drainage channels leading to an impounding basin or by intermediate curbs or spill dikes in order to prevent spills from endangering adjacent tanks within the diked area. Intermediate curbs and spill dikes shall not be less than 18 inches (457.2 mm) in height.

7902.2.8.3.5 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.

7902.2.8.3.6 Removing water from diked area. Provision shall be made for draining or removing excess water from a drainage system or diked area. Such drains shall not discharge to adjoining property, natural water courses, public sewers or public drainage channels unless the drain is designed to prevent the release of flammable or combustible liquids. A valve operable from outside the dike shall be provided in the dike system and shall normally be kept closed. Control of drainage shall be accessible under fire conditions.

7902.2.8.3.7 Combustible materials in diked areas. Diked areas shall be kept free of combustible materials, drums and barrels.

7902.2.8.3.8 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 aboveground shall be minimized and located as close as practical to the shell of the tank in diked areas or drainage basins.

7902.3 Container and Portable Tank Storage Outside of Buildings.

7902.3.1 General. Storage of flammable and combustible liquids in closed containers and portable tanks outside of buildings shall be in accordance with Sections 7902.1 and 7902.3. See also Section 7902.1.8.1 for capacity limits for containers and portable tanks.

7902.3.2 Plans. See Section 7901.3.2. Storage shall be in accordance with approved plans.

7902.3.3 Location on property.

7902.3.3.1 General. Outdoor storage of liquids in containers and portable tanks shall be in accordance with Table 7902.3-A. Storage of liquids near buildings located on the same property shall be in accordance with Section 7902.3.3.

When two or more classes of materials 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.

Storage of containers or portable tanks shall be provided with fire apparatus access roads in accordance with Section 902.2.

The storage area shall be protected against tampering or trespassers where necessary and shall be kept free of weeds, debris and other combustible materials not necessary to the storage.

7902.3.3.2 Storage adjacent to buildings. A maximum of 1,100 gallons (4163.5 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:

1. The building does not exceed one story in height. Such building shall be of fire-resistive construction with noncombustible exterior surfaces or noncombustible construction and shall be devoted principally to the storage of liquids, or

2. The exterior building wall adjacent to the storage area shall have a fire-resistance rating of not less than two hours, having no openings to abovegrade areas within 10 feet (3048 mm) horizontally of such storage and no openings to belowgrade 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 (4163.5 L), provided that the maximum quantity per pile does not exceed 1,100 gallons (4163.5 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 (4163.5 L) adjacent to a building complying with Item 1, or the provisions of Item 1 cannot be met, a minimum distance in accordance with the column for distance to property line that can be built on in Table 7902.3-A shall be maintained between buildings and the nearest container or portable tank.

7902.3.4 Spill control, drainage control and secondary containment. Storage areas shall be provided with spill control, drainage control and secondary containment as set forth in Section 7901.8.

EXCEPTION: Containers stored on approved containment pallets in accordance with Section 7901.8.5.

7902.3.5 Security. Storage areas shall be protected against tampering or trespassers by fencing or other control measures.

7902.3.6 Protection from vehicles. Guard posts or other means shall be provided to protect exterior storage tanks from vehicular damage. When guard posts are installed, the posts shall be installed in accordance with Section 8001.9.3.

7902.3.7 Clearance from combustibles. The storage area shall be kept free of 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).

7902.3.8 Weather protection. For weather protection for outdoor storage, see Section 8003.1.20.

7902.3.9 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.

7902.4 Stationary Aboveground Tank Storage inside Buildings.

7902.4.1 General. Storage of flammable and combustible liquids in stationary aboveground tanks inside of buildings shall be in accordance with Sections 7902.1 and 7902.4.

7902.4.2 Where allowed. Stationary tanks for the storage of flammable and combustible liquids shall be in rooms or buildings complying with the Building Code.

Rooms or buildings used for storage of Class I, II or III liquids shall be in accordance with Section 7902.5.7.

Rooms or buildings used for dispensing, use, mixing and handling of Class I, II or III liquids shall be in accordance with Section 7903.2.1.6.

7902.4.3 Openings for manual gaging. Openings for manual gaging, if independent of the fill pipe, shall be provided with a liquid-tight cover. Covers shall be kept closed when not in use. Such openings shall be protected against liquid overflow and possible vapor release by means of a spring-loaded check valve or other approved devices.

7902.5 Container and Portable Tank Storage inside Buildings.

7902.5.1 General.

7902.5.1.1 Applicability. Storage of flammable and combustible liquids inside buildings in drums or other containers and portable tanks shall be in accordance with Sections 7902.1 and 7902.5.

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.

7902.5.1.2 Fire protection.

7902.5.1.2.1 Portable fire extinguishers. Approved portable fire extinguishers shall be provided in accordance with U.F.C. Standard 10-1, except as specified in Section 7902.5.11.5.2.

7902.5.1.2.2 Water supply. The water supply shall be sufficient to deliver the specified fire-protection demand, including at least 500 gallons per minute (31.5 L/s) for inside and outside hose lines.

7902.5.2 Capacity limits for containers and portable tanks. Containers shall not exceed 60 gallons (227.1 L) capacity. Portable tanks shall not exceed 660 gallons (2498 L) capacity. See Section 7902.1.8.1. Tanks exceeding 660 gallons (2498 L) capacity shall be in accordance with Sections 7902.2, 7902.4 or 7902.6.

7902.5.3 Empty containers and portable tanks. 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 tanks and containers.

Tanks and containers, when emptied, shall have the covers or plugs immediately replaced in openings.

7902.5.4 Incompatible materials. Materials which will react with water or other liquids to produce a hazard shall not be stored in the same room with flammable or combustible liquids. See also Section 7902.1.6.

7902.5.5 Storage near exits. Class I, II or III-A liquids, including stock for sale, shall not be stored near exit doorways, stairways or in a location that would impede egress.

7902.5.6 Shelf storage.

7902.5.6.1 General. Shelving shall be of substantial construction, adequately braced and anchored. For seismic requirements, see the Building Code.

7902.5.6.2 Displacement protection. Shelves shall be of sufficient depth and provided with a lip or guard to prevent individual containers from being easily displaced.

EXCEPTION: Shelves in storage cabinets or on laboratory furniture specifically designed for such use.

7902.5.6.3 Manner of storage. Shelf storage of flammable and combustible liquids shall be maintained in an orderly manner.

7902.5.7 Quantity limits for storage.

7902.5.7.1 Exempt amounts for control areas. For occupancies other than Group M Occupancy wholesale and retail sales uses, indoor storage of flammable and combustible liquids shall not exceed the exempt amounts set forth in Table 7902.5-A and shall not exceed the additional limitations set forth in Section 7902.5.7.2.

For Group M Occupancy wholesale and retail sales uses, indoor storage of flammable and combustible liquids shall not exceed the exempt amounts set forth in Table 7902.5-B.

See Article 51 for storage of hazardous production material flammable and combustible liquids in Group H, Division 6 Occupancies.

7902.5.7.2 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 amounts necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7902.5-A.

2. **Group B Occupancies:**

Quantities in drinking, dining, office and school uses within Group B Occupancies shall not exceed amounts necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7902.5-A.

3. **Group E Occupancies:**

Quantities in Group E Occupancies shall not exceed amounts necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7902.5-A.

4. **Group F Occupancies:**

Quantities in dining, office and school uses within Group F Occupancies shall not exceed amounts necessary for demonstration, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7902.5-A.

5. **Group I Occupancies:**

Quantities in Group I Occupancies shall not exceed amounts necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7902.5-A.

6. **Group M Occupancies:**

Quantities in dining, office and school uses within Group M Occupancies shall not exceed amounts necessary for demonstration, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7902.5-A.

See Section 7902.5.7.1 for exempt amounts for wholesale and retail sales uses.

7. **Group R Occupancies:**

Quantities in Group R Occupancies shall not exceed amounts necessary for maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7902.5-A.

8. **Group S Occupancies:**

Quantities in dining and office uses within Group S Occupancies shall not exceed amounts necessary for demonstration, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7902.5-A.

7902.5.7.3 Quantities exceeding limits for control areas. Quantities exceeding quantities allowed in control areas set forth in Sections 7902.5.7.1 and 7902.5.7.2 shall be in liquid storage rooms or liquid storage warehouses in accordance with Sections 7902.5.11 and 7902.5.12.

7902.5.8 Special provisions for liquids used for maintenance and operation of equipment. In all occupancies, quantities of flammable and combustible liquids in excess of 10 gallons (37.85 L) used for maintenance purposes and the operation of equipment shall be stored in liquid storage cabinets in accordance with Section 7902.5.9. Quantities not exceeding 10 gallons (37.85 L) are allowed to be stored outside of a cabinet when in approved containers located in private garages or other approved locations.

In Groups A, B, E, F, I, M, R and S Occupancies, quantities of flammable and combustible liquids used for demonstration, treatment and laboratory work exceeding 10 gallons (37.85 L) shall be stored in liquid storage cabinets in accordance with Section 7902.5.9. Quantities not exceeding 10 gallons (37.85 L) shall be in approved locations.

7902.5.9 Liquid storage cabinets.

7902.5.9.1 General. When other sections of this code require that liquid containers are stored in storage cabinets, such cabinets and storage shall be in accordance with Section 7902.5.9.

7902.5.9.2 Quantities. The combined quantity of Class I and II liquids in a cabinet shall not exceed 60 gallons (227.1 L), and the total quantities of all liquids shall not exceed 120 gallons (454.2 L).

7902.5.9.3 Construction.

7902.5.9.3.1 Labeling. Cabinets shall be provided with a conspicuous label in red letters on contrasting background which reads FLAMMABLE—KEEP FIRE AWAY.

7902.5.9.3.2 Doors. Doors shall be well fitted, self-closing and equipped with a latch.

7902.5.9.3.3 Bottom. The bottom of the cabinet shall be liquid tight to a height of at least 2 inches (50.8 mm).

7902.5.9.3.4 Materials. Cabinets shall be constructed of wood or metal and approved by the chief. Cabinets shall be listed or constructed 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 (38.1 mm) airspace between the walls. Joints shall be riveted or welded and shall be tightfitting.

2. Unlisted wooden cabinets, including doors, shall be constructed of not less than 1-inch (25.4 mm) exterior grade plywood. Joints shall be rabbited 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.

7902.5.9.4 Number of cabinets.

7902.5.9.4.1 Group A Occupancies. Group A Occupancies shall not contain more than one cabinet.

7902.5.9.4.2 Other occupancies. In occupancies other than Group A Occupancies, a room shall not contain more than three cabinets.

EXCEPTION: Cabinets in groups not exceeding three are allowed in the same room, provided they are separated from other cabinets by not less than 100 feet (30 480 mm).

7902.5.10 Storage in control areas.

7902.5.10.1 General. Storage in control areas shall be in accordance with the following:

1. Class I liquids shall not be stored in basements,

2. Containers having less than 30-gallon (113.6 L) capacity 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 having a capacity of 30 gallons (113.6 L) or more shall not be stored more than one container high. Containers shall be stored in an upright position,

3. Containers on shelves shall be stored in accordance with Table 7902.5-C. Combustible commodities shall not be stored above flammable or combustible liquids,

4. Piles shall not be closer than 3 feet (914.4 mm) to the nearest beam, chord, girder or other obstruction and shall be 3 feet (914.4 mm) below sprinkler deflectors or discharge orifices of water spray or other overhead fire-protection systems, and

5. In areas that are not accessible to the public, Class I, II and III-A liquids shall not be stored in the same pile or rack section as ordinary combustible commodities unless such materials are packaged together as kits.

7902.5.10.2 Group M Occupancy wholesale and retail sales uses.

7902.5.10.2.1 General. Flammable and combustible liquids in Group M Occupancy wholesale and retail sales uses shall be in accordance with Section 7902.5.10.2.

7902.5.10.2.2 Container type. Containers for Class I liquids shall be metal.

EXCEPTION: In sprinklered buildings an aggregate quantity of 120 gallons (454.2 L) of water-miscible Class I-B and I-C liquids is allowed in nonmetallic containers, each having a capacity of 16 ounces (0.473 L) or less.

See also Section 7902.1.8.1.3.

7902.5.10.2.3 Container capacity. Containers for Class I liquids shall not exceed 5-gallon (18.9 L) capacity.

7902.5.10.2.4 Fire protection and storage arrangement. Fire protection and container storage arrangement shall be in accordance with Table 7902.5-C and the following:

1. Combustible commodities shall not be stored above flammable or combustible liquids,

2. Storage on shelves shall not exceed 6 feet (1828.8 mm) in height, and shelving shall be metal,

3. Storage on pallets or in piles greater than 4 feet 6 inches (1371.6 mm) in height, or where the ceiling exceeds 18 feet (5486.4 mm) in height, shall be protected in accordance with Table 7902.5-F, and the storage heights and arrangement shall be limited to those specified in Table 7902.5-D, and

4. Storage on racks greater than 4 feet 6 inches (1371.6 mm) in height, or where the ceiling exceeds 18 feet (5486.4 mm) in height, shall be protected in accordance with Tables 7902.5-H, 7902.5-I and 7902.5-J as appropriate, and the storage heights and arrangements shall be limited to those specified in Table 7902.5-E.

7902.5.10.2.5 Storage plan. When required by the chief, aisle and storage plans shall be submitted in accordance with Section 8003.1.6.

7902.5.11 Liquid storage rooms.

7902.5.11.1 General. Quantities of liquids exceeding those set forth in Section 7902.5.7 for storage in control areas shall be stored in a liquid storage room complying with Section 7902.5.11 and constructed and separated as required by the Building Code.

7902.5.11.2 Quantities and arrangement of storage.

7902.5.11.2.1 General. The quantity limits and arrangements of liquid storage in liquid storage rooms shall be in accordance with Table 7902.5-D or 7902.5-E and Section 7902.5.11.2.

7902.5.11.2.2 Mixed storage. When two or more classes of liquids are stored in a pile or rack section:

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 7902.5-D or 7902.5-E, and

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 7902.5-D or 7902.5-E.

7902.5.11.2.3 Separation and aisles. Piles shall be separated from each other by at least 4-foot (1219.2 mm) aisles. Aisles shall be provided so that all containers are 12 feet (3657.6 mm) or less from an aisle. Where the storage of liquids is on racks, a minimum 4-foot-wide (1219.2 mm) aisle shall be provided between adjacent rows of racks and adjacent storage of liquids. Main aisles shall be a minimum of 8 feet (2438.4 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 at least 3 feet (914.4 mm) in width, unless greater widths are required for separation of piles or racks, in which case the greater width shall be provided.

7902.5.11.2.4 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 high shall be designed to nest securely without dunnage. See U.F.C. Standard 79-5 for requirements for portable tank design. Shelving, racks, dunnage, scuffboards, floor overlay and similar installations shall be of noncombustible construction or of wood not less than 1-inch (25.4 mm) nominal thickness. Adequate material-handling equipment shall be available to handle tanks safely at upper tier levels.

7902.5.11.3 Spill control, drainage control and secondary containment. Liquid storage rooms shall be provided with spill control, drainage control and secondary containment in accordance with Section 7901.8.

7902.5.11.4 Ventilation. Liquid storage rooms shall be ventilated in accordance with Section 8003.1.8.

7902.5.11.5 Fire protection.

7902.5.11.5.1 Fire-extinguishing systems. Liquid storage rooms shall be protected by automatic sprinkler systems installed in accordance with the Building Code (see U.B.C. Standard 9-1) and Table 7902.5-F, 7902.5-G, 7902.5-H, 7902.5-I or 7902.5-J. In-rack sprinklers shall also comply with U.F.C. Standard 81-2.

Automatic foam-water systems and automatic aqueous film forming foam (AFFF)-water sprinkler systems may be used only when approved by the chief.

7902.5.11.5.2 Portable fire extinguishers. One or more portable fire extinguisher 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.

One or more portable fire extinguishers 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.

7902.5.11.6 Basement storage. Class I liquids shall not be stored in basements.

7902.5.11.7 Explosion control. See Section 7902.1.5.

7902.5.12 Liquid storage warehouses.

7902.5.12.1 General. Buildings used for storage of flammable or combustible liquids in quantities exceeding those set forth in Section 7902.5.7 for control areas and Section 7902.5.11.2 for liquid storage rooms shall comply with Section 7902.5.12 and shall be constructed and separated as required by the Building Code.

7902.5.12.2 Quantities and storage arrangement.

7902.5.12.2.1 General. The total quantities of liquids in a liquid storage warehouse are not limited. The arrangement of storage shall be in accordance with Table 7902.5-D or 7902.5-E.

7902.5.12.2.2 Mixed storage. Mixed storage shall be in accordance with Section 7902.5.11.2.2.

7902.5.12.2.3 Separation and aisles. Separation and aisles shall be in accordance with Section 7902.5.11.2.3.

7902.5.12.2.4 Stabilizing and supports. Stabilizing and supports shall be in accordance with Section 7902.5.11.2.4.

7902.5.12.3 Spill control, drainage control and secondary containment. Liquid storage warehouses shall be provided with spill control, drainage control and secondary containment as set forth in Section 7901.8.

7902.5.12.4 Ventilation. Liquid storage warehouses shall be ventilated in accordance with Section 8003.1.8.

7902.5.12.5 Fire protection.

7902.5.12.5.1 Fire-extinguishing systems. Liquid storage warehouses shall be protected by automatic sprinkler systems installed in accordance with the Building Code (see U.B.C. Standard 9-1) and Table 7902.5-F, 7902.5-G, 7902.5-H, 7902.5-I or 7902.5-J. In-rack sprinklers shall also comply with U.F.C. Standard 81-2.

Automatic foam-water systems and automatic aqueous film forming foam-water sprinkler systems may only be used when approved by the chief.

7902.5.12.5.2 Warehouse hose lines. In liquid storage warehouses, either $1^1/_2$-inch (38.1 mm) lined or 1-inch (25.4 mm) hard rubber hand hose lines shall be provided in sufficient number to reach all liquid storage areas. See also Section 1001.9.

7902.5.12.6 Basement storage. Class I liquids shall not be stored in basements.

7902.5.12.7 Explosion control. See Section 7902.1.5.

7902.6 Underground Tank Storage.

7902.6.1 General. Underground storage of flammable and combustible liquids in tanks shall be in accordance with Sections 7902.1 and 7902.6.

7902.6.2 Contents. Underground tanks shall not contain petroleum products containing mixtures of a nonpetroleum nature, such as ethanol or methanol blends, without evidence of compatibility.

7902.6.3 Location. Flammable and combustible liquid storage tanks located underground, either outside or under buildings, shall be in accordance with 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 property line shall not be less than 3 feet (914.4 mm), and

3. A minimum distance of 1 foot (304.8 mm), shell to shell, shall be maintained between underground tanks.

7902.6.4 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 at least 6 inches (152.4 mm) of noncorrosive inert material such as clean sand or gravel well tamped in place or in accordance with the manufacturer's installation instructions. Tanks shall be covered with a minimum of 2 feet (609.6 mm) of earth or shall be covered by not less than 1 foot (304.8 mm) of earth, on top of which shall be placed a slab of reinforced concrete not less than 4 inches (101.6 mm) thick.

When underground tanks are, or are likely to be, subjected to traffic, they shall be protected against damage from vehicles passing over them by at least 3 feet (914.4 mm) of earth cover, or 18 inches (457.2 mm) of well-tamped earth plus 6 inches (152.4 mm) of reinforced concrete, or 8 inches (203.2 mm) of asphaltic concrete. When asphaltic or reinforced concrete paving is used as part of the protection, it shall extend at least 1 foot (304.8 mm) horizontally beyond the outline of the tank in all directions.

For tanks built in accordance with Section 7902.1.8, the burial depth and the height of the vent line shall be such that the static head imposed at the bottom of the tank will not exceed 10 psig (68.9 kPa) if the fill or vent pipe is filled with liquid.

If the depth of cover exceeds 7 feet (2133.6 mm) or the manufacturer's specifications, reinforcements shall be provided in accordance with the tank manufacturer's recommendations.

Nonmetallic underground tanks shall be installed in accordance with the manufacturer's instructions. The minimum depth of cover shall be as specified above in Section 7902.6.4.

7902.6.5 Overfill protection.

7902.6.5.1 General. Fill pipes shall be equipped with a spill container and an overfill prevention system as specified in Section 7902.6.5.

7902.6.5.2 Spill containers. A spill container shall be provided for each fill pipe to collect liquids spilled by overfilling during tank-filling operations. Containers are allowed to be constructed of single-wall construction. Containers shall have a capacity of not less than 5 gallons (18.9 L) and shall be equipped with a drain valve which drains a spill into the primary tank.

7902.6.5.3 Overfill prevention system. An overfill prevention system shall be provided for each tank. The system shall either:

1. Have an alarm which provides an audible and visual signal when the quantity of liquid in the tank reaches 90 percent of tank capacity,

2. Automatically shut off the flow when the quantity of liquid in the tank reaches 95 percent of tank capacity, or

3. 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 due to overfilling.

7902.6.6 Inventory control. Daily inventory records shall be maintained for underground storage tank systems in accordance with Section 5202.3.9.

7902.6.7 Locations subject to flooding. Where a tank could become buoyant due to a rise in the level of the water table or due to location in an area that is subject to flooding, the tank shall be anchored in place. See Appendix II-B or manufacturer's installation instructions.

7902.6.8 Leaking tanks. Leaking tanks shall be promptly emptied and removed from the ground or abandoned in accordance with Section 7902.1.7.4 or 7902.1.7.2.4, respectively.

7902.6.9 Used tanks. Reinstallation of used tanks is allowed when such tanks comply with the requirements of Sections 7902.1.8 and 7902.6.15. See also Section 7902.6.16.4.

7902.6.10 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.

Tank opening, cleaning, preparation, inspection, lining, closing and testing shall be in accordance with U.F.C. Standard 79-6.

For permits to alter a tank, see Section 105, Permit f.3.6.

Interior-lined underground tanks shall be protected from corrosion in accordance with Section 7902.6.15.

7902.6.11 Secondary containment. An approved method of secondary containment shall be provided for underground tank systems, including tanks, piping and related components, where a leak from such a system would pose an immediate hazard to persons or property, as determined by the chief. See Appendix II-G.

7902.6.12 Leak detection required. Underground storage tank systems shall be provided with an approved method of detecting leaks from any component of the system which normally contains liquid.

7902.6.13 Leak-detection installation and maintenance. Leak-detection devices and methods shall be in accordance with nationally recognized standards. See Article 90, Standard u.3.2. Such devices shall be inspected and tested at least annually, and the test results maintained for at least one year.

7902.6.14 Leak reporting. Any consistent or accidental loss of liquid, or other indication of a leak from a tank system, shall be reported immediately to the fire department.

7902.6.15 Corrosion protection.

7902.6.15.1 General. Underground tanks and piping shall be properly designed, installed and maintained, and protected from corrosion in accordance with Section 7902.6.15.2 or 7902.6.15.3.

EXCEPTION: If conditions, based on adequate proof, warrant the deletion of the corrosion-protection requirements, the chief may waive the corrosion-protection requirements.

See Article 90, Standards a.3.10, n.1.2, s.1.1, u.1.14 and u.2.1.

7902.6.15.2 Cathodic protection. Cathodic protection systems provided for corrosion protection shall be in accordance with nationally recognized standards.

7902.6.15.3 Corrosion-resistant materials. Corrosion-resistant materials of construction, such as special alloys; nonmetallic, reinforced plastic coatings; composites; or equivalent systems, may be used when approved.

7902.6.15.4 Testing of corrosion protection. New underground steel tanks and piping shall be tested by the structure-to-soil-potential method after the system is in operation. The tank manufacturer shall provide a structure lead and a test station. The criteria for adequate corrosion protection shall be in accordance with recognized standards. Testing shall be done at installation and not less than once every five years thereafter by qualified persons approved by the chief.

EXCEPTION: Approved and listed composite fiberglass-reinforced plastic tanks.

7902.6.16 Testing of underground tanks.

7902.6.16.1 General. Before being covered or placed in use, tanks and piping connected to underground tanks shall be tested for tightness in the presence of the chief. For pipe testing, see Section 7901.11.10. The system shall not be covered until it has been approved.

7902.6.16.2 New tanks. New underground tanks shall be tested for tightness hydrostatically or pneumatically at not less than 3 pounds per square inch (20.7 kPa) and not more than 5 pounds per square inch (34.5 kPa) for 30 minutes. Pneumatic testing shall not be used on a tank containing flammable or combustible liquids or vapors.

When secondary containment tanks are required in accordance with Section 7902.6.11, they shall be tested in accordance with the manufacturer's instructions. Both the primary and secondary containment shall be tested.

7902.6.16.3 Existing tanks and piping. Existing underground storage tanks and piping shall be tested for leakage at the owner's or operator's expense when the chief has reasonable cause to believe that a leak exists. Orders by the chief requiring testing on underground tanks or piping shall indicate that the test be completed by a specified date. Tanks shall be emptied of flammable or combustible liquids, and piping and other equipment shall not be used if required tests are not completed within the specified time.

When testing is required, owners or operators shall provide the chief with data setting forth the method of testing that is to be used and shall submit the name of a qualified individual who will conduct the test. The method of testing to be used shall consider the effects of temperature, pressure and other variables and shall establish conclusively whether the tank or piping is leaking. Pneumatic testing shall not be used for tanks.

Devices used for final testing of tanks shall be capable of detecting leaks as small as 0.05 gallon per hour (0.19 L/hr). Leaking piping and equipment shall not be used until repaired or replaced.

The chief is authorized to require that the test be conducted in the chief's presence.

7902.6.16.4 Used tanks. Used tanks intended for flammable or combustible liquid service shall be tested as required for new tanks.

TABLE 7902.1-A—MAXIMUM SIZE OF CONTAINERS AND PORTABLE TANKS (See Section 7902.1.8.1)

CONTAINER TYPE	CLASS I-A	CLASS I-B	CLASS I-C	CLASS II	CLASS III
	× 3.785 for gal. to L				
1. Glass[1]	1 pt. (0.47 L)	1 qt. (0.95 L)	1 gal.	1 gal.	5 gal.
2. Metal or listed approved plastic[2]	1 gal.	5 gal.	5 gal.	5 gal.	5 gal.
3. Approved plastic[2]	0 gal.	0 gal.	0 gal.	0 gal.	5 gal.
4. Safety cans	2 gal.	5 gal.	5 gal.	5 gal.	5 gal.
5. Metal drum	60 gal.	60 gal.	60 gal.	60 gal.	60 gal.
6. Approved portable tanks	660 gal.	660 gal.	660 gal.	660 gal.	660 gal.
7. Polyethylene[3]		Footnote 4	Footnote 4	60 gal.	60 gal.

(Continued)

Footnotes to Table 7902.1-A

[1]Class I-A and I-B liquids are allowed to be stored in glass containers of not more than 1-gallon (3.785 L) capacity if the required liquid purity, such as American Chemical Society analytical reagent grade or higher, would be affected by storage in metal containers or if the liquid would cause excessive corrosion of a metal container.

[2]See Sections 7902.1.8.1.3 and 7902.5.10.2.2 for special limitations.

[3]Polyethylene containers in accordance with nationally recognized standards. See Article 90, Standard u.3.2.

[4]See Rows 2, 3 and 4.

TABLE 7902.1-B—VENT LINE DIAMETERS (See Section 7902.1.10.7)

MAXIMUM FLOW (gpm)	PIPE LENGTH[1]					
× 3.785 for L/min	50 feet	15 240 mm	100 feet	30 480 mm	200 feet	60 960 mm
100	1 1/4-inch	31.75 mm	1 1/4-inch	31.75 mm	1 1/4-inch	31.75 mm
200	1 1/4-inch	31.75 mm	1 1/4-inch	31.75 mm	1 1/4-inch	31.75 mm
300	1 1/4-inch	31.75 mm	1 1/4-inch	31.75 mm	1 1/2-inch	38.1 mm
400	1 1/4-inch	31.75 mm	1 1/2-inch	38.1 mm	2-inch	50.8 mm
500	1 1/2-inch	38.1 mm	1 1/2-inch	38.1 mm	2-inch	50.8 mm
600	1 1/2-inch	38.1 mm	2-inch	50.8 mm	2-inch	50.8 mm
700	2-inch	50.8 mm	2-inch	50.8 mm	2-inch	50.8 mm
800	2-inch	50.8 mm	2-inch	50.8 mm	3-inch	76.2 mm
900	2-inch	50.8 mm	2-inch	50.8 mm	3-inch	76.2 mm
1,000	2-inch	50.8 mm	2-inch	50.8 mm	3-inch	76.2 mm

[1]Vent lines of 50 feet (15 240 mm), 100 feet (30 480 mm) and 200 feet (60 960 mm) of pipe, plus 7 ells.

TABLE 7902.2-A—STABLE LIQUIDS WITH OPERATING PRESSURE OF 2.5 PSIG (17.2 kPa) OR LESS (See Section 7902.2.2.2)

TYPE OF TANK	REQUIRED PROTECTION	MINIMUM DISTANCE IN FEET FROM PROPERTY LINE OF PROPERTY WHICH IS OR CAN BE BUILT UPON, INCLUDING THE OPPOSITE SIDE OF A PUBLIC WAY, AND SHALL NOT BE LESS THAN 5 FEET (1524 mm)	MINIMUM DISTANCE IN FEET FROM NEAREST SIDE OF ANY PUBLIC WAY OR FROM NEAREST IMPORTANT BUILDING ON THE SAME PROPERTY, AND SHALL NOT BE LESS THAN 5 FEET (1524 mm)
Floating roof (See Section 7901.2.2)	Protection for exposures[1]	1/2 times diameter of tank	1/6 times diameter of tank
	None	Diameter of tank but need not exceed 175 feet (53 340 mm)	1/6 times diameter of tank
Vertical with weak roof-to-shell seam (See Sections 7902.2.2.2 and 7902.2.6.2)	Approved foam or inerting system on tanks not exceeding 150 feet (45 720 mm) in diameter[2]	1/2 times diameter of tank	1/6 times diameter of tank
	Protection for exposures[1]	Diameter of tank	1/3 times diameter of tank
	None	2 times diameter of tank but need not exceed 350 feet (106.7 mm)	1/3 times diameter of tank
Horizontal and vertical with emergency relief venting to limit pressures to 2.5 psig (17.2 kPa)	Approved inerting system on the tank or approved foam system on vertical tanks	1/2 times Table 7902.2-F	1/2 times Table 7902.2-F
	Protection for exposures[1]	Table 7902.2-F	Table 7902.2-F
	None	2 times Table 7902.2-F	Table 7902.2-F

[1]Protection for exposure is protection by a public fire department or private fire brigade capable of providing cooling water streams on structures on property adjacent to liquid storage.

[2]For tanks over 150 feet (45 720 mm) in diameter, use "Protection for exposures" or "None," as applicable.

TABLE 7902.2-B—STABLE LIQUIDS WITH OPERATING PRESSURE GREATER THAN 2.5 PSIG (17.2 kPa) (See Section 7902.2.2.3)

TYPE OF TANK	REQUIRED PROTECTION	MINIMUM DISTANCE IN FEET FROM PROPERTY LINE OF PROPERTY WHICH IS OR CAN BE BUILT UPON, INCLUDING THE OPPOSITE SIDE OF A PUBLIC WAY	MINIMUM DISTANCE IN FEET FROM NEAREST SIDE OF ANY PUBLIC WAY OR FROM NEAREST IMPORTANT BUILDING ON THE SAME PROPERTY
Any type	Protection for exposures[1]	1 1/2 times Table 7902.2-F but shall not be less than 25 feet (7620 mm)	1 1/2 times Table 7902.2-F but shall not be less than 25 feet (7620 mm)
	None	3 times Table 7902.2-F but shall not be less than 50 feet (15 240 mm)	1 1/2 times Table 7902.2-F but shall not be less than 25 feet (7620 mm)

[1]Protection for exposure is protection by a public fire department or private fire brigade capable of providing cooling water streams on structures on property adjacent to liquid storage.

TABLE 7902.2-C—BOILOVER LIQUIDS (See Section 7902.2.2.4)

TYPE OF TANK	REQUIRED PROTECTION	MINIMUM DISTANCE IN FEET FROM PROPERTY LINE OF PROPERTY WHICH IS OR CAN BE BUILT UPON, INCLUDING THE OPPOSITE SIDE OF A PUBLIC WAY AND SHALL NOT BE LESS THAN 5 FEET (1524 mm)	MINIMUM DISTANCE IN FEET FROM NEAREST SIDE OF ANY PUBLIC WAY OR FROM NEAREST IMPORTANT BUILDING ON THE SAME PROPERTY AND SHALL NOT BE LESS THAN 5 FEET (1524 mm)
Floating roof (See Section 7901.2.2)	Protection for exposures[1]	1/2 times diameter of tank	1/6 times diameter of tank
	None	Diameter of tank	1/6 times diameter of tank
Fixed roof	Approved foam or inerting system[2]	Diameter of tank	1/3 times diameter of tank
	Protection for exposures[1]	2 times diameter of tank	2/3 times diameter of tank
	None	4 times diameter of tank but need not exceed 350 feet (106.7 m)	2/3 times diameter of tank

[1]Protection for exposure is protection by a public fire department or private fire brigade capable of providing cooling water streams on structures on property adjacent to liquid storage.

[2]See Section 7902.2.5.

TABLE 7902.2-D—UNSTABLE LIQUIDS
(See Section 7902.2.2.5)

TYPE OF TANK	REQUIRED PROTECTION	MINIMUM DISTANCE IN FEET FROM PROPERTY LINE OF PROPERTY WHICH IS OR CAN BE BUILT UPON, INCLUDING THE OPPOSITE SIDE OF A PUBLIC WAY	MINIMUM DISTANCE IN FEET FROM NEAREST SIDE OF ANY PUBLIC WAY OR FROM NEAREST IMPORTANT BUILDING ON THE SAME PROPERTY
Horizontal and vertical tanks with emergency relief venting to permit pressure not in excess of 2.5 psig (17.2 kPa)	Tank protected with any one of the following: approved water spray, approved inerting, approved insulation and refrigeration, approved barricade	Table 7902.2-F but not less than 25 feet (7620 mm)	25 feet (7620 mm)
	Protection for exposures[1]	$2^1/_2$ times Table 7902.2-F but not less than 50 feet (15 240 mm)	50 feet (15 240 mm)
	None	5 times Table 7902.2-F but not less than 100 feet (30 480 mm)	100 feet (30 480 mm)
Horizontal and vertical tanks with emergency relief venting to permit pressure over 2.5 psig (17.2 kPa)	Tank protected with any one of the following: approved water spray, approved inerting, approved insulation and refrigeration, approved barricade	2 times Table 7902.2-F but not less than 50 feet (15 240 mm)	50 feet (15 240 mm)
	Protection for exposures[1]	4 times Table 7902.2-F but not less than 100 feet (30 480 mm)	100 feet (30 480 mm)
	None	8 times Table 7902.2-F but not less than 150 feet (45 720 mm)	150 feet (45 720 mm)

[1]Protection for exposure is protection by a public fire department or private fire brigade capable of providing cooling water streams on structures on property adjacent to liquid storage.

TABLE 7902.2-E—CLASS III-B LIQUIDS
(See Section 7902.2.2.6)

TANK CAPACITY (gallons)	MINIMUM DISTANCE FROM PROPERTY LINE OF PROPERTY WHICH IS OR CAN BE BUILT UPON, 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)
× 3.785 for L	× 304.8 for mm	
12,000 or less	5	5
12,001 to 30,000	10	5
30,001 to 50,000	10	10
50,001 to 100,000	15	10
100,001 or more	15	15

TABLE 7902.2-F—REFERENCE TABLE FOR USE IN TABLES 7902.2-A, 7902.2-B AND 7902.2-D

TANK CAPACITY (gallons)	MINIMUM DISTANCE FROM PROPERTY LINE OF PROPERTY WHICH IS OR CAN BE BUILT UPON, 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)
× 3.785 for L	× 304.8 for mm	
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

TABLE 7902.2-G—MINIMUM SEPARATION (SHELL-TO-SHELL) OF TANKS CONTAINING STABLE LIQUIDS[1,2] (See Section 7902.2.3.1)

TANK DIAMETER (feet)	MINIMUM SEPARATION		
		Fixed Roof Tanks	
× 304.8 for mm	Floating Roof Tanks	Class I or II Liquids	Class III Liquids
Not over 150	1/6 sum of adjacent tank diameters but not less than 3 feet (914.4 mm)	1/6 sum of adjacent tank diameters but not less than 3 feet (914.4 mm)	1/6 sum of adjacent tank diameters but not less than 3 feet (914.4 mm)
More than 150			
If remote impounding is in accordance with Section 7902.2.8.2	1/6 sum of adjacent tank diameters	1/4 sum of adjacent tank diameters	1/6 sum of adjacent tank diameters
If impounding is within dikes around tanks in accordance with Section 7902.2.8.3	1/4 sum of adjacent tank diameters	1/3 sum of adjacent tank diameters	1/4 sum of adjacent tank diameters

[1]Crude petroleum tanks having individual capacities not exceeding 126,000 gallons (3,000 barrels) (476 910 L), when located at production facilities in isolated locations, need not be separated by more than 3 feet (914.4 mm).

[2]Tanks used for storing Class III-B liquids are allowed to be spaced 3 feet (914.4 mm) apart unless within a diked area or drainage path for a tank storing Class I or II liquid.

TABLE 7902.2-H—WETTED AREA VERSUS VENT CAPACITY[1] (14.7 psia and 60°F.) (101.3 kPa and 15.6°C.) (See Sections 7902.2.6.3.1 and 7902.2.6.3.2)

WETTED AREA (SQ. FT.)	VENT CAPACITY (CFH)	WETTED AREA (SQ. FT.)	VENT CAPACITY (CFH)	WETTED AREA (SQ. FT.)	VENT CAPACITY (CFH)
× 0.0929 for m^2	× 0.0283 for m^3/hr.	× 0.0929 for m^2	× 0.0283 for m^3/hr.	× 0.0929 for m^2	× 0.0283 for m^3/hr.
20	21,100	200	211,000	1,000	524,000
30	31,600	250	239,000	1,200	557,000
40	42,100	300	265,000	1,400	587,000
50	52,700	350	288,000	1,600	614,000
60	63,200	400	312,000	1,800	639,000
70	73,700	500	354,000	2,000	662,000
80	84,200	600	392,000	2,400	704,000
90	94,800	700	428,000	2,800	742,000
100	105,000	800	462,000	and over	
120	126,000	900	493,000		
140	147,000				
160	168,000				
180	190,000				

[1]Interpolate for intermediate values.

TABLE 7902.2-I—WETTED AREA OVER 2,800 SQ. FT. (260.1 m^2) AND PRESSURES OVER 1 PSIG (6.89 kPa) (See Section 7902.2.6.3.2)

WETTED AREA (SQ. FT.)	VENT CAPACITY (CFH)	WETTED AREA (SQ. FT.)	VENT CAPACITY (CFH)
× 0.0929 for m^2	× 0.0283 for m^3/hr.	× 0.0929 for m^2	× 0.0283 for m^3/hr.
2,800	742,000	9,000	1,930,000
3,000	786,000	10,000	2,110,000
3,500	892,000	15,000	2,940,000
4,000	995,000	20,000	3,720,000
4,500	1,100,000	25,000	4,470,000
5,000	1,250,000	30,000	5,190,000
6,000	1,390,000	35,000	5,900,000
7,000	1,570,000	40,000	6,570,000
8,000	1,760,000		

TABLE 7902.3-A—OUTDOOR LIQUID STORAGE IN CONTAINERS AND PORTABLE TANKS
(See Sections 7902.3.3.1 and 7902.3.3.2)

CLASS OF LIQUID	CONTAINER STORAGE—MAXIMUM PER PILE		PORTABLE TANK STORAGE—MAXIMUM PER PILE		MINIMUM DISTANCE BETWEEN PILES OR RACKS (feet)	MINIMUM DISTANCE TO PROPERTY LINE OF PROPERTY THAT CAN BE BUILT UPON[3, 4] (feet)	MINIMUM DISTANCE TO STREET, ALLEY OR A PUBLIC WAY[4] (feet)
	Quantity[1, 2] (gallons)	Height (feet)	Quantity[1, 2] (gallons)	Height (feet)			
	× 3.785 for L	× 304.8 for mm	× 3.785 for L	× 304.8 for mm			
I-A	1,100	10	2,200	7	5	50	10
I-B	2,200	12	4,400	14	5	50	10
I-C	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

[1]For mixed class storage, see Section 7902.3.3.1.

[2]For storage in racks, the quantity limits per pile do not apply, but the rack arrangement shall be limited to a maximum of 50 feet (15 240 mm) in length and two rows or 9 feet (30 480 mm) in depth.

[3]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.

[4]When 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 (914.4 mm).

TABLE 7902.5-A—EXEMPT AMOUNTS OF FLAMMABLE AND COMBUSTIBLE LIQUIDS—MAXIMUM QUANTITIES STORED PER CONTROL AREA[1,2,3]
(See Section 7902.5.7)

TYPE OF LIQUID	EXEMPT AMOUNT (gallons) × 3.785 for L
Flammable	
Class I-A	30
Class I-B	60
Class I-C	90
Combination I-A, I-B, I-C	120[4]
Combustible	
Class II	120
Class III-A	330
Class III-B	13,200[5]

[1]Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation. The number of control areas within a building used for retail or wholesale sales shall not exceed two. The number of control areas in buildings with other uses shall not exceed four. See Sections 204 and 8001.8.2.

[2]Quantities are allowed to be increased 100 percent when stored in approved storage cabinets. When Footnote 3 applies, the increase for each footnote is allowed.

[3]Quantities are allowed to be increased 100 percent in buildings equipped with an approved automatic sprinkler system. When Footnote 2 applies, the increase for each footnote is allowed.

[4]Combinations shall not contain more than the exempt amounts of any individual class.

[5]Quantities permitted in a building equipped with an approved automatic sprinkler system are not limited.

TABLE 7902.5-B—EXEMPT AMOUNTS OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN WHOLESALE AND RETAIL SALES USES—MAXIMUM QUANTITIES STORED PER CONTROL AREA[1]
(See Section 7902.5.7.1)

TYPE OF LIQUID	EXEMPT AMOUNTS (gallons) × 3.785 for L		
	Sprinklered[2] per Footnote Densities and Arrangements	Sprinklered per Tables 7902.5-F through 7902.5-J	Unsprinklered
Flammable: Class I-A	60	60	30
Flammable and combustible: Combination Class I-B, I-C, II and III-A	7,500[3]	15,000[3]	1,600
Combustible: Class III-B	Unlimited	Unlimited	13,200

[1]Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation. The number of control areas within a building used for retail or wholesale sales shall not exceed two. The number of control areas in buildings with other uses shall not exceed four. See Sections 204 and 8001.8.2.

[2]To be considered as sprinklered, buildings shall be protected with approved automatic sprinkler systems with designs providing minimum densities as follows:

For uncartoned commodities on shelves 6 feet (1828.8 mm) or less in height where the ceiling height does not exceed 18 feet (5486 mm), quantities are those permitted with a minimum sprinkler design density of 0.19 gpm per square foot [7.74 for L/(min•m^2)] over the most remote 1,500-square-foot (139.3 m^2) area.

For cartoned, palletized or racked commodities where storage is 4 feet 6 inches (1372 mm) or less in height and where the ceiling height does not exceed 18 feet (5486 mm), quantities are those permitted with a minimum sprinkler design density of 0.21 gpm per square foot [8.56 L/(min•m^2)] over the most remote 1,500-square-foot (139.3 m^2) area.

[3]When wholesale and retail sales or storage areas exceed 50,000 square feet (4645 m^2) in area, exempt amounts are allowed to be increased by 2 percent for each 1,000 square feet (92.9 m^2) of area in excess of 50,000 square feet (4645 m^2), up to a maximum of 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 (113 562 L).

TABLE 7902.5-C—MAXIMUM STORAGE HEIGHT IN CONTROL AREA
(See Sections 7902.5.10.1 and 7902.5.10.2.4)

TYPE OF LIQUID	UNSPRINKLERED AREA (feet)	SPRINKLERED AREA (feet)	SPRINKLERED[1] WITH IN-RACK PROTECTION (feet)
	× 304.8 for mm		
Flammable liquids:			
Class I-A	4	4	4
Class I-B	4	8	12
Class I-C	4	8	12
Combustible liquids:			
Class II	6	8	12
Class III-A	8	12	16
Class III-B	8	12	20

[1]In-rack protection shall be in accordance with Table 7902.5-H, 7902.5-I or 7902.5-J.

TABLE 7902.5-D—STORAGE ARRANGEMENTS FOR PALLETIZED OR SOLID-PILE STORAGE IN LIQUID STORAGE ROOMS AND WAREHOUSES
(See Sections 7902.5.10.2.4, 7902.5.11.2.1, 7902.5.11.2.2 and 7902.5.12.2.1)

CLASS	STORAGE LEVEL	MAXIMUM STORAGE HEIGHT			MAXIMUM QUANTITY PER PILE (gallons)		MAXIMUM QUANTITY PER ROOM[1] (gallons)	
					× 3.785 for L			
		Drums	Containers[2] (feet)	Portable Tanks (feet)	Containers	Portable Tanks	Containers	Portable Tanks
			× 304.8 for mm					
I-A	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
I-B	Ground floor	1	$6^1/_2$	7	5,000	20,000	15,000	40,000
	Upper floors	1	$6^1/_2$	7	3,000	10,000	12,000	20,000
	Basements	0	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed	Not allowed
I-C	Ground floor	1	$6^1/_2$[3]	7	5,000	20,000	15,000	40,000
	Upper floors	1	$6^1/_2$[3]	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	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

[1]See Section 7902.5.12.2.1 for unlimited quantities in liquid storage warehouses.

[2]Storage heights are allowed to be increased for Class I-B, I-C, II and III liquids in metal containers of 5-gallon (18.9 L) or less capacity when an automatic AFFF-water protection system is provided in accordance with Table 7902.5-G.

[3]These height limitations are allowed to be increased to 10 feet (3048 mm) for containers having a capacity of 5 gallons (18.9 L) or less.

TABLE 7902.5-E—STORAGE ARRANGEMENTS FOR RACK STORAGE IN LIQUID STORAGE ROOMS AND WAREHOUSES
(See Sections 7902.5.10.2.4, 7902.5.11.2.1, 7902.5.11.2.2 and 7902.5.12.2.1)

CLASS	TYPE RACK	STORAGE LEVEL	MAXIMUM STORAGE HEIGHT (feet) × 304.8 for mm Containers	MAXIMUM QUANTITY PER ROOM (gallons) × 3.785 for L Containers
I-A	Double row or Single row	Ground floor Upper floors Basements	25 15 Not allowed	7,500 4,500 Not allowed
I-B I-C	Double row or Single row	Ground floor Upper floors Basements	25 15 Not allowed	15,000 9,000 Not allowed
II	Double row or Single row	Ground floor Upper floors Basements	25 25 15	24,000 24,000 9,000
III	Multirow, Double row or Single row	Ground floor Upper floors Basements	40 20 20	48,000 48,000 24,000

TABLE 7902.5-F—AUTOMATIC SPRINKLER PROTECTION FOR SOLID-PILE AND PALLETIZED STORAGE OF LIQUIDS IN CONTAINERS AND PORTABLE TANKS[1]
(See Sections 7902.5.10.2.4, 7902.5.11.5.1 and 7902.5.12.5.1)

STORAGE CONDITIONS		CEILING SPRINKLER DESIGN AND DEMAND					
		Density gpm/sq. ft.	Area (sq. ft.) × 0.0929 for m^2		Maximum Spacing (sq. ft.)	MINIMUM HOSE STREAM DEMAND (gpm)	
Class Liquid	Container Size and Arrangement	× 40.75 for L/min./m^2	High Temp. Sprinklers	Ordinary Temp. Sprinklers	× 0.0929 for m^2	× 3.785 for L/min.	MINIMUM DURATION SPRINKLERS AND HOSE STREAMS (hrs.)
I-A	5 gal. (18.9 L) or less, with or without cartons, palletized or solid pile[2]	0.30	3,000	5,000	100	750	2
	Containers greater than 5 gal. (18.9 L), on end or side, palletized or solid pile	0.60	5,000	8,000	80	750	
I-B, I-C and II	5 gal. (18.9 L) or less, with or without cartons, palletized or solid pile[2]	0.30	3,000	5,000	100	500	2
	Containers greater than 5 gal. (18.9 L) on pallets or solid pile, one high	0.25	5,000	8,000	100		
II	Containers greater than 5 gal. (18.9 L) on pallets or solid pile, more than one high on end or side	0.60	5,000	8,000	80	750	2
I-B, I-C, 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 gal. (18.9 L) or less, with or without cartons, palletized or solid pile	0.25	3,000	5,000	120	500	1
	Containers greater than 5 gal. (18.9 L) on pallets or solid pile, on end or sides, up to three high	0.25	3,000	5,000	120	500	1
III	Containers greater than 5 gal. (18.9 L), on pallets or solid pile, on end or sides, up to 18 feet (5486 mm) 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

[1]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.

[2]For storage heights above 4 feet (1219 mm) or ceiling heights greater than 18 feet (5486 mm), an approved engineering design shall be provided. See Section 103.1.1.

TABLE 7902.5-G—AUTOMATIC AFFF-WATER PROTECTION REQUIREMENTS FOR SOLID PILE AND PALLETIZED STORAGE OF LIQUIDS IN METAL CONTAINERS OF 5-GALLON (18.9 L) CAPACITY OR LESS[1,2]

(See Sections 7902.5.11.5.1 and 7902.5.12.5.1)

PACKAGE TYPE	CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND					STORAGE HEIGHT (feet)	HOSE DEMAND (gpm)[3]	DURATION AFFF SUPPLY (min.)	DURATION WATER SUPPLY (hours)
		Density gpm/sq. ft.	Area (sq. ft.)			Orifice Size (inch)				
		× 40.75 for L/(min•m²)	× 0.0929 for m²	Temperature Rating	Maximum Spacing	× 25.4 for mm	× 304.8 for mm	× 3.785 for L/min.		
Cartoned	I-B, I-C, II and III	0.40	2,000	286°F. (141°C.)	100 sq. ft./hd. (9.29 m²/hd.)	$^{17}/_{32}$	11	500	15	2
Uncartoned	I-B, I-C, II and III	0.30	2,000	286°F. (141°C.)	100 sq. ft./hd. (9.29 m²/hd.)	$^{1}/_{2}$ or $^{17}/_{32}$	12	500	15	2

[1]System shall be a closed-head wet system with approved devices for proportioning aqueous film-forming foam.

[2]Maximum ceiling height of 30 feet (9144 mm).

[3]Hose stream demand includes $1^{1}/_{2}$-inch (38.1 mm) inside hand hose, when required.

TABLE 7902.5-H—AUTOMATIC SPRINKLER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN CONTAINERS OF 5-GALLON (18.9 L) CAPACITY OR LESS WITH OR WITHOUT CARTONS ON CONVENTIONAL WOOD PALLETS[1]
(See Sections 7902.5.10.2.4, 7902.5.11.5.1 and 7902.5.12.5.1)

	CEILING SPRINKLER DESIGN AND DEMAND			IN-RACK SPRINKLER ARRANGEMENT AND DEMAND					MIN. HOSE STREAM DEMAND (gpm)	MIN. DURATION SPRINKLER AND HOSE STREAM (hrs.)
	Density gpm/ sq.ft.	Area (sq. ft.) × 0.0929 for m^2								
CLASS LIQUID	× 40.75 for L/(min•m^2)	High Temp. Sprinklers	Ord. Temp. Sprinklers	Max. Spacing	Racks up to 9 ft. (2744 mm) deep	Racks over 9 ft. (2744 mm) to 12 ft. (3658 mm) deep	Min. Nozzle Pressure	Number of Sprinklers Operating	× 3.785 for L/min.	
I [max. 25 ft. (7620 mm) height] Option 1	0.40	3,000	5,000	80 sq. ft./hd. (7.4 m^2/hd.)	1. Ord. temp., quick-response sprinklers, maximum 8 feet 3 inches (2515 mm) horizontal spacing 2. One line sprinklers above each level of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multilevel	1. Ord. temp., quick-response sprinklers, maximum 8 feet 3 inches (2515 mm) horizontal spacing 2. One line sprinklers above each level of storage 3. Locate in transverse flue spaces, staggered vertical and within 20 in. (508 mm) of aisle 4. Shields required where multilevel	30 psi (206.8 kPa) [$^1/_2$-inch (13.5 mm) 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 3 levels, if 3 or more levels 4. Hydraulically most remote	750	2
I [max. 25 ft. (7620 mm) height] Option 2	0.55	2,000[2]	N/A	100 sq. ft./hd. (9.29 m^2/hd.)	1. Ord. temp., quick-response sprinklers, maximum 8 feet 3 inches (2515 mm) horizontal spacing 2. See 2 above 3. See 3 above 4. See 4 above	1. Ord. temp, quick-response sprinklers, maximum 8 feet 3 inches (2515 mm) horizontal spacing 2. See 2 above 3. See 3 above 4. See 4 above	14 psi (96.5 kPa) [$^{17}/_{32}$-inch (13.5 mm) orifice]	See 1 through 4 above	500	2

(Continued)

TABLE 7902.5-H—AUTOMATIC SPRINKLER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN CONTAINERS OF 5-GALLON (18.9 L) CAPACITY OR LESS WITH OR WITHOUT CARTONS ON CONVENTIONAL WOOD PALLETS[1]—(Continued)
(See Sections 7902.5.10.2.4, 7902.5.11.5.1 and 7902.5.12.5.1)

I and II [max. 14-ft. (4267 mm) storage ht.] (max. three tiers)	0.55[3]	2,000[2,4]	N/A	100 sq. ft./hd. (9.29 m^2/hd.)	N/A None for max. 6 ft. (1829 mm) deep racks	N/A	N/A	N/A	500	2
II [max. 25 ft. (7620 mm) height]	0.30	3,000	5,000	100 sq. ft./hd. (9.29 m^2/hd.)	1. Ord. temp. sprinklers 8 feet (2438 mm) apart horizontally 2. One line sprinklers between levels at nearest 10-foot (3048 mm) vertical intervals 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multilevel	1. Ord. temp. sprinklers 8 feet (2438 mm) apart horizontally 2. Two lines between levels at nearest 10 foot (3048 mm) vertical intervals 3. Locate in transverse flue spaces, staggered vertical and within 20 inches (508 mm) of aisle 4. Shields required where multilevel	30 psi (206.8 kPa)	1. Hydraulically most remote—6 sprinklers at each level, up to max. of three levels	750	2
III [40 ft. (12 192 mm) height]	0.25	3,000	5,000	120 sq. ft./hd. (11.15 m^2/hd.)	Same as for Class II liquids	Same as for Class II liquids	30 psi (206.8 kPa)	Same as for Class II liquids	500	2

[1]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.

[2]Using listed or approved extra-large orifices (K = 11.0-11.5), pendent style, 286°F. (141°C.), quick-response or standard-link sprinklers under a maximum 30-foot (19 144 mm) ceiling with minimum $7^1/_2$-foot (2286 mm) aisles.

[3]For friction lid cans or metal containers equipped with plastic nozzles or caps, the density shall be increased to 0.65 gpm/sq. ft. [26.5 L/(min•m^2)] using listed or approved extra-large orifice (K = 11.0-11.5), pendent style, 286°F. (141°C.), quick-response sprinklers.

[4]Using listed or approved extra-large orifice (K = 11.0-11.5), pendent style, 286°F. (141°C.), quick-response or standard-link sprinklers under a maximum 18-foot (15 486 mm) ceiling with minimum $7^1/_2$-foot (2286 mm) aisles and metal containers.

TABLE 7902.5-I—AUTOMATIC SPRINKLER PROTECTION FOR RACK STORAGE OF LIQUIDS IN CONTAINERS GREATER THAN 5-GALLON (18.9 L) CAPACITY[1]
(See Sections 7902.5.10.2.4, 7902.5.11.5.1 and 7902.5.12.5.1)

	CEILING SPRINKLER DESIGN AND DEMAND			IN-RACK SPRINKLER ARRANGEMENT AND DEMAND						
	Density (gpm/sq.ft.)	Area (sq. ft.) × 0.0929 for m^2							MIN. HOSE STREAM DEMAND (gpm)	MIN. DURATION SPRINKLER AND HOSE STREAM (hrs.)
CLASS LIQUID	× 40.75 for L/(min•m^2)	High Temp. Sprinklers	Ord. Temp. Sprinklers	Max. Spacing	On-side Storage Racks up to 9-foot (2744 mm) Deep Racks	On-end Storage (on pallets) up to 9 foot (2744 mm) Deep Racks	Min. Nozzle Pressure	Number of Sprinklers Operating	× 3.785 for L/min.	
I-A [max. 25 ft. (7620 mm) height]	0.60	3,000	5,000	80 sq. ft./hd. (7.4 m^2/hd.)	1. Ord. temp. sprinklers 8 feet (2438 mm) apart horizontally 2. One line sprinklers above each tier of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multilevel	1. Ord. temp. sprinklers 8 feet (2438 mm) apart horizontally 2. One line sprinklers above each tier of storage 3. Locate in longitudinal flue space, staggered vertical 4. Shields required where multilevel	30 psi (206.8 kPa)	1. Hydraulically most remote—6 sprinklers at each level	1,000	2
I-B, I-C and II [max. 25 ft. (7620 mm) height]	0.60	3,000	5,000	100 sq. ft./hd. (9.29 m^2/hd.)	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 (206.8 kPa)	1. See 1 above	750	2
III [max. 40 ft. (12 192 mm) height]	0.25	3,000	5,000	120 sq. ft./hd. (11.15 m^2/hd.)	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 (103.4 kPa)	1. See 1 above	500	1

[1]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 7902.5-J—AUTOMATIC AFFF-WATER PROTECTION REQUIREMENTS FOR RACK STORAGE OF LIQUIDS IN CONTAINERS[1,2] (See Sections 7902.5.10.2.4, 7902.5.11.5.1 and 7902.5.12.5.1)

CLASS LIQUID	CEILING SPRINKLER DESIGN AND DEMAND			IN-RACK SPRINKLER ARRANGEMENT AND DEMAND[3]				DURATION AFFF SUPPLY (min.)	DURATION WATER SUPPLY (hrs.)
	Density (gpm/sq. ft.)	Area (sq. ft.)		On-end Storage of Drums on Pallets, up to 25 ft. (7620 mm)	Minimum Nozzle Pressure (psi)	Number of Sprinklers Operating	Hose Stream Demand[4] (gpm)		
	× 40.75 for L/(min•m²)	× 0.0929 for m²			× 6.895 for kPa		× 3.785 for L/min		
		High Temp. Sprinklers	Ord. Temp. Sprinklers						
I-A, I-B, I-C, II	0.30	1,500	2,500	1. Ord. temp. sprinkler up to 10 feet (3048 mm) apart horizontally 2. One line sprinklers above each level of storage 3. Locate in longitudinal flue space, staggered vertically 4. Shields required for multilevel	30	Three sprinklers per level	500	15	2

[1]System shall be a closed-head wet system with approved devices for proportioning aqueous film-forming foam.

[2]Except as modified herein, in-rack sprinklers shall be installed in accordance with U.F.C. Standard 81-2.

[3]The height of storage shall not exceed 25 feet (7620 mm).

[4]Hose stream demand includes $1^1/_2$-inch (38.1 mm) inside hand hose, when required.

SECTION 7903 — DISPENSING, USE, MIXING AND HANDLING

7903.1 General.

7903.1.1 Applicability. Dispensing, use, mixing and handling of flammable and combustible liquids shall be in accordance with Sections 7901 and 7903. See Section 7904 for tank vehicle and tank car loading and unloading and other special operations.

EXCEPTION: Containers of organic coatings having no fire point when tested in accordance with U.F.C. Standard 2-6 when opened for pigmentation need not comply with Section 7903.

7903.1.2 Sale of Class I or II liquids for domestic cleaning. Class I and II liquids with a flash point of 110°F. (43.3°C.) or less shall not be sold or offered for sale for the express purpose of domestic cleaning.

7903.1.3 Liquid transfer.

7903.1.3.1 General. Liquid transfer equipment and methods for transfer of Class I, II and III-A liquids shall be approved and in accordance with Section 7903.1.3.

7903.1.3.2 Pumps. Positive displacement pumps shall be provided with pressure relief discharging back to the tank, pump suction or other suitable location, or shall be provided with interlocks to prevent overpressure.

7903.1.3.3 Pressured systems. When gases are introduced to provide for liquid transfer by pressure, only inert gases shall be used, and controls, including pressure-relief devices, shall be provided to limit the pressure so that it cannot exceed the maximum working pressure of tanks, containers and piping systems. When 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.

7903.1.3.4 Piping, hoses and valves. Piping, hoses and valves used in liquid transfer operations shall be approved or listed for the intended use.

7903.1.3.5 Class I and II liquids. Class I and II liquids shall be transferred by one of the following methods:

EXCEPTION: Liquids in containers not exceeding 5.3-gallon (20 L) capacity.

1. From safety cans,
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 I-B, I-C, II or III liquids, from containers or tanks by gravity through an approved self- or automatic-closing valve when the container or tank and dispensing operations are provided with spill control and secondary containment (see Section 7901.8). Class I-A liquids shall not be dispensed by gravity from tanks, or
5. Engineered liquid transfer systems approved by the chief.

7903.1.4 Container-filling facilities for Class I liquids.

7903.1.4.1 Manual operations. Class I liquids shall not be run into containers unless the nozzle and containers are electrically interconnected. Acceptable methods of electrical interconnection include:

1. Metallic floor plates on which containers stand while filling, when such floor plates are electrically connected to the fill stem, or
2. Where the fill stem is bonded to the container during filling by means of a bond wire.

7903.1.4.2 Automatic operations. Container-filling operations for Class I liquids involving conveyor belts or other automatic-feeding operations shall be adequately designed to prevent static accumulations.

7903.2 Use, Dispensing and Mixing Inside of Buildings.

7903.2.1 General.

7903.2.1.1 Applicability. Indoor use, dispensing and mixing of flammable and combustible liquids shall be in accordance with Sections 7903.1 and 7903.2.

7903.2.1.2 Closure of mixing or blending vessels. Vessels used for mixing or blending of Class I liquids shall be provided with self-closing, tightfitting, noncombustible lids that will control a fire within such vessel.

EXCEPTION: Where such devices are impractical, automatic or manually controlled fire-extinguishing devices approved by the chief shall be provided.

7903.2.1.3 Bonding of vessels. Vessels shall be electrically connected by bond wires, piping or similar means where differences of potential could be created by the accumulation of static electricity charges.

7903.2.1.4 Heating, lighting and cooking appliances. Heating, lighting and cooking appliances which utilize Class I liquids shall not be operated within a building or structure.

EXCEPTION: Operation in single-family dwellings.

7903.2.1.5 Location of processing vessels. Processing vessels shall be located with respect to distances to lines of adjoining property which can be built on in accordance with Table 7903.2-A.

EXCEPTION: When the exterior wall facing the adjoining property line is a blank wall having a fire-resistance rating of not less than four hours, the chief is authorized to modify the distances. The distance shall not be less than that set forth in the Building Code, and when Class I-A or unstable liquids are involved, explosion control shall be provided in accordance with Section 8003.1.12.

7903.2.1.6 Quantity limits for use.

7903.2.1.6.1 Exempt amounts for control areas. Indoor use, dispensing and mixing of flammable and combustible liquids shall not exceed the exempt amounts set forth in Table 7903.2-B and shall not exceed the additional limitations set forth in Section 7903.2.1.6.2.

EXCEPTION: Cleaning with Class I, II or III-A liquids shall be in accordance with Section 7903.2.2.

See Article 51 for use of hazardous production material flammable and combustible liquids in Group H, Division 6 Occupancies.

7903.2.1.6.2 Occupancy quantity limits. The following limits for quantities of flammable or combustible liquids used, dispensed or mixed based on occupancy classification shall not be exceeded.

EXCEPTION: Cleaning with Class I, II or III-A liquids shall be in accordance with Section 7903.2.2.

1. **Group A Occupancies:**

Quantities in Group A Occupancies shall not exceed amounts necessary for maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7903.2-B.

Quantities in Group A Occupancies used as classrooms or laboratories shall not exceed amounts necessary for demonstration, treatment or laboratory work and shall not exceed quantities set forth in Table 7903.2-B.

2. **Group B Occupancies:**

Quantities in drinking, dining, office and school uses within Group B Occupancies shall not exceed amounts necessary for maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7903.2-B.

Quantities in offices, classrooms or laboratories within Group B Occupancies shall not exceed amounts necessary for demonstration, treatment or laboratory work and shall not exceed quantities set forth in Table 7903.2-B.

3. **Group E Occupancies:**

Quantities in Group E Occupancies shall not exceed amounts necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7903.2-B.

4. **Group F Occupancies:**

Quantities in dining, office and school uses within Group F Occupancies shall not exceed amounts necessary for maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7903.2-B.

Quantities in offices, classrooms or laboratories within Group F Occupancies shall not exceed amounts necessary for demonstration or laboratory work and shall not exceed quantities set forth in Table 7903.2-B.

5. **Group I Occupancies:**

Quantities in Group I Occupancies shall not exceed amounts necessary for demonstration, treatment, laboratory work, maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7903.2-B.

6. **Group M Occupancies:**

Quantities in dining, office and school uses within Group M Occupancies shall not exceed amounts necessary for maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7903.2-B.

Quantities in offices or classrooms within Group M Occupancies shall not exceed amounts necessary for demonstration or laboratory work and shall not exceed quantities set forth in Table 7903.2-B.

7. **Group R Occupancies:**

Quantities in Group R Occupancies shall not exceed amounts necessary for maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7903.2-B.

8. **Group S Occupancies:**

Quantities in dining and office uses within Group S Occupancies shall not exceed amounts necessary for maintenance purposes and operation of equipment and shall not exceed quantities set forth in Table 7903.2-B.

Quantities in offices within Group S Occupancies shall not exceed amounts necessary for demonstration or laboratory work and shall not exceed quantities set forth in Table 7903.2-B.

7903.2.1.6.3 Quantities exceeding limits for control areas. Quantities exceeding quantities allowed in control areas set forth in Sections 7903.2.1.6.1 and 7903.2.1.6.2 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 Building Code and Sections 7903.2.3.1 through 7903.2.3.4.

2. For closed systems, indoor use, dispensing and mixing of flammable and combustible liquids shall be within a room or building complying with the Building Code and Sections 7903.2.3.1 through 7903.2.3.3 and 7903.2.3.5.

7903.2.2 Cleaning with flammable and combustible liquids.

7903.2.2.1 General. Cleaning with Class I, II and III-A liquids shall be in accordance with Section 7903.2.2.

EXCEPTIONS: 1. For dry cleaning, see Article 36.

2. For spray nozzle cleaning, see Article 45.

7903.2.2.2 Cleaning operations. Class I-A liquids shall not be used for cleaning. Cleaning with Class I-B, I-C, II, or III-A liquids shall be conducted:

1. In a room or building complying with Section 7903.2.3,
2. In a machine listed and approved for the purpose as set forth in Section 7903.2.2.3, or
3. Using methods set forth in Section 7903.2.2.4.

7903.2.2.3 Listed and approved machines.

7903.2.2.3.1 General. Parts cleaning and degreasing conducted in listed and approved machines in accordance with Section 7903.2.2.2 shall be in accordance with Section 7903.2.2.3.

7903.2.2.3.2 Solvents. Solvents shall be classified and shall be compatible with the machines within which they are used.

7903.2.2.3.3 Machine capacities. The quantity of solvent used in a machine shall not exceed the design capacity of the machine.

7903.2.2.3.4 Quantity limits. Quantities shall be limited as follows:

1. Machines without remote solvent reservoirs shall be limited to quantities set forth in Section 7903.2.1.6.

2. Machines with remote solvent reservoirs using Class I liquids shall be limited to quantities set forth in Section 7903.2.1.6.

Machines with remote solvent reservoirs using Class II liquids shall be limited to 35 gallons (132.5 L) per machine. The total quantities shall not exceed an aggregate of 240 gallons (908.4 L) per control area in buildings not protected by an approved automatic sprinkler system and an aggregate of 480 gallons (1817 L) per control area in buildings protected by an approved automatic sprinkler system.

Machines with remote solvent reservoirs using Class III-A liquids shall be limited to 80 gallons (302.8 L) per machine.

7903.2.2.3.5 Immersion soaking of parts. Work areas of machines with remote solvent reservoirs shall not be used for immersion soaking of parts.

7903.2.2.3.6 Separation. Multiple machines shall be separated from each other by a distance of not less than 30 feet (9144 mm) or by a one-hour occupancy separation.

7903.2.2.3.7 Ventilation. Machines shall be located in areas adequately ventilated to prevent accumulation of vapors.

7903.2.2.3.8 Installation. Machines shall be installed in accordance with their listings.

7903.2.2.4 Cleaning operations conducted outside of listed and approved machines or designated rooms or buildings. The amount of Class I-B, I-C, II or III-A liquids in use outside of listed and approved machines or a room or building complying with Section 7903.2.3 shall not exceed that necessary to facilitate maintenance cleaning operations. Quantities in use shall not exceed 5 gallons (18.9 L) of Class I-B or I-C liquids or 25 gallons (94.6 L) of Class II or III-A liquids.

7903.2.3 Construction of rooms or buildings for use, dispensing and mixing of liquids in quantities exceeding exempt amounts.

7903.2.3.1 General. When required by Section 7903.2.1.6.3 or 7903.2.2.2, rooms or buildings used for use, dispensing and mixing of flammable and combustible liquids shall be in accordance with Section 7903.2.3.

7903.2.3.2 Construction, location and fire protection.

7903.2.3.2.1 General. Rooms or buildings which are classified in accordance with the Building Code as Group H, Division 2 or 3 Occupancies based on use, dispensing or mixing of flammable or combustible liquids shall be constructed in accordance with the Building Code.

7903.2.3.2.2 Basements. Rooms or buildings classified in accordance with the Building Code as Group H, Division 2 or 3 Occupancies based on use, dispensing or mixing of flammable or combustible liquids shall not be in basements.

7903.2.3.2.3 Fire protection. Rooms or buildings classified in accordance with the Building Code as Group H, Division 2 or 3 Occupancies shall be protected by an approved automatic fire-extinguishing system in accordance with the Building Code (see U.B.C. Standard 9-1). See also Section 1003.2.5.

7903.2.3.3 Doors. Interior doors to rooms or portions of such buildings shall be self-closing and fire resistive in accordance with the Building Code.

7903.2.3.4 Open systems.

7903.2.3.4.1 General. Use, dispensing and mixing of flammable and combustible liquids in open systems shall be in accordance with Section 7903.2.3.4.

7903.2.3.4.2 Ventilation. Continuous mechanical ventilation shall be provided at a rate of not less than 1 cubic foot per minute per square foot (5.1 L/s per 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 when needed to prevent the accumulation of hazardous vapors. For ventilation system design, see the Building and Mechanical Codes.

EXCEPTION: Where natural ventilation can be shown to be effective for the materials used, dispensed or mixed.

7903.2.3.4.3 Explosion control. Explosion control shall be provided for Class I liquids or where explosive vapor-air mixtures can develop under normal operating conditions. Explosion control shall be designed in accordance with the Building Code.

7903.2.3.4.4 Spill control, drainage control and secondary containment. Spill control shall be provided in accordance with Section 7901.8.2 when flammable or combustible liquids are dispensed into containers exceeding 1.1-gallon (4 L) capacity or mixed or used in open containers or systems exceeding 5.3-gallon (20 L) capacity. Spill control and secondary containment shall be provided in accordance with Section 7901.8 when 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).

7903.2.3.5 Closed systems.

7903.2.3.5.1 General. Use or mixing of flammable or combustible liquids in closed systems shall be in accordance with Section 7903.2.3.5.

7903.2.3.5.2 Ventilation. Closed systems designed to be opened as part of normal operations shall be provided with ventilation in accordance with Section 7903.2.3.4.2.

7903.2.3.5.3 Explosion control. Explosion control shall be provided when an explosive environment can occur as a result of the dispensing, mixing or use process. Explosion control shall be designed in accordance with the Building Code.

EXCEPTION: When process vessels are designed to fully contain the worst-case explosion anticipated within the vessel under process conditions considering the most likely failure.

7903.2.3.5.4 Spill control, drainage control and secondary containment. Spill control shall be provided in accordance with Section 7901.8.2 when flammable or combustible liquids are dispensed into or used or mixed in containers exceeding 55-gallon (208 L) capacity. Spill control and secondary containment shall be provided in accordance with Section 7901.8 when the aggregate capacity of multiple containers or tanks exceeds 1,000 gallons (3785 L).

7903.3 Use, Dispensing, Mixing and Handling Outside of Buildings.

7903.3.1 General. Outside dispensing operations shall be in accordance with Section 7903.3.

Dispensing of liquids into motor vehicle fuel tanks at motor vehicle fuel-dispensing stations shall be in accordance with Article 52.

7903.3.2 Spill control and drainage control. Outside dispensing areas shall be provided with spill control and drainage control as set forth in Section 7901.8.

7903.3.3 Location on property. Dispensing activities which exceed the amounts set forth in Table 7903.3-A shall not be conducted within 15 feet (4572 mm) of buildings or combustible materials or within 25 feet (7620 mm) of building openings, property lines, streets, alleys or public ways. Dispensing activities which exceed the amounts set forth in Table 7903.3-A 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 which are tested and labeled as two-hour protected tank assemblies in accordance with nationally recognized standards. See U.F.C. Standard A-II-F-1.

7903.3.4 Location of processing vessels. Processing vessels shall be located with respect to distances to lines of adjoining property which can be built on in accordance with Table 7903.2-A.

EXCEPTION: In refineries and distilleries.

TABLE 7903.2-A—SEPARATION OF PROCESSING VESSELS FROM PROPERTY LINES (See Sections 7903.2.1.5 and 7903.3.4)

PROCESSING VESSELS WITH EMERGENCY RELIEF VENTING TO ALLOW PRESSURE	LOCATION[1]	
× 6.895 for kPa	Stable Liquids	Unstable Liquids
Not in excess of 2.5 psig	Table 7902.2-F	$2^1/_2$ times Table 7902.2-F
Over 2.5 psig	$1^1/_2$ times Table 7902.2-F	4 times Table 7902.2-F

[1]Double distances where protection of exposure is not provided.

TABLE 7903.2-B—EXEMPT AMOUNTS FOR USE, DISPENSING AND MIXING OF FLAMMABLE AND COMBUSTIBLE LIQUIDS—MAXIMUM QUANTITIES PER CONTROL AREA[1,2] (See Section 7903.2.1.6)

CLASS OF LIQUID	QUANTITY (gallons) × 3.785 for L	
	Use—Closed[3, 4, 5]	Use—Open, Dispensing and Mixing[3,4,5]
Flammable		
Class I-A	30	10
Class I-B	60	15
Class I-C	90	20
Combination Class I-A, I-B and I-C	120[6]	30[6]
Combustible		
Class II	120	30
Class III-A	330	80
Class III-B	13,200[7]	3,300[7]

[1]Control areas shall be separated from each other by not less than a one-hour fire-resistive occupancy separation. The number of control areas within a building used for retail or wholesale sales shall not exceed two. The number of control areas in buildings with other uses shall not exceed four. See Sections 204 and 8001.8.2.

[2]Special conditions may be imposed by the chief regarding locations, types of containers, dispensing units, fire-control measures and other factors involving fire safety.

[3]Quantities are allowed to be increased 100 percent in buildings protected by an approved automatic sprinkler system.

[4]The use of Class I, II and III-A liquids for cleaning, including the allowance of increased quantities in listed and approved remote reservoir parts-cleaning machines, shall be in accordance with Section 7903.2.2.

[5]The amounts in use shall be considered as contributing to the exempt amounts for storage in accordance with Section 7902.5.7.

[6]Containing not more than the exempt amounts of each individual class.

[7]The quantities allowed in a sprinklered building are not limited.

TABLE 7903.3-A—EXEMPT AMOUNTS FOR DISPENSING OF FLAMMABLE AND COMBUSTIBLE LIQUIDS—MAXIMUM QUANTITIES ALLOWED IN OUTDOOR AREA PER SINGLE PROPERTY UNDER SAME OWNERSHIP OR CONTROL[1,2]
(See Section 7903.3.3)

CLASS OF LIQUID	QUANTITY (gallons) ×3.785 for L
Flammable	
Class I-A	10
Class I-B	15
Class I-C	20
Combination Class I-A, I-B and I-C	30[3]
Combustible	
Class II	30
Class III-A	80
Class III-B	3,300

[1]For definition of OUTDOOR AREA, see Section 7901.2.2.

[2]Special conditions may be imposed by the chief regarding locations, types of containers, dispensing units, fire-control measures and other factors involving fire safety.

[3]Containing not more than the exempt amounts of each individual class.

SECTION 7904 — SPECIAL OPERATIONS

7904.1 General. The following special operations shall be in accordance with Sections 7901, 7902 and 7903 except as provided in Section 7904.

1. Storage and dispensing of flammable and combustible liquids on farms and construction sites.
2. Well drilling and operating.
3. Bulk plants or terminals.
4. Loading and unloading of tank vehicles and tank cars.
5. Tank vehicles and tank vehicle operation.
6. Refineries.

7904.2 Storage and Dispensing of Flammable and Combustible Liquids on Farms and Construction Sites.

7904.2.1 General. 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 Section 7904.2.

EXCEPTION: Storage and use of fuel-oil and containers connected with oil-burning equipment regulated by Article 61 and the Mechanical Code.

7904.2.2 Combustibles and open flames near tanks. Storage areas shall be kept free of weeds and extraneous combustible material. Open flames and smoking are prohibited in flammable or combustible liquid storage areas.

7904.2.3 Marking of tanks and containers. Tanks and containers for the storage of liquids aboveground shall be conspicuously marked with the name of the product which they contain and FLAMMABLE—KEEP FIRE AND FLAME AWAY. Tanks shall bear the additional marking KEEP 50 FEET (15.2 METERS) FROM BUILDINGS.

7904.2.4 Containers for storage and use. Metal containers used for storage of Class I or II liquids shall be in accordance with DOT requirements or shall be of an approved design.

Discharge devices shall be of a type that does 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 and inside of buildings shall be in accordance with Section 7902 and the Building Code.

7904.2.5 Permanent and temporary tanks for storage and use.

7904.2.5.1 General. The capacity of permanent aboveground tanks containing Class I or II liquids shall not exceed 1,100 gallons (4163.9 L). The capacity of temporary aboveground tanks containing Class I or II liquids shall not exceed 10,000 gallons (37 854 L). Tanks shall be of single-compartment design, constructed in accordance with Section 7902.1.8.2.

7904.2.5.2 Fill opening security. Fill openings shall be equipped with a locking closure device. Fill openings shall be separate from vent openings.

7904.2.5.3 Vents. Each tank shall be provided with a free-opening vent of a size not less than specified in Table 7904.2-A to relieve vacuum or pressure which could develop in normal operation or from a fire exposure. Venting shall be in accordance with Section 7902.1.10.

Vents shall be arranged to discharge in a manner which prevents localized overheating or flame impingement on any part of the tank in the event vapors from such vents are ignited.

7904.2.5.4 Location.

7904.2.5.4.1 General. Tanks containing Class I or II liquids shall be kept outside of and at least 50 feet (15 240 mm) from buildings and combustible storage. Additional distance shall be provided when 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.

7904.2.5.4.2 Locations where aboveground tanks are prohibited. The storage of Class I and II liquids in aboveground tanks is prohibited within the limits established by law as the limits of districts in which such storage is prohibited. (See sample adoption ordinance, Section 4.)

7904.2.5.5 Type of tank.

7904.2.5.5.1 General. Tanks shall be provided with top openings only or shall be elevated for gravity discharge.

7904.2.5.5.2 Tanks with top openings only. Tanks with top openings only shall be mounted as follows:

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, or

2. For stationary tanks, on a stable base of timbers or blocks approximately 6 inches (152.4 mm) in height which prevents the tank from contacting the ground.

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.

7904.2.5.5.3 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 of adequate strength and designed to provide stability, and

2. Bottom or end openings for gravity discharge shall be equipped with a valve located adjacent to the tank shell which will close automatically in the event of fire through the operation of an effective heat-actuated releasing device. If this valve cannot be operated manually, it shall be supple-

mented 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.

7904.2.6 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 7901.8. Outdoor storage areas shall be provided with drainage control or diking as set forth in Section 7902.2.8.

7904.2.7 Portable fire extinguishers. Portable fire extinguishers with a minimum rating of 20-B:C shall be provided when required by the chief.

7904.2.8 Dispensing from tank vehicles.

7904.2.8.1 General. When approved by the chief, liquids used as fuels may be transferred from tank vehicles into the tanks of motor vehicles or special equipment, provided:

1. The tank vehicle's specific function is that of supplying fuel to motor vehicle fuel tanks,
2. The dispensing line does not exceed 50 feet (15 240 mm) in length,
3. The dispensing nozzle is an approved type,
4. The dispensing hose is properly placed on the approved reel or in a compartment provided before the tank vehicle is moved,
5. Signs prohibiting smoking or open flame within 25 feet (7620 mm) of a tank 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 the Electrical Code,
7. Vapor-recovery systems are provided in accordance with Section 5202.12,
8. Tank vehicle dispensing equipment is operated only by designated personnel who are trained to handle and dispense motor fuels, and
9. Provisions are made for controlling and mitigating unauthorized discharges.

7904.2.8.2 Location. Dispensing from tank vehicles shall be conducted at least 50 feet (15 240 mm) from structures or combustible storage.

7904.3 Well Drilling and Operating.

7904.3.1 General. Wells for oil and natural gas shall be drilled and operated in accordance with Section 7904.3.

7904.3.2 Location.

7904.3.2.1 Storage tanks and sources of ignition. Well heads shall not be located within 25 feet (7620 mm) of storage tanks or boilers, fired heaters, open-flame devices or other sources of ignition. Smoking is prohibited at wells or tank locations except as designated and in posted areas approved by the chief.

EXCEPTION: Engines used in the drilling, production and serving of wells.

7904.3.2.2 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.

7904.3.2.3 Buildings. Wells shall not be drilled within 100 feet (30 480 mm) of buildings not necessary to the operation of the well.

Wells shall not be drilled within 300 feet (91 440 mm) of buildings used as a place of assembly, institution or school.

When wells are existing, buildings shall not be constructed within the distances set forth in Section 7904.3 for separation of wells and buildings.

7904.3.3 Waste Control.

7904.3.3.1 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.

7904.3.3.2 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 of oil, waste oil, refuse or waste material.

EXCEPTION: Material within an oil sump or tank.

7904.3.3.3 Clearing around wells and tanks. Land within 25 feet (7620 mm) of wells, flammable or combustible liquid tanks, or other appurtenances to such wells shall be kept free of dry weeds, grass, rubbish or other combustible material at all times. When, in the opinion of the chief, the distance is not sufficient to provide reasonable fire safety, a greater distance may be required, not to exceed the height of a derrick or greatest dimension of a tank.

7904.3.4 Sumps.

7904.3.4.1 Maximum width. Sumps or other basins for the retention of oil or petroleum products shall not exceed 12 feet (3658 mm) in width.

7904.3.4.2 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.

7904.3.4.3 Security. Sumps, diversion ditches and depressions used as sumps shall be securely fenced or covered.

7904.3.5 Prevention of blowouts. Adequate protection shall be provided to control and prevent the blowout of a well. Protection equipment shall meet federal, state and other applicable jurisdiction requirements.

7904.3.6 Storage tanks. Storage of flammable or combustible liquids in tanks shall be in accordance with Section 7902. Each oil storage tank or group 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, name or number of lease and the telephone number where a responsible person can be reached at any time.

7904.3.7 Soundproofing. Where soundproofing material is required during field operations, such material shall be noncombustible.

EXCEPTION: Fire-retardant treated material may be used and maintained when approved by the chief.

7904.3.8 Signs. Well locations shall have posted in a conspicuous place an approved sign with the name of the owner or operator, name or number of the lease, and number of the well. Such signs shall be maintained on the premises from the time materials are delivered for drilling purposes until the well is abandoned.

7904.3.9 Field loading racks. Field loading racks shall be in accordance with Section 7904.5.

7904.4 Bulk Plants or Terminals.

7904.4.1 General. Portions of properties where flammable and combustible liquids are received by tank vessels, pipelines, tank cars or tank vehicles and are stored or blended in bulk for the purpose of distributing such liquids by tank vessels, pipelines, tank cars, tank vehicles or containers shall be in accordance with Section 7904.4.

7904.4.2 Buildings.

7904.4.2.1 Construction. Buildings shall be constructed in accordance with the Building Code.

7904.4.2.2 Exits. Rooms in which liquids are stored, used or transferred by pumps shall have exits arranged to prevent occupants from being trapped in the event of fire.

7904.4.2.3 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.

7904.4.3 Ventilation.

7904.4.3.1 General. 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. When 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 Mechanical Code.

7904.4.3.2 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.

7904.4.3.3 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.

7904.4.4 Storage. Storage of Class I, II and III-A liquids in bulk plants shall be in accordance with the applicable provisions of Article 79.

7904.4.5 Wharves.

7904.4.5.1 General. Wharves, including 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, shall be in accordance with Section 7904.4.5.

EXCEPTION: Marine motor vehicle fuel-dispensing stations. See Section 5202.11.

7904.4.5.2 Transferring times. Package cargo of liquids, including full and empty drums, bulk fuel and stores, shall only be transported over a wharf during cargo transfer at such times and places as agreed on by the wharf superintendent and the senior deck officer on duty.

7904.4.5.3 Transferring locations. Wharves at which liquid cargoes are to be transferred in bulk quantities to or from tank vessels shall be at least 100 feet (30 480 mm) from bridges over a navigable waterway, or from an entrance to or superstructure of vehicular or railroad tunnels under a waterway. The termination of fixed piping used for loading or unloading at a wharf shall be at least 200 feet (60 960 mm) from bridges or from entrances to or superstructures of tunnels.

7904.4.5.4 Cargo vessels and transfer equipment. Substructure and decking shall be substantially designed for the use intended. Decking shall be constructed of materials which will afford the desired combination of flexibility, resistance to shock, durability, strength and fire resistance. Heavy timber construction is acceptable.

Installation of tanks used exclusively for ballast water or Class II or III liquids on suitably designed wharves is allowed.

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 at not more than yearly intervals to determine that they function satisfactorily at the pressure at which they are set.

Pressure hoses and couplings shall be inspected at intervals appropriate to the service. With the hose extended, hose and couplings shall be tested using in-service maximum operating pressures. Hoses showing material deteriorations, signs of leakage, or weakness in its carcass or at the couplings shall be withdrawn from service and repaired or discarded.

7904.4.5.5 Piping, valves and fittings. Piping, valves and fittings shall be in accordance with Section 7901.11, except as follows:

1. Flexibility of piping shall be assured 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 strain above the elastic limit.

2. Pipe joints depending on the friction characteristics of combustible materials or 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. Swivel joints shall be designed such that the mechanical strength of the joint will not be impaired if the packing material were to fail.

4. 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.

5. In addition to the requirements of Item 4, each line conveying Class I and II liquids leading to a wharf shall be provided with a readily accessible block valve located 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.

6. Means of easy access shall be provided for cargo line valves located below the wharf deck.

7. Piping on wharves shall be adequately bonded and grounded if Class I and II liquids are transported. If excessive stray currents are encountered, insulating joints shall be installed. Bonding and grounding connections on all piping shall be located on the wharf side of hose riser insulating flanges, if used, and shall be accessible 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.

7904.4.5.6 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.

7904.4.5.7 Mechanical work. Mechanical work shall not be performed on the wharf during cargo transfer, except under special authorization by the chief based on a review of the area involved, methods to be employed and precautions necessary.

7904.4.6 Sources of ignition. Class I, II or III-A liquids shall not be used, drawn or dispensed where flammable vapors can reach a source of ignition. Smoking is prohibited except in designated locations. NO SMOKING signs shall be conspicuously posted where hazard from flammable vapors is normally present.

7904.4.7 Drainage control. Loading and unloading areas shall be provided with drainage control in accordance with Section 7901.8.

7904.4.8 Fire protection.

7904.4.8.1 General. Fire protection shall be in accordance with Articles 9 and 10 and Section 7904.4.8.

7904.4.8.2 Portable fire extinguishers. Suitable portable fire extinguishers with a rating of not less than 20-B shall be located within 75 feet (22 860 mm) of those portions of the facility where fires are likely to occur, such as hose connections, pumps and separator tanks.

7904.4.8.3 Fire hoses. Where piped water is available, ready-connected fire hose in a size appropriate for the water supply shall be provided so that manifolds where connections are made and broken can be reached by at least one hose stream.

7904.4.8.4 Obstruction of equipment. Material shall not be placed on wharves in such a manner which would obstruct access to firefighting equipment or important pipeline control valves.

7904.4.8.5 Fire apparatus access. Where the wharf is accessible to vehicle traffic, an unobstructed roadway to the shore end of the wharf shall be maintained for access of firefighting apparatus. See Section 902.

7904.4.9 Overfill protection of Class I liquids. Manual and automatic systems shall be provided to prevent overfill during the transfer of Class I liquids from mainline pipelines and marine vessels in accordance with nationally recognized standards. See Article 90, Standard a.3.19.

7904.5 Loading and Unloading of Tank Vehicles and Tank Cars.

7904.5.1 General.

7904.5.1.1 Applicability. Tank vehicle and tank car loading and unloading shall be in accordance with Section 7904.5.

7904.5.1.2 Fire protection. Fire protection shall be provided in accordance with Article 10. Approved portable fire extinguishers shall be provided in accordance with U.F.C. Standard 10-1. Extinguishers having a minimum rating of 40-B shall be provided at each loading rack. Suitable fire-control devices, such as small hose or portable fire extinguishers, shall be available to protect locations where fires are likely to occur. The chief is authorized to require additional fire-control equipment where an unusual exposure hazard exists. Such additional fire-control equipment shall be sufficient to extinguish a fire in the largest tank. The design and amount of such equipment shall be in accordance with approved engineering standards.

7904.5.1.3 Spill control and drainage control. Areas where tank vehicle and tank car loading racks are located shall be provided with spill control and drainage control as set forth in Section 7901.8.

7904.5.2 Tank vehicle loading racks.

7904.5.2.1 Construction. Loading racks shall be constructed of noncombustible materials.

7904.5.2.2 Location. Loading racks dispensing Class I, II or III-A liquids shall be separated from tanks, warehouses or other plant buildings, and the nearest property line of a property that can be built on by a clear distance of not less than 25 feet (7620 mm), measured from the nearest fill stem. Buildings for pumps or for shelter of loading personnel are allowed to be part of the loading rack.

7904.5.2.3 Static protection. Loading racks shall be equipped with protection to prevent the accumulation of static charges during truck-filling operations. Bonding facilities shall be provided during the loading of tank vehicles through open domes where Class I liquids are loaded, or where Class II and III liquids are loaded into vehicles which 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 or to some part of the rack structure in electrical contact with the fill stem. The fill stem 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 some metallic part in electrical contact with the cargo tank of the tank vehicle.

Protection shall consist of a flexible bond wire of adequate strength for the intended service and the electrical resistance shall not exceed 1 megohm.

Such bonding connection shall be fastened to the vehicle or tank before dome covers are raised and shall remain in place until filling is completed and all dome covers have been closed and secured.

EXCEPTIONS: 1. Where vehicles are loaded exclusively with products not having a static-accumulating tendency, such as asphalts, cutback asphalts, most crude oils, residual oils and water-soluble liquids.

2. When Class I liquids are not handled at the loading facility and the tank vehicles loaded are used exclusively for Class II and III liquids.

3. Where vehicles are loaded or unloaded through closed top or bottom connections whether the hose or pipe is conductive or nonconductive.

Filling through open domes into the tanks of tank vehicles 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 which extends to near the bottom of the tank.

7904.5.2.4 Drag chains. Drag chains or similar devices on tank vehicles shall not be used to meet the requirement of Section 7904.5.2.3 for static protection.

7904.5.2.5 Smoking. Approved signs which read NO SMOKING shall be maintained at entrance gates of bulk plants and near each loading rack.

7904.5.2.6 Security. Loading rack or properties on which a loading rack is located shall be surrounded by a fence not less than 5 feet (1524 mm) in height, constructed of wire mesh, solid metal sheathing or masonry. Tank vehicles shall not be loaded or unloaded unless such vehicles are entirely within the fenced area. Tank vehicles shall not be backed into or from the premises of a bulk plant.

EXCEPTION: Existing installations where adequate public safety exists due to isolation, natural barriers or other factors as determined by the chief.

7904.5.2.7 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 vehicle is full. Self-closing valves shall not be tied or locked in the open position.

When top loading a tank vehicle with vapor control, flow control shall be in accordance with Section 7904.5.2.8.

7904.5.2.8 Bottom loading. When bottom loading a tank vehicle 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 overfilling. The connecting components between the loading rack and the tank vehicle required to operate the secondary control shall be functionally compatible.

When bottom loading a tank vehicle 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 on the vehicle.

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.

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.

Vapor-processing equipment shall be separated from aboveground tanks, warehouses, other plant buildings, loading and unloading facilities or nearest line of adjoining property that can be built on by a distance of at least 25 feet (7620 mm). Vapor-processing equipment shall be protected from physical damage by remote location, guardrails, curbs or fencing.

7904.5.2.9 Switch loading. Tanks which have previously contained Class I liquids shall not be loaded with Class II or III liquids until such tanks and all piping, pumps, hoses and meters connected thereto have been completely drained and flushed.

7904.5.2.10 Electrical. Wiring and electrical equipment located within 25 feet (7620 mm) of any portion of the loading rack shall be designed, operated and installed such that it does not create an ignition hazard.

7904.5.3 Tank Car Loading Racks.

7904.5.3.1 Construction. Construction shall be in accordance with Section 7904.5.2.1.

7904.5.3.2 Location. Location shall be in accordance with Section 7904.5.2.2.

7904.5.3.3 Static protection. Where the resistance of a tank car to ground through the rails is 25 ohms or greater, bonding shall be provided in accordance with Section 7904.5.2.3.

7904.5.3.4 Stray current protection. Tank car loading facilities where Class I, II or III-A liquids are loaded or unloaded through open domes shall be protected against stray currents by permanently bonding the pipe to at least one rail and to the rack structure. Multiple pipes entering the rack area shall be permanently electrically bonded together. In areas where excessive stray currents are known to exist, all pipes entering the rack area shall be provided with insulating sections to electrically isolate the rack piping from the pipe lines.

7904.5.3.5 Smoking. Smoking controls shall be in accordance with Section 7904.5.2.5.

7904.5.3.6 Security. Loading racks or properties on which a loading rack is located shall be surrounded by a fence not less than 5 feet (1524 mm) in height, constructed of wire mesh, solid metal sheathing or masonry. Tank cars shall not be loaded or unloaded unless such tank cars are entirely within such enclosure.

EXCEPTION: Existing installations where adequate public safety exists due to isolation, natural barriers or other factors as determined by the chief.

7904.5.3.7 Switch loading. Switch loading shall be in accordance with Section 7904.5.2.9.

7904.5.4 Liquid transfer.

7904.5.4.1 Transfer apparatus. Transfer apparatus shall be of an approved type.

7904.5.4.2 Destination of liquids off loaded from tank vehicles and tank cars.

7904.5.4.2.1 General. Class I, II or III liquids shall be transferred from a tank vehicle or tank car only into an approved atmospheric tank or approved portable tank, except as provided in Sections 7904.5.4.2.2 through 7904.5.4.2.6.

7904.5.4.2.2 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 when approved by the chief, and when:

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 or property,
3. The dispensing line does not exceed 50 feet (15 240 mm) in length, and
4. The dispensing nozzle is approved.

7904.5.4.2.3 Emergency refueling. When approved by the chief, 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 7904.2.8 and 7904.6.

7904.5.4.2.4 Aircraft fueling. Transfer of liquids from tank vehicles to the fuel tanks of aircraft is allowed in accordance with Section 2402.

7904.5.4.2.5 Fueling of vehicles at farms, construction sites and similar areas. Transfer of liquids 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 7904.2.8.

7904.5.4.2.6 Disabled vehicles. When a tank vehicle or tank is disabled through accident or mechanical failure and it becomes necessary to remove the cargo at that location, such cargo is allowed to be transferred to another tank vehicle or tank car.

7904.5.4.3 Time limit or unloading. Tank vehicles and tank cars shall be unloaded as soon as possible after arrival at point of delivery and shall not be used as storage tanks. Tank cars shall be unloaded only on private sidings or railroad siding facilities equipped for transferring the liquid between tank cars and permanent storage tanks. Unless otherwise approved by the chief, a tank car shall not be allowed to remain on a siding at the point of delivery for more than 24 hours while connected for transfer operations.

7904.5.4.4 Unloading inside buildings. Tank vehicles or tank cars shall not be located inside of a building while unloading Class I, II or III-A liquids, unless approved by the chief.

EXCEPTION: Tank vehicles are allowed under canopies of automotive motor vehicle fuel-dispensing stations.

7904.5.4.5 Vehicle motor shut-down. See Section 7904.6.3.3.

7904.5.4.6 Attendant required. The operator or other competent person shall be in attendance at all times while a tank vehicle or tank car is discharging cargo. When practical, the tank vehicle or tank car shall be positioned such that the operating controls and the discharging end of the hoses are both in view of the operator or other competent person.

7904.5.4.7 Chock blocks. At least two chock blocks not less than 5 inches by 5 inches by 12 inches (127 mm by 127 mm by 304.8 mm) in size and dished to fit the contour of tires shall be used during unloading operations of tank vehicles.

7904.6 Tank Vehicles and Vehicle Operation.

7904.6.1 General. Tank vehicles shall be designed, constructed, equipped and maintained in accordance with U.F.C. Standard 79-4 and Section 7904.6.

7904.6.2 Full trailers and semitrailers.

7904.6.2.1 Attachments. Trailers shall be firmly and securely attached to the vehicle drawing them in a manner conforming with accepted engineering practice.

7904.6.2.2 Brakes. Full trailers and semitrailers shall be equipped with reliable brakes on all wheels, and adequate provisions shall be made for their efficient operation from the driver's seat of the vehicle drawing the trailer or semitrailer.

7904.6.2.3 Trailer connections. Trailer connections shall prevent the towed vehicle from whipping or swerving from side to side dangerously or unreasonably and shall cause the trailer to follow substantially in the path of the towing vehicle.

7904.6.3 Operation of tank vehicles.

7904.6.3.1 Vehicle maintenance. Tank vehicles shall not be operated unless they are in proper repair and free of accumulation of grease, oil or other flammables, and leaks.

7904.6.3.2 Leaving vehicle unattended. The driver, operator or attendant of a tank vehicle 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.

7904.6.3.3 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.

7904.6.3.4 Bonding. Bonding shall be in accordance with Section 7904.5.2.3.

7904.6.3.5 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 not be 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 due to rise in temperature in transit.

7904.6.3.6 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 gaging device. To prevent overfilling, the driver, operator or attendant shall not deliver in excess of that amount.

7904.6.3.7 Securing hatches. During loading, hatch covers shall be secured on all but the receiving compartments.

7904.6.3.8 Simultaneous delivery. Simultaneous delivery to underground tanks from two or more discharge hoses shall be made by means of mechanically tight connections between the hose and fill pipe.

7904.6.3.9 Covers closed in transit. Dome covers shall be closed and latched while the tank vehicle is in transit.

7904.6.3.10 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.

7904.6.3.11 Low vapor-pressure liquids. Flammable and combustible liquids with a vapor pressure of 40 psi (275.8 kPa) absolute or less at 100°F. (37.8°C.) shall be loaded into cargo tanks designed and constructed in accordance with Section 7904.6.1.

7904.6.3.12 Bonding of fill stem. Cargo tanks shall be bonded to the fill stem or some part of the rack structure which is electrically interconnected with the fill-stem piping.

EXCEPTIONS: 1. Tank vehicles used for asphalt.

2. Tank vehicles loading flammable or combustible liquids through bottom connections.

3. Tank vehicles used exclusively for transporting Class III liquids when loaded at locations where Class I and II liquids are not handled.

7904.6.3.13 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.

7904.6.4 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.

7904.6.5 Parking.

7904.6.5.1 General. Parking of tank vehicles shall be in accordance with Section 7904.6.5.

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.

7904.6.5.2 Unattended parking.

7904.6.5.2.1 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 (152.4 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 chief, present an extreme life hazard.

7904.6.5.2.2 Parking on thoroughfares. Tank vehicles shall not be left unattended on a street, highway, avenue or alley.

ARTICLE 28 — STORAGE AND HANDLING OF COMBUSTIBLE FIBERS

SECTION 2801 — SCOPE

Storage and handling of combustible fibers shall be in accordance with Article 28.

SECTION 2802 — DEFINITIONS

For definitions of COMBUSTIBLE FIBERS; COMBUSTIBLE FIBER STORAGE BINS; COMBUSTIBLE FIBER STORAGE ROOMS; COMBUSTIBLE FIBER STORAGE VAULT, PROTECTED; and COMBUSTIBLE FIBER STORAGE VAULT, UNPROTECTED, see Article 2.

SECTION 2803 — PERMITS

For permits to store or handle combustible fibers, see Section 105, Permit c.5.

EXCEPTION: A permit is not required for exterior storage of hay, straw and similar agricultural materials.

SECTION 2804 — LOOSE STORAGE

Combustible fibers not in suitable bales or packages shall be stored in accordance with Table 2804-A.

EXCEPTION: Amounts not exceeding 2,500 cubic feet (70.8 m^3) of loose fibers are allowed to be stored in a detached "loose house" suitably located, with opening properly protected against entrance of sparks. The loose house shall be used for no other purpose.

SECTION 2805 — BALED STORAGE

2805.1 General. A single block or pile shall not contain more than 25,000 cubic feet (708 m^3) of fiber exclusive of aisles or clearances. Blocks or piles of baled fiber shall be separated from adjacent storage by aisles not less than 5 feet (1524 mm) wide, or by flash-fire barriers consisting of continuous sheets of noncombustible material extending from floor to a height of at least 1 foot (305 mm) above the highest point of piles and projecting at least 1 foot (305 mm) beyond the sides of the piles.

2805.2 Location. Sisal and other fibers in bales bound with combustible tie ropes, also jute and other fibers liable to swell when wet, shall be stored to allow for expansion in any direction without endangering building walls, floors, ceilings or columns. Not less than 3-foot (914 mm) clearance shall be left between walls and sides of piles, except that if storage compartment is not more than 30 feet (9144 mm) in width, 18-inch (457 mm) clearance at side walls will be sufficient, provided a center aisle not less than 5 feet (1524 mm) is maintained.

2805.3 Clearance. A clearance of not less than 3 feet (914 mm) shall be maintained between sprinkler heads and the tops of piles.

SECTION 2806 — STORAGE OF AGRICULTURAL PRODUCTS

Hay, straw and other similar agricultural products shall not be stored adjacent to buildings or combustible material unless a cleared horizontal distance equal to the height of pile is maintained between such storage and combustible material and buildings.

Storage shall be limited to stacks of 100 tons (90 718.5 kg) each. Either an approved one-hour occupancy separation constructed as specified in the Building Code or a clear space of 20 feet (6096 mm) shall be maintained between such stacks.

SECTION 2807 — DUST-COLLECTING SYSTEM

Equipment or machinery within a building which generates or emits combustible fibers shall be provided with an approved dust-collecting and exhaust system. See Article 76 and the Mechanical Code.

TABLE 2804-A—STORAGE REQUIREMENTS FOR COMBUSTIBLE FIBERS

AMOUNT OF MATERIAL (cubic feet) × 0.028 for m^3	METHOD OF STORAGE
0-100	Combustible fiber storage bin
More than 100-500	Combustible fiber storage room
More than 500-1,000	Unprotected combustible fiber storage vault
More than 1,000	Protected combustible fiber storage vault

ARTICLE 29 — REPAIR GARAGES

SECTION 2901 — SCOPE

Garages used for service or repair of motor vehicles and classified as Group S, Division 3, or Group H, Division 4 Occupancies shall be in accordance with Article 29.

SECTION 2902 — PERMITS

For permits to use a structure as a place of business for the purpose of servicing or repairing motor vehicles, see Section 105, Permit r.3.

SECTION 2903 — FLAMMABLE AND COMBUSTIBLE LIQUIDS

2903.1 General. Storage, use and handling of flammable or combustible liquids shall be in accordance with Article 79 and Section 2903.

2903.2 Dispensing inside of Buildings. When flammable or combustible liquids are used or dispensed in a repair garage, electrical and fuel-burning equipment shall comply with Sections 5202.6, 5202.7.2 and 7901.4.

For operations involving dispensing of fuel into the fuel tanks of motor vehicles, see Article 52.

2903.3 Storage and Use in Buildings with Basements or Pits. When Class I liquids are stored or used within a building having a basement or pit into which flammable vapors could travel, the basement or pit shall be provided with ventilation designed to prevent the accumulation of flammable vapors therein.

2903.4 Storage and Handling of Liquids Drained from Vehicles.

2903.4.1 Motor vehicle fuel. Motor vehicle fuel shall not be drained in Group S, Division 3 Occupancies. Liquids drained from motor vehicle fuel tanks in Group H, Division 4 Occupancies shall be stored and handled as required for Class I liquids in accordance with Article 79.

2903.4.2 Lubricating oil. Lubricating oil which has been drained from motor vehicles in Group S, Division 3 or Group H, Division 4 Occupancies shall be stored and handled as required for Class III-B liquids in accordance with Article 79.

2903.4.3 Mixed liquids. Containers and tanks containing a mixture of fuel and lubricating oil shall be installed in accordance with the requirements of Article 79 for Class I liquids.

2903.5 Storage. Stored liquids shall be kept in containers or tanks complying with Section 7902.

Tank drainage lines terminating inside a building shall be equipped with a nonremovable-type cap, such as a hinged cap.

2903.6 Spill Control. Spill control shall be provided in accordance with Section 7901.8.

2903.7 Oily Waste Materials. Oily rags and similar materials shall be stored in metal, metal-lined, or other approved containers equipped with tightfitting covers.

SECTION 2904 — SOURCES OF IGNITION

2904.1 General. Sources of ignition shall not be within 18 inches (457.2 mm) of the floor.

Smoking and open flames shall be prohibited in areas used for servicing internal combustion engines.

2904.2 Welding. Welding operations shall be conducted only in Group H, Division 4 Occupancies, and shall be in accordance with Article 49.

ARTICLE 30 — WOODWORKING PLANTS AND EXTERIOR LUMBER STORAGE

SECTION 3001 — SCOPE

Woodworking plants and exterior lumber storage shall be in accordance with Article 30.

SECTION 3002 — PERMITS

For permits to operate a lumber yard or a dust-producing operation, see Section 105, Permits l.3 and d.2.

SECTION 3003 — EXTERIOR LUMBER STORAGE

3003.1 Exterior Lumber Storage. Exterior lumber storage shall be in accordance with Section 1103.3.5. Lumber shall be arranged to form stable piles. Piles shall not exceed 150,000 cubic feet (4248 m^3) in volume.

3003.2 Fire Apparatus Access Roads. Fire apparatus access roads shall be provided for all portions of exterior lumber storage areas and buildings in accordance with Section 902.2.

3003.3 Water Supply. An approved water supply capable of supplying the required fire flow shall be provided for all portions of yards and buildings in accordance with Section 903.

3003.4 Security. Permanent lumber storage areas shall be surrounded with an approved fence. Fences shall be a minimum of 6 feet (1829 mm) in height.

EXCEPTION: Lumber piles inside of buildings.

SECTION 3004 — WOODWORKING PLANTS

3004.1 Construction. Woodworking plants shall be constructed in accordance with the Building Code.

3004.2 Waste Removal. Woodworking plants shall be equipped with an approved waste removal system which shall collect and remove sawdust and wood shavings as they are produced. Such systems shall be installed in accordance with Article 76 and the Mechanical Code.

SECTION 3005 — FIRESAFETY PROVISIONS

3005.1 Burning of Waste. Burning of wood shavings, sawdust and waste material shall only be conducted when approved. Burning of such material shall only be within boilers, furnaces or incinerators that are suitable for such use. Boiler and furnace stacks and incinerators shall be in accordance with Section 1102.2. At boilers or other locations where sawdust or shavings are used as fuel, such fuel shall be kept within a bin constructed of noncombustible materials with a raised sill.

3005.2 Combustible Waste. The storage, accumulation and handling of combustible materials and control of vegetation shall be in accordance with Section 1103.

3005.3 Ignition Control. Ignition sources shall be in accordance with Section 1105.

3005.4 Fire Protection. Fire protection equipment shall be provided and maintained in accordance with Article 10.

ARTICLE 31

(NOT USED)

ARTICLE 32 — TENTS, CANOPIES AND TEMPORARY MEMBRANE STRUCTURES

SECTION 3201 — SCOPE

Tents and temporary membrane structures having an area in excess of 200 square feet (18.5 m^2), and canopies in excess of 400 square feet (37.1 m^2), shall be in accordance with Article 32.

SECTION 3202 — DEFINITIONS

3202.1 General. For definitions of AWNINGS, TEMPORARY MEMBRANE STRUCTURE and TENT, see Article 2.

3202.2 Limited Application. For the purpose of Article 32, certain terms are defined as follows:

ASSEMBLY is the gathering together of 10 or more persons for deliberation, education, instruction, worship, entertainment, amusement, drinking or dining establishments, or awaiting transportation.

CANOPY is a temporary structure, enclosure or shelter constructed of fabric or pliable material supported by any manner except by air or the contents it protects and is open, without sidewalls or drops, on 75 percent or more of the perimeter.

TEMPORARY STRUCTURE is an enclosure or shelter constructed of materials as described in Article 32 and erected for a period of less than 180 days.

SECTION 3203 — PERMITS

For permits to erect tents, temporary membrane structures or canopies, see Section 105, Permit t.1.

SECTION 3204 — USE PERIOD

Tents, canopies and temporary membrane structures shall not be used for a period of more than 180 days within a 12-month period on a single premises.

SECTION 3205 — LOCATIONS, ACCESS AND PARKING

Location of tents, canopies and temporary membrane structures shall be in accordance with Table 3205-A. Fire access roadways and parking of automobiles or other internal combustion engines shall be in accordance with Table 3205-A.

SECTION 3206 — STRUCTURAL STABILITY

Tents, canopies and temporary membrane structures and their appurtenances shall be adequately roped, braced and anchored to withstand the elements of weather against collapsing. Evidence of structural stability shall be furnished to the chief upon request.

Air-supported and air-inflated structures shall have the design and construction of the fabric envelope, the method of anchoring and inflation systems in accordance with the Building Code. See U.B.C. Appendix Chapter 31, Division II.

SECTION 3207 — FLAME-RETARDANT TREATMENT AND STANDARDS

The sidewalls, drops and tops of all tents, canopies and temporary membrane structures shall be of flame-retardant material or shall be made fire retardant in an approved manner. Floor coverings,

bunting, flammable decorations or effects, including sawdust when used on floors or passageways, shall be made fire retardant in an approved manner.

An approved certification shall be retained on the premises indicating the following:

1. Identification of tent, canopy or temporary membrane structure, size and fabric type,
2. Date that tent, canopy or temporary membrane structure and other flammable materials were last treated with flame-retardant solution,
3. Trade name and type of solution utilized in flame-retardant treatment,
4. Name of persons and firm treating materials, and
5. Name and address of tent, canopy or temporary membrane structure.

SECTION 3208 — SOURCES OF IGNITION

3208.1 Smoking. Smoking shall not be permitted in tents, canopies and temporary membrane structures or in adjacent areas where hay, straw, sawdust or any other combustible materials are stored or used unless approved by the chief. When required, approved NO SMOKING signs shall be conspicuously posted.

3208.2 Fireworks, Open Flames and Hot Objects. Fireworks, open flames, and devices emitting flames or fire or creating a glow capable of igniting combustible materials shall not be used in or adjacent to a tent, canopy or temporary membrane structure, unless approved by the chief.

SECTION 3209 — PORTABLE FIRE EXTINGUISHERS AND OTHER FIRE-PROTECTION APPLIANCES

Fire extinguishers and other fire-protection appliances shall be provided in every tent, canopy and temporary membrane structure as follows:

1. Minimum fire-extinguisher coverage shall be provided in every tent, canopy and temporary membrane structure as follows:
   - 1.1 200 to 500 square feet (18.5 to 46.4 m^2) of floor area: One 2-A:10-B:C.
   - 1.2 501 to 1,000 square feet (47 to 93 m^2) of floor area: Two 2-A:10-B:C.
   - 1.3 Each additional 2,000 square feet (186 m^2) of floor area or fraction thereof: One 2-A:10-B:C,
2. Fire extinguishers shall be provided for each kitchen, mess hall, power generator or transformer, locations where flammable or combustible liquids are used, and other locations in accordance with U.F.C. Standard 10-1,
3. At least one 40-B:C-rated fire extinguisher shall be provided for each kitchen, mess hall, power generator or transformer and at locations where flammable or combustible liquids are used, stored or dispensed, and
4. Other fire appliances shall be maintained at the site as required by the chief.

SECTION 3210 — STANDBY PERSONNEL

Qualified persons necessary to safeguard the premises shall be provided as required and approved by the chief.

SECTION 3211 — EXITS

3211.1 Distribution. Exits shall be spaced at approximately equal intervals around the perimeter of the tent, canopy or temporary membrane structure and shall be located such that all points are 100 feet (30 480 mm) or less from an exit.

3211.2 Number. Exits shall be provided in accordance with Table 3211-A.

3211.3 Openings. Exit openings from tents shall remain open unless covered by a flame-retardant curtain, provided:

1. Curtains shall be free sliding on a metal support. The support shall be a minimum of 8 feet (2438 mm) above the floor level at the exit. The curtains shall be so arranged that, when open, no part of the curtains obstructs the exit, and

2. Curtains shall be of color, or colors, contrasting with the color of the tent.

3211.4 Doors. Exit doors from air-supported structures shall swing in the direction of exit travel. To avoid hazardous pressure loss, such doors shall be automatic closing against operating pressures. Opening force at the door edge shall not exceed 15 pounds (66.8 N).

3211.5 Aisles. Aisles having minimum width of not less than 44 inches (1118 mm) shall be provided from all seating areas, and their width shall be progressively increased to provide at all points not less than 1 foot (305 mm) of aisle width for each 50 persons served by such aisle at that point.

The arrangement of aisles shall be approved by the chief.

SECTION 3212 — MAINTENANCE OF EXITWAYS

The required minimum clear width of exits, aisles and passageways shall be maintained at all times to a public way.

Guywires, guyropes and other support members shall not cross a means of egress at a height of less than 8 feet (2438 mm).

The surface of exitways shall be maintained in a manner approved by the chief.

SECTION 3213 — EXIT ILLUMINATION

Exits shall be illuminated with light having an intensity of not less than one footcandle (10.76 lx) at floor level while the structure is occupied. Fixtures required for exit illumination shall be supplied from a separate circuit or sources of power when these are required for exit signs by Section 3214.2.

SECTION 3214 — EXIT SIGNS

3214.1 When Required. Exit signs shall be installed at required exit doorways and where otherwise necessary to clearly indicate the direction of egress when the exit serves an occupant load of 50 or more.

3214.2 Illumination. Exit signs in tents, canopies and temporary membrane structures with occupant loads of more than 100 persons shall be of an approved self-luminous type or shall be internally or externally illuminated by fixtures supplied in the following manner:

1. Two separate circuits, one of which shall be separate from all other circuits, for occupant loads of 300 or less, or

2. Two separate sources of power, one of which shall be an approved emergency system, shall be provided when the occupant load exceeds 300. Emergency systems shall be supplied from storage batteries or on-site generator set, and the system shall be installed in accordance with the Electrical Code.

SECTION 3215 — MAXIMUM OCCUPANT LOAD

Occupant load requirements shall be in accordance with Section 2501.16.

SECTION 3216 — SEATING ARRANGEMENTS

Seating arrangements shall be in accordance with Section 2501.10.

SECTION 3217 — HEATING AND COOKING EQUIPMENT

3217.1 General. Heating and cooking equipment shall be in accordance with the Mechanical Code or shall be as approved by the chief.

3217.2 Vents. Gas-, solid- and liquid-fuel-burning equipment shall be vented to the outside air by means of a flue or vent approved for use with the type of equipment used and in such a manner that all portions of the tent, canopy or temporary membrane structure are 12 inches (305 mm) or more from the flue or vent. Vents for solid-fuel-burning equipment shall be equipped with spark arrestors having openings not exceeding $^1/_4$-inch (6.4 mm) wire mesh.

3217.3 Location. Heating and cooking equipment shall not be located within 10 feet (3048 mm) of exits, aisles, passageways or combustible materials.

Gas-, solid- and liquid-fuel-burning cooking equipment located outside of a tent, canopy or temporary membrane structure shall not be located within 30 feet (9144 mm) of such structures.

SECTION 3218 — FLAMMABLE AND COMBUSTIBLE LIQUIDS AND LP-GAS

Flammable or combustible liquids and LP-gas shall not be stored in a tent or temporary membrane structure or less than 50 feet (15 240 mm) from such structures.

The storage and use of flammable or combustible liquids shall be in accordance with Article 79.

Liquefied petroleum gas shall not be stored or used in connection with a tent, canopy or temporary membrane structure unless the storage containers, equipment, fittings and appliances and the placement, use and operation of such equipment comply with Article 82.

SECTION 3219 — HOUSEKEEPING

3219.1 General. Housekeeping shall be in accordance with Section 3219.

EXCEPTION: The distance specified in Sections 3219.2, 3219.3 and 3219.4 are allowed to be reduced by the chief where, in the chief's opinion, adequate safety has been provided.

3219.2 Vegetation Removal. Weeds and flammable vegetation shall be removed from the area occupied by a tent, canopy or temporary membrane structure and from areas adjacent to or within 30 feet (9144 mm) of such structures.

3219.3 Flammable Material Storage. Hay, straw, trash and other flammable material shall be stored not less than 30 feet (9144 mm) outside of tents, canopies and temporary membrane structures.

3219.4 Floor Surfaces. The floor surface inside, and the grounds adjacent to or within 30 feet (9144 mm) outside of tents, canopies and temporary membrane structures, shall be kept free and clear of combustible waste. Such waste shall be stored in approved containers until removed from the premises.

3219.5 Burning. Rubbish shall not be burned on the premises.

SECTION 3220 — HAZARDOUS GASES IN BALLOONS

Balloons and other similar devices shall be in accordance with Section 7403.1.9.

TABLE 3205-A—LOCATION, ACCESS AND PARKING FOR TENTS, CANOPIES AND TEMPORARY MEMBRANE STRUCTURES

FLOOR AREA (Square Feet)	MINIMUM SEPARATION FROM ANY PROPERTY LINE, BUILDING, OTHER TENT, CANOPY, OR TEMPORARY MEMBRANE STRUCTURE[1]	MINIMUM FIRE ACCESS ROADWAY WIDTH[2]	MINIMUM DISTANCES FOR THE PARKING OF AUTOMOBILES OR OTHER INTERNAL COMBUSTION ENGINES
× 0.0929 for m^2	× 304.8 for mm		
0-5,000	20 feet[3]	12 feet	30 feet
5,001-15,000	30 feet[3]	20 feet	40 feet
Over 15,000	50 feet	20 feet	60 feet

[1]For the purposes of required distances, support ropes and guywires are to be considered part of the tent, canopy and temporary membrane structure.

[2]A fire access roadway in accordance with Section 902.2 is required when deemed necessary by the chief.

[3]Tents, canopies and temporary membrane structures are allowed to be separated from each other by a minimum of 10 feet (3048 mm) or the required exit width, whichever is greater, when the accumulated area of adjacent tents, canopies, or temporary membrane structures is less than 15,000 square feet (1394 m^2).

TABLE 3211-A—EXITS FROM TENTS, CANOPIES AND TEMPORARY MEMBRANE STRUCTURES[1]

CAPACITY	MINIMUM NUMBER OF EXITS	MINIMUM WIDTH EACH EXIT (feet) × 304.8 for mm	
		Tent or Canopy	Membrane Structure
Up to 199	2	6	3
200 to 499	3	6	6
500 to 999	4	8	6
1,000 to 1,999	5	10	8
2,000 to 2,999	6	10	8
Over 3,000	7	10	8

[1]The total width of exits in feet (mm) shall not be less than the total occupant load served divided by 50 (0.164). Such width of exits shall be divided approximately equally among the separate exits.

ARTICLE 33 — CELLULOSE NITRATE MOTION PICTURE FILM

SECTION 3301 — SCOPE

Storage and handling of cellulose nitrate motion picture film, hereinafter referred to as "nitrate film," shall be in accordance with Article 33.

EXCEPTION: Film having a cellulose acetate or other slow-burning base, referred to as "safety film."

SECTION 3302 — PERMITS

For permits to store cellulose nitrate film, see Section 105, Permit c.3.

SECTION 3303 — BUILDINGS

Buildings or portions thereof in which nitrate film is stored, examined, projected or processed shall be in accordance with the Building Code.

SECTION 3304 — STORAGE AND HANDLING

The storage and handling of nitrate film shall be in accordance with nationally recognized standards. See Article 90, Standard n.2.1.

ARTICLE 34 — AUTOMOBILE WRECKING YARDS

SECTION 3401 — SCOPE

Automobile wrecking yards shall be in accordance with Article 34.

For rubbish handling operations, see Articles 11 and 28.

SECTION 3402 — DEFINITIONS

3402.1 General. For definitions of AUTOMOBILE WRECKING YARD, RUBBISH and SALVAGE VEHICLE, see Article 2.

3402.2 Limited Application. For the purpose of Article 34, certain terms are defined as follows:

MOTOR VEHICLE FLUIDS are liquids which are flammable, combustible or hazardous materials, such as crankcase fluids, fuel, brake fluids, transmission fluids, radiator fluids and gear oil. This definition does not include liquids which are permanently sealed, such as hydraulic fluid within shock absorbers.

SECTION 3403 — PERMITS

For permits to operate automobile wrecking yards, see Section 105, Permit a.5.

SECTION 3404 — FIRE APPARATUS ACCESS ROADS

Fire apparatus access roads shall be constructed and maintained throughout the site in accordance with Section 902.2.

SECTION 3405 — WELDING AND CUTTING

Welding and cutting operations shall be in accordance with Articles 49 and 74.

SECTION 3406 — HOUSEKEEPING

Combustible rubbish accumulated on the site shall be collected and stored in approved containers, rooms or vaults of noncombustible materials. Combustible vegetation, cut or uncut, shall be removed when determined by the chief to be a fire hazard.

SECTION 3407 — FIRE PROTECTION

Offices, storage buildings and vehicles used for site operations shall each be provided with at least one portable fire extinguisher with a rating of not less than 4-A:40-B:C. When required by the chief, additional portable fire extinguishers shall be provided in specific use areas in accordance with U.F.C. Standard 10-1.

SECTION 3408 — TIRES

Tires shall be stored on racks in an approved manner or shall be piled in accordance with Section 1103.3.6.

SECTION 3409 — BURNING OPERATIONS

The burning of salvage vehicles and salvage or waste materials shall be in accordance with Section 1102 and federal, state or local air quality control regulations.

SECTION 3410 — MOTOR VEHICLE FLUIDS AND HAZARDOUS MATERIALS

3410.1 General. The storage, use and handling of motor vehicle fluids and hazardous materials, such as those used to operate air bags and electrical systems, shall be in accordance with Section 3410 and Articles 29, 79 and 80.

3410.2 Motor Vehicle Fluids. Motor vehicle fluids shall be drained from salvage vehicles when such fluids are leaking. Storage and handling of motor vehicle fluids shall be done in an approved manner. Flammable and combustible liquids shall be stored and handled in accordance with Articles 29, 79 and 80.

3410.3 Mitigation for Vehicle Fluid Leaks. Supplies or equipment capable of mitigating leaks from fuel tanks, crankcases, brake systems and transmissions shall be kept available on site. Single-use plugging, diking and absorbent materials shall be disposed of as hazardous waste and removed from the site in a manner approved by federal, state or local requirements.

3410.4 Air Bag Systems. Removed air bag systems shall be handled and stored in accordance with Article 80.

3410.5 Lead-acid Batteries. Lead-acid batteries shall be removed from salvage vehicles when such batteries are leaking. Lead-acid batteries which have been removed from vehicles shall be stored in an approved manner.

ARTICLE 35 — COVERED MALL BUILDINGS

SECTION 3501 — SCOPE

Temporary use of the common pedestrian area within a covered mall building for promotional, educational, assembly, sales or similar activities shall be in accordance with Article 35.

SECTION 3502 — DEFINITIONS

3502.1 General. For definitions of COVERED MALL BUILDING and MALL, see Article 2.

3502.2 Limited Use. For the purpose of Article 35, certain terms are defined as follows:

ALLOWABLE USE AREA is the area approved to conduct activities in accordance with Article 35 and shall not include area necessary for main and cross aisles.

CROSS AISLES are required aisles which permit exiting from one main aisle to another through an allowable use area.

FIXTURES are those furnishings accessory to the normal operation of the mall. Fixtures are allowed to include, but are not limited to, seating, directories, planters and lighting fixtures.

MAIN AISLE is that area of a mall designated to accommodate the required exit width located between the furthest projection of the area designated for use by a tenant and the allowable use area.

TEMPORARY STRUCTURES are kiosks, booths, concession stands and similar structures.

TEMPORARY USE is a single permitted activity not to exceed 60 consecutive days.

SECTION 3503 — PERMITS

For temporary use permits of the allowable use area, see Section 105, Permit m.2.

SECTION 3504 — GENERAL REQUIREMENTS

3504.1 Main Aisle Width. Main aisles shall be a minimum of 10 feet (3048 mm) in width or the minimum required exit width, whichever is greater, and shall be maintained in accordance with Section 1204. Main aisles shall not be obstructed.

3504.2 Cross Aisle Width. Cross aisles shall be a minimum of 15 feet (4572 mm) in width or the required exit width, whichever is greater, and shall be maintained in accordance with Section 1204.

3504.3 Fueled Equipment. Liquid- or gas-fueled appliances, tools, apparatus, craft or vehicles shall not be located in a mall.

> **EXCEPTION:** When approved by the chief, liquid- or gas-fueled appliances, tools, apparatus, craft or vehicles are allowed to be displayed within the mall. When on display, batteries shall be disconnected and fuel tanks emptied and sealed in an approved manner.

3504.4 Hazardous Materials. Hazardous materials shall not be used, stored or displayed in a mall.

> **EXCEPTION:** Carcinogens, irritants, sensitizers, combustible liquids and Class I oxidizers.

3504.5 Nonflammable Gas. Cylinders containing nonflammable gases shall be in accordance with Article 74.

3504.6 Combustible Decorative Materials and Signs. Combustible decorative materials and combustible signs other than plastics shall be in accordance with Section 1103.3.3. Plastic panels and plastic signs shall be in accordance with the Building Code. (See U.B.C. Section 404.3.7.)

3504.7 Fixtures. Fixtures shall not be located in main aisles or cross aisles.

SECTION 3505 — TEMPORARY STRUCTURES

3505.1 General. Temporary structures located in the allowable use area shall be in accordance with Section 3505.

3505.2 Flame Spread. Temporary structures shall be noncombustible or be treated and maintained in a flame-retardant condition conforming to Class II flame-spread ratings. (See U.B.C. Chapter 8.)

3505.3 Sprinkler Obstructions. Roofs or coverings for kiosks, display booths, concession equipment or similar structures shall not exceed 4 feet (1219 mm) in dimension unless the area beneath the roofs or coverings is protected by an approved automatic fire-extinguishing system.

SECTION 3506 — TEMPORARY PLACES OF ASSEMBLY

When the mall area, or any portion thereof, is used as a temporary place of assembly, such area shall be in accordance with Article 25.

The exit facilities shall limit the number of persons in attendance. The chief is authorized to establish the conditions necessary to assure that the covered mall building tenants do not have their exits obstructed by the assembly. It shall be the responsibility of the covered mall management to provide adequate personnel to comply with the conditions required by the chief.

ARTICLE 36 — DRY CLEANING

SECTION 3601 — GENERAL

3601.1 Scope. Dry-cleaning plants and systems shall be in accordance with Article 36.

3601.2 Definitions.

3601.2.1 General. For definitions of COMBUSTIBLE LIQUID, DRY CLEANING and FLAMMABLE LIQUID, see Article 2.

3601.2.2 Limited applications. For the purposes of Article 36, certain terms are defined as follows:

CONTAINER is a vessel of 60 United States gallons (227 L) or less capacity used for transporting or storing flammable or combustible liquids. Pipes, piping systems, engines and engine fuel tanks are not considered to be containers.

NONCOMBUSTIBLE LIQUID is a liquid that does not exhibit a flash point.

STORAGE is the keeping, retention or leaving of flammable or combustible liquids in closed containers, tanks or similar vessels.

3601.3 Permits. For permits to engage in dry cleaning, see Section 105, Permit d.1.

3601.4 Plant and System Classification. Dry-cleaning plants and systems shall be classified according to the character of the flammable or combustible liquids used or stored as listed below (see Section 3603.2 regarding the use of Class I liquids):

1. **Class II plants or systems** are those plants or systems in which Class II combustible liquids are used as solvents for dry cleaning.

2. **Class III-A plants or systems** are those plants or systems in which Class III-A combustible liquids are used as solvents for dry cleaning.

3. **Class III-B plants or systems** are those plants or systems in which Class III-B combustible liquids are used as solvents for dry cleaning.

4. **Class IV plants or systems** are those plants or systems in which only noncombustible liquids are used as solvents for dry cleaning, using flammable and combustible liquids only for spotting.

Except for the quantities of liquids allowed for scouring, brushing or spotting in Section 3603.13, when more than one class of flammable or combustible liquid solvent is used or stored in a plant or system, the plant or system classification shall be based on the numerically lowest class.

3601.5 Control of Solvents.

3601.5.1 Changes in class. Solvents shall not be changed to a solvent in a more hazardous classification unless such change has been approved by the chief and a new permit has been issued.

3601.5.2 Verification of class. The chief is authorized to require that samples of solvents be taken and tested to verify that a plant or system is correctly classified. Tests shall be by an independent agency or laboratory.

3601.6 Fire Protection. Approved portable fire extinguishers of a type suitable for fighting fires involving flammable or combustible liquids shall be provided in dry-cleaning plants in accordance with Article 10. At least one extinguisher shall be provided at each entrance to rooms where flammable or combustible liquids are stored or used.

3601.7 Smoking. Smoking in dry-cleaning plants shall only be within designated smoking rooms. NO SMOKING signs shall be posted in rooms containing flammable or combustible liquids. See Section 1109.4.

SECTION 3602 — DRY CLEANING WITH NONCOMBUSTIBLE LIQUIDS EXCEPT FOR LIMITED-ACCESS SPOTTING OPERATIONS

3602.1 General. Class IV dry-cleaning plants and systems shall be in accordance with Section 3602.

3602.2 Equipment.

3602.2.1 Compatibility. Equipment used for dry cleaning with noncombustible liquids shall be suitable for the type of solvent utilized and shall be installed in accordance with the manufacturer's recommendations.

3602.2.2 Solvent-handling systems.

3602.2.2.1 Transfer. The transfer and circulation of solvents shall be through closed systems.

3602.2.2.2 Pumps. Pumps used for the transfer or circulation of solvents shall be designed with leakproof seals. Positive displacement pumps shall be fitted with relief valves or bypasses to prevent overpressure.

3602.2.2.3 Physical protection. Flow and level sight glasses shall be protected against physical damage.

3602.2.2.4 Testing. Piping, valves and sight glasses shall be tested at a minimum of 150 percent of the system's maximum operating pressure. Testing shall be in accordance with nationally recognized standards. See Article 90, Standard a.2.5.

3602.2.3 Exhaust ventilation systems. Dry-cleaning systems shall be provided with an automatically activated exhaust ventilation system to maintain a minimum of 100-feet-per-minute (0.51 m/s) air velocity through the loading door when the door is opened. Such systems for dry-cleaning equipment shall be in accordance with the Mechanical Code. See *Uniform Mechanical Code* Chapter 5.

EXCEPTION: Dry-cleaning units need not be provided with exhaust ventilation when an exhaust hood is installed immediately outside of and above the loading door which operates at an airflow rate as follows:

$$Q = 100 \times A_{LD}$$

For SI:

$$Q = 510 \times A_{LD}$$

WHERE:

Q = flow rate exhausted through the hood, cubic feet per minute (L/s).

A_{LD} = area of the loading door, square feet (m^2).

3602.2.4 Combustion air. Combustion air for fuel-burning equipment shall be taken from exterior openings that are located a minimum of 5 feet (1524 mm) from exhaust openings for dry-cleaning equipment.

3602.3 Storage of Solvents and Waste Solvents.

3602.3.1 Flammable and combustible solvents. The storage of flammable and combustible liquid solvents and waste solvents shall be in accordance with Article 79.

3602.3.2 Noncombustible solvents. The storage of noncombustible liquid solvents and waste solvents that are hazardous materials shall be in accordance with Article 80.

3602.4 Spotting operations.

3602.4.1 General. The local application of flammable or combustible liquids for the removal of stains shall be in accordance with Section 3602.4, Article 79 and Article 80. Spotting operations shall be in accordance with Section 3603.13 except as modified by Section 3602.4.

3602.4.2 Public access. Areas where flammable and combustible liquids are used for spotting operations shall not be accessible by the public.

3602.4.3 Dispensing at workstations. Dispensing of flammable or combustible liquids for spotting operations shall be from approved containers. The amount of flammable and combustible liquid solvents at each workstation shall not exceed 1 gallon (3.8 L), 1 pint (0.47 L) of which is allowed to be in a plastic container.

SECTION 3603 — DRY CLEANING WITH FLAMMABLE AND COMBUSTIBLE LIQUIDS

3603.1 General. Class II, III-A and III-B dry-cleaning plants or systems shall be in accordance with Section 3603.

3603.2 Class I Liquids. Class I liquids shall not be used for dry cleaning.

EXCEPTION: Class I liquids used in accordance with Section 3603.13.

3603.3 Heating of Liquids. The temperatures of Class II and Class III-A liquids shall not exceed 90°F. (32.2°C.). The temperature of Class III-B liquids shall not be in excess of 30°F. (1.1°C.) below their flash point. When liquid coolers are required, temperatures shall be monitored by visual as well as audible alarming devices installed to warn operators that temperatures are approaching the specified limitation.

3603.4 Occupancy Requirements.

3603.4.1 General. Class II and Class III-A dry-cleaning plants shall be within Group H, Division 2 Occupancies. Class III-B dry-cleaning plants shall be within Group F, Division 1 Occupancies. Classes II, III-A and III-B plants shall also be within an occupancy complying with the Group H, Division 7 Occupancy classification when required by the Building Code.

3603.4.2 Fire protection. Buildings containing dry-cleaning plants shall be protected throughout by an automatic fire-sprinkler system in accordance with the Building Code.

3603.4.3 Location within buildings. Dry-cleaning rooms and solvent storage rooms shall be located only on the first story.

3603.4.4 Plant separations. Buildings containing Class II or III-A dry-cleaning plants and their associated operations shall be separated from other businesses by not less than four-hour fire-resistive occupancy separations.

EXCEPTIONS: 1. Class II dry-cleaning plants and associated operations are allowed to be separated from other businesses by two-hour fire-resistive occupancy separations when the total quantity of Class II liquids within the building does not exceed 550 gallons (2082 L) and the capacity of individual containers or tanks within the building does not exceed 275 gallons (1041 L).

2. Class III-A plants and associated operations are allowed to be separated from other occupancies by two-hour fire-resistive occupancy separations when the total quantity of Class III-A liquids within the building does not exceed 1,320 gallons (4997 L) and the capacity of individual containers or tanks within the building does not exceed 330 gallons (1249 L).

3603.4.5 Occupancy separations within plants.

3603.4.5.1 Dry-cleaning rooms. Dry-cleaning rooms containing Class II or Class III-A liquid solvents shall be separated from other uses, including solvent storage, offices and laundering, scouring, scrubbing, pressing and ironing operations, by not less than a two-hour fire-resistive occupancy separation.

EXCEPTION: Solvent storage tanks need not be separated from the dry-cleaning room when the capacity of each such tank does not exceed 1,500 gallons (5678 L), provided there are not more than two storage tanks and the aggregate capacity of all solvent tanks and containers within the room does not exceed 7,500 gallons (28 391 L).

Dry-cleaning rooms containing Class III-B solvents need not be separated from other uses in the dry-cleaning plant; however, the maximum capacity of any container or tank within the room shall

not exceed 2,500 gallons (9464 L) and the capacity of all containers or tanks within the room shall not exceed 7,500 gallons (28 391 L).

3603.4.5.2 Solvent storage. Except for solvent storage allowed within a dry-cleaning room in Section 3603.4.5.1, solvents stored within a plant shall be within liquid storage rooms in accordance with Section 7902.5.11.

> **EXCEPTION:** Solvent storage for scouring, brushing and spotting operations in quantities not exceeding exempt amounts for control areas set forth in Section 7902.5.7.1 and stored in accordance with Section 7902.5 as required for such quantities.

3603.4.5.3 Drying rooms. Rooms or areas in which articles are hung up to dry shall be separated from other uses by not less than a two-hour fire-resistive occupancy separation.

> **EXCEPTION:** Approved drying or deodorizing cabinets located within dry-cleaning rooms.

3603.4.5.4 Rooms containing open flames. Fuel-burning equipment which generates an open flame shall be separated from rooms in which solvents are used or stored by not less than a four-hour fire-resistive occupancy separation. Openings to such rooms shall be at least 10 feet (3048 mm) from openings into rooms containing solvents.

3603.4.5.5 Floors. Floors in rooms containing solvents shall be in accordance with the Building Code as required for floors in liquid storage rooms.

3603.5 Ventilation. A mechanical ventilation system which is designed to exhaust 1 cubic foot of air per minute for each square foot (5.1 L/s per square meter) of floor area shall be installed in dry-cleaning rooms and in drying rooms.

The ventilation system shall operate automatically when the dry-cleaning equipment is in operation and shall have manual controls at an approved location.

3603.6 Fuel-burning Equipment. Fuel-burning equipment shall be separated from dry-cleaning operations and solvent storage areas as required by Section 3603.4.5.4. Circulating-air systems which return air from dry-cleaning rooms or solvent rooms to fuel-burning or other heating equipment shall not be used.

> **EXCEPTION:** Forced-air, fuel-burning or other heating equipment which is separated from the dry-cleaning room is allowed when only Class III-B systems are used. Combustion air for fuel-burning equipment shall not be taken from rooms in which liquids are used or stored or from areas containing flammable vapors.

3603.7 Electrical Wiring and Equipment. Artificial illumination shall be by electricity. Electrical wiring and equipment shall be installed in accordance with the Electrical Code. Electrical forced-air heating systems shall be in accordance with Section 3603.6.

3603.8 Solvent Containers, Tanks and Transferring Equipment.

3603.8.1 General. Containers and tanks shall be in accordance with Section 7902, except as modified by Section 3603.8. Piping shall be in accordance with Section 7901.11; however, flexible hoses resistant to the solvent are allowed to connect equipment when the operating pressures do not exceed 5 psi (34.5 kPa). Required shutoff valves at equipment shall be located ahead of flexible connectors.

3603.8.2 Transferring. Transferring of solvents from storage tanks through processes shall be by closed-circuit piping. Positive displacement pumps shall have a bypass and relief valve.

Fill openings to storage tanks shall be located outside of the building at an approved location. Fill pipe inlets shall be permanently identified with the appropriate liquid classification.

3603.8.3 Venting. The emergency relief venting capacity for aboveground tanks and containers shall not be less than that derived from Table 7902.2-H multiplied by 0.3. In calculating the vent size, 100 percent of the surface area of the tank or container shall be assumed to be wetted.

3603.8.4 Gaging device. A gaging device shall be installed on inside storage or treatment tanks. Gaging devices shall be of a design that will not allow vapors to escape within the building or liquids to escape in case a gage is broken.

3603.8.5 Sludge removal. When underground treating and settling tanks are used, a separate suction pipe shall be carried to the bottom of the tank and a pump shall be installed to remove the sludge. Discharge piping from the pump shall connect to a suitable container.

3603.8.6 Treatment tanks. Treatment tanks shall be constructed in accordance with approved standards and shall be designed for working pressure not less than 15 psig (103.4 kPa) when they are subjected to pressures greater than atmospheric.

Pressure-relief devices shall be installed on treatment tanks that are subjected to pressures greater than atmospheric which will prevent the pressures in the tank from exceeding 10 percent above the working pressure. Relief devices shall be connected to an underground tank or an aboveground tank of a dry-cleaning unit by piping not less than $^3/_4$ inch (19 mm) in diameter without a shutoff valve in the piping.

3603.8.7 Filters and pressure-relief devices. Pressure-type filters shall be equipped with a reliable pressure gage and shall not be operated at pressures exceeding those for which they were designed. Filters shall be provided with an air-bleeding valve and line connected to discharge into a washer or into the storage tank vent line. Such air-bleeding lines shall not discharge into the room.

Pressure-relief devices shall be installed on pressure filters to prevent the pressure in the filter from rising more than 10 percent above its working pressure. Relief devices shall be connected to an underground tank or dry-cleaning unit by piping not less than $^3/_4$ inch (19 mm) in diameter.

3603.8.8 Sight glasses. Sight glasses, the breakage of which would allow the escape of liquids, shall not be of the type readily damaged by heat and shall be protected against physical damage.

3603.9 Dry-cleaning Units.

3603.9.1 Construction. Immersion and agitation of textiles in solvent and the extraction of solvent from textiles shall be within dry-cleaning machines that comply with Section 3603.9. Dry-cleaning machines shall be substantially constructed closed units that are well secured to the building or foundations. The loading opening shall be equipped with a close-fitting door designed to prevent solvent leaks. The units shall be provided with interlocks to prevent cylinder rotation under power when the doors are open. A manually operated stop switch shall be installed on or at each unit.

EXCEPTION: Scouring, brushing and spotting operations in accordance with Section 3603.13.

3603.9.2 Connections. Dry-cleaning units shall be provided with an overflow pipe one size larger than the size of solvent supply line to the machine. Such overflow pipe shall be connected to the shell of the washer such that the top of overflow is below the bottom of the trunion shaft. The overflow pipe shall be without shutoff valves and be arranged to discharge to a suitable tank. The supply pipe shall contain a shutoff valve, shall enter the washer above the discharge level and shall discharge away from the door opening.

3603.9.3 Traps. Individual button and lint traps shall be provided for each dry-cleaning unit.

3603.9.4 Warning labels and signs. A permanently affixed label or sign shall be displayed near the door opening of each machine indicating that it is not to be operated with solvents having a flash point less than a specified level. The specified flash point shall be the minimum flash point established by the manufacturer. The label or sign shall also indicate that the doors to the machine shall not be opened until the rotating cylinder has stopped.

3603.10 Stills. The source of heat for stills shall be steam, hot water or oil. When steam is used, a pressure-regulating valve shall be installed in the steam line to the still, and a check valve shall be installed in the steam line between the boiler and the still. Stills shall be liquid and gas tight and shall be designed to operate on the vacuum principle. If a relief valve is installed on a still, it shall be equipped with a vent line extending to the exterior.

Stills shall be provided with a combination vacuum and pressure gage. Stills shall be equipped with a constant level device to automatically maintain the solvent liquid in the still at the proper height.

3603.11 Drying Tumblers and Cabinets. Drying tumblers shall be of substantial construction, well secured to foundations and shall be provided with self-closing explosion hatches having an area of 0.011 square feet per cubic foot (0.036 m^2 per m^3) of cylinder volume. Hatches shall be arranged to open away from the operator. Drying tumblers in Class II systems shall be provided with approved extinguishing equipment arranged to operate automatically in case of a fire, unless otherwise approved by the chief.

Drying tumblers in Class II systems shall be provided with a steam jet of not less than $^3/_8$-inch (9.5 mm) size for humidifying during the drying processes. Drying tumblers and drying cabinets shall be ventilated to the outside by means of pipes or ducts connected to an exhaust fan of sufficient capacity to remove dust, vapors or lint generated by the process. Such discharge pipes or ducts shall be carried to a height or not less than 6 feet (1829 mm) above the roof and shall be provided with cleanout facilities. Discharge pipes shall not terminate within 10 feet (3048 mm), measured horizontally, from doors, windows or combustible walls.

The fan shall be properly housed and interlocked to ensure operation while the drying tumbler is in use. Fan blades shall be of nonferrous metal, and fan motors shall not be located within the duct.

3603.12 Bonding and Grounding.

3603.12.1 General. Storage tanks, treatment tanks, filters, pumps, piping, ducts, dry-cleaning units, stills, tumblers, drying cabinets and other such equipment, if not inherently electrically conductive, shall be bonded together and grounded. Isolated equipment shall be grounded.

3603.12.2 Pulleys and belts. Pulleys and belts in dry-cleaning rooms shall be provided with properly grounded combs, collectors or neutralizers.

3603.12.3 Double process equipment. When fabrics are transferred from one piece of equipment to another, the two pieces of equipment shall be electrically bonded together.

3603.12.4 Spotting tables. Metal tops of spotting tables shall be permanently and effectively grounded.

3603.13 Scouring, Brushing and Spotting.

3603.13.1 Design. Scouring, brushing and spotting tables shall have a liquid-tight top with a curb on all sides not less than 1 inch (25.4 mm) high. The top of the table shall be pitched to ensure thorough draining to a $1^1/_2$-inch (38 mm) drain connected to a suitable container especially provided and marked for such purpose.

3603.13.2 Type of solvent. Scouring, brushing and spotting operations using solvents with lower flash points than the solvents used in the plant dry-cleaning units shall be limited to 1 gallon (3.785 L). Such solvents shall be dispensed from approved safety cans.

Additional storage shall be in approved safety cans or approved metal shipping containers not exceeding 1-gallon (3.785 L) capacity. Class I liquids and Class II liquids in Class III plants that are not in use shall be stored in liquid cabinets that comply with Section 7902.5.9 or shall be within liquid storage rooms complying with Section 7902.5.11.

Mechanical ventilation shall be provided at scouring, brushing and spotting tables. The mechanical ventilation system shall be designed to capture vapors and exhaust them through a system that complies with the Mechanical Code.

3603.13.3 Dry cleaning outside of dry-cleaning units. Textiles which cannot be cleaned within dry-cleaning units that comply with Section 3603.9 shall be cleaned on scouring or brushing tables or in scrubbing tubs that contain not more than 3 gallons (11.4 L) of flammable or combustible solvent. Scrubbing tubs shall be secured to the floor and shall be provided with permanent $1^1/_2$-inch (38 mm) trapped drains connecting to a suitable container especially provided and marked for such purpose.

PART V

SPECIAL PROCESSES

ARTICLE 45 — APPLICATION OF FLAMMABLE FINISHES

SECTION 4501 — GENERAL

4501.1 Scope. Locations and areas where the following activities are conducted shall be in accordance with Article 45:

1. The application of flammable or combustible paint, varnish, lacquer, stain or other flammable or combustible liquid applied as spray by compressed air, airless or hydraulic atomization, steam, electrostatic or other methods or means in continuous or intermittent process,

2. Dip tank operations in which articles or materials are passed through contents of tanks, vats or containers of flammable or combustible liquids, including coating, finishing, treatment and similar processes, and

3. The application of combustible powders by powder spray guns, electrostatic powder spray guns, fluidized beds or electrostatic fluidized beds.

4501.2 Definitions. For definitions of SPRAYING AREA, SPRAY BOOTH and SPRAYING ROOM, see Article 2.

4501.3 Permits. For permits for spraying or dipping operations utilizing flammable or combustible liquids, or the application of combustible powders regulated by Article 45, see Section 105, Permit s.1.

4501.4 Smoking. Smoking shall be prohibited in spray-finishing areas and in the vicinity of dip tanks. NO SMOKING signs with lettering of approved size shall be conspicuously posted in such areas.

4501.5 Welding Warning Signs. Conspicuous signs with the following warning shall be posted in the vicinity of spraying 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.

4501.6 Electrical Wiring and Equipment. Electrical wiring and equipment shall be in accordance with Article 45 and the Electrical Code.

4501.7 Storage, Use and Handling of Flammable and Combustible Liquids. The storage , use and handling of flammable and combustible liquids shall be in accordance with Article 79.

SECTION 4502 — SPRAY FINISHING

4502.1 Location of Spray-finishing Operations. When conducted in buildings used for assembly, educational, institutional or residential occupancies, spray-finishing operations shall be located in a spraying room protected with an approved automatic sprinkler system and separated vertically and horizontally from other areas in accordance with the Building Code.

In other occupancies, spray-finishing operations shall be conducted in a spray booth, spraying area or spraying room approved for such use. Limited spraying areas for touch-up or spot painting may be approved by the chief, provided they meet the requirements of Article 45. See Section 4502.6.

4502.2 Spray Booths.

4502.2.1 Materials. Spray booths shall be substantially constructed of steel not less than 0.044 inch (1.118 mm) (18 gage) in thickness or other approved noncombustible materials.

4502.2.2 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, Division 2 Occupancy without area increases, as set forth in the Building Code (see U.B.C. Table 5-B).

The area of any individual spray booth in a building shall not exceed the lesser of the aggregate size limit or 1,500 square feet (139 m^2).

EXCEPTION: One individual booth not exceeding 500 square feet (45 m^2).

4502.2.3 Surfaces. Interior surfaces of spray booths shall be smooth and continuous without edges and otherwise designed to prevent pocketing of residue, to allow free passage of exhaust air from all parts of the interior and to facilitate washing and cleaning without injury.

4502.2.4 Floors. Floors of spray booths shall be of noncombustible material or shall be covered with a noncombustible, nonsparking material of such character to facilitate safe cleaning and removal of residue.

4502.2.5 Baffles. If installed, baffle plates shall be of a noncombustible material readily removable or accessible to facilitate cleaning and designed to provide an even flow of air through the booth and to prevent the deposit of overspray before it enters the exhaust duct. Baffle plates shall not be installed in the exhaust ducts.

4502.2.6 Deflectors. Spray booths having a frontal area of more than 9 square feet (0.84 m^2) and not equipped with doors shall have a metal deflector or fire curtain not less than $4\frac{1}{2}$ inches (114.3 mm) deep installed at the upper outer edge of the booth over the booth opening.

4502.2.7 Separation. Spray booths shall be separated from other operations by not less than 3 feet (914 mm), by a wall or partition, or by a greater distance as required by the chief.

4502.2.8 Clear space. All portions of spray booths shall be readily available for cleaning, and a clear space of not less than 3 feet (914 mm) shall be kept free of storage or combustible materials.

4502.2.9 Light fixtures. When spray booths are illuminated, fixed lighting units which transmit light into the spray booth through heat-treated or hammered wire glass shall be used. Glass panels shall be arranged to minimize breakage and so that normal accumulation of residue on the exposed surface of a panel will not be raised to a dangerous temperature by heat from the source of illumination.

4502.2.10 Exit doors. Exit doors from premanufactured paint spray booths shall not be less than 2 feet 6 inches by 6 feet 8 inches (763 mm by 2032 mm).

4502.3 Spray Booths Using Dry Filters.

4502.3.1 General. Spray booths using dry filters and dry filter rolls and the use and handling of such filters shall be in accordance with Section 4502.3.

4502.3.2 Maintaining air velocity. Spray booths equipped with a filter roll which is automatically advanced when the air velocity is reduced to less than 100 lineal feet (30 480 mm) per minute shall be arranged to cause shut down of spraying operations if the filter roll fails to automatically advance.

Visible gages or audible alarm devices shall be installed to indicate that the required air velocity is maintained in accordance with Section 4502.5.

4502.3.3 Filter disposal. Discarded filter pads shall be immediately removed to a safe, well-detached location or placed in a water-filled metal container and disposed of at the close of each day's operation.

4502.3.4 Filter obstruction. Articles being sprayed shall be positioned in a spray booth in a manner which does not obstruct collection of overspray.

4502.3.5 Spontaneous ignition. Spray booths using dry filters shall not be used for spraying materials which are known to be highly susceptible to spontaneous heating and ignition.

Filters shall be changed prior to spraying materials which could react with other materials previously collected. Examples of potentially reactive combinations include lacquer when combined with varnishes, stains or primers. See also Section 4502.9.5.

4502.3.6 Filter material. Clean filters shall be noncombustible or of an approved type.

4502.4 Sources of Ignition.

4502.4.1 General. Open-flame and spark-producing equipment shall not be located in spraying areas and shall not be located within 20 feet (6096 mm) of spraying areas unless separated by a partition.

EXCEPTION: Equipment allowed by Sections 4502.10, 4504.1 and 4504.2.

4502.4.2 Hot surfaces. Space-heating appliances, steam pipes and hot surfaces shall not be located in spraying areas where deposits of combustible residues could readily accumulate.

4502.4.3 Electrical wiring and equipment.

4502.4.3.1 Areas subject to overspray deposits. Electrical equipment in spraying 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.

EXCEPTIONS: 1. Wiring in rigid conduit, boxes or fittings not containing taps, splices or terminal connections.

2. Equipment allowed by Sections 4502.10, 4504.1 and 4504.2.

4502.4.3.2 Areas not subject to overspray deposits. Electrical wiring and equipment not subject to deposits of combustible residues but located in a spraying area shall be of an explosion-proof type approved for use in a Class I, Division 1 hazardous location in accordance with the Electrical Code.

Electrical wiring, motors and other equipment located outside of, but within 20 feet (6096 mm) of, a spraying area and not separated from the spraying area by partitions shall not produce sparks under normal operating conditions. Electric lamps in such areas shall be totally enclosed to prevent the falling of hot particles and shall be protected from physical damage by suitable guards or by location. Such areas shall be considered a Class I, Division 2 hazardous location in accordance with the Electrical Code.

4502.4.3.3 Portable electric lamps. Portable electric lamps shall not be used in spraying areas during spraying operations. Portable electric lamps, if used during cleaning or repairing operations, shall be of a type approved for hazardous locations.

4502.4.4 Grounding. Metal parts of spray booths, exhaust ducts and piping systems conveying Class I or II liquids shall be electrically grounded in accordance with the Electrical Code.

4502.5 Ventilation of Spray Booths and Spraying Areas.

4502.5.1 General. Spraying areas shall be provided with mechanical ventilation adequate to prevent the dangerous accumulation of vapors.

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 spraying area such that spraying operations cannot be conducted unless the ventilation system is in operation.

Air exhausted from spraying operations shall not be recirculated.

4502.5.2 Air velocity. Ventilation systems shall be designed, installed and maintained such that the average air velocity over the open face of the booth, or booth cross section in the direction of airflow during spraying operations, shall not be less than 100 lineal feet (30 480 mm) per minute.

4502.5.3 Independent ducts. Each spray booth shall have an independent exhaust duct system discharging to the building's exterior.

EXCEPTION: Multiple cabinet spray booths having a combined frontal area of 18 square feet (1.62 m^2) or less are allowed to have a common exhaust when 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 operate simultaneously.

4502.5.4 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 casings shall consist of or be lined with such material.

Belts shall not enter ducts or booths unless belts and pulleys within a duct or booth are tightly enclosed.

4502.5.5 Duct material and discharge point. Exhaust ducts shall be constructed of steel having a thickness in accordance with Table 4502.5-A. The point of discharge for exhaust ducts from spray booths shall not be less than 6 feet (1829 mm) from adjoining combustible construction and not less than 25 feet (7620 mm) from adjoining exterior wall openings.

EXCEPTION: The point of discharge for exhaust ducts from water wash spray booths is not regulated.

TABLE 4502.5-A—MINIMUM THICKNESS OF EXHAUST DUCTS

DIAMETER OF DUCT (inches)	MINIMUM SHEET THICKNESS (inches)
× 25.4 for mm	
8 or less	0.021 (24 gage)
Over 8 to 18	0.027 (22 gage)
Over 18 to 30	0.033 (20 gage)
Over 30	0.044 (18 gage)

4502.5.6 Clearance between ducts and combustible construction.

4502.5.6.1 General. Exhaust ducts shall have a clearance from combustible construction or material of not less than 18 inches (457 mm) unless protection of exposed surfaces is provided in accordance with Section 4502.5.6.2.

4502.5.6.2 Protected combustible construction. When combustible construction is provided with the following protection applied to all surfaces within 18 inches (457 mm) of the exhaust duct, clearances shall not be less than those indicated:

1. 0.013-inch (0.33 mm) (28 gage) sheet metal on $^1/_4$-inch (6.4 mm) insulating millboard ..... 12 inches (305 mm)
2. 0.013-inch (0.33 mm) (28 gage) sheet metal on $^1/_8$-inch (3.2 mm) insulating millboard spaced out 1 inch (25.4 mm) on noncombustible spacers ... 9 inches (229 mm)
3. 0.027-inch (0.67 mm) (22 gage) sheet metal on 1-inch (25.4 mm) rockwool batts reinforced with wire mesh or the equivalent ..... 3 inches (76 mm)

4502.5.7 Product-conveying system intake. The mechanical ventilation system shall have air intake ducts extended to pick up flammable vapor within 6 inches (153 mm) of the floor.

4502.5.8 Duct bends. Exhaust ducts shall not include individual bends exceeding 45 degrees measured from the center line of the duct. Bends, turns and elbows in ducts and pipes shall be constructed in a manner which does not reduce the cross-sectional area of the duct or pipe.

4502.5.9 Cleanouts. Cleanout openings shall be provided at intervals which allow thorough cleaning of ducts. Cleanout openings in ducts and pipes shall be equipped with tightfitting sliding or hinged doors constructed of metal which is equal to or greater than the thickness of the duct or pipe. Such doors shall be equipped with a substantial latch to hold the door tightly closed.

4502.6 Limited Spraying Areas.

4502.6.1 General. When approved by the chief, limited spraying areas are allowed in accordance with Section 4502.6.

4502.6.2 Occupancy. Limited spraying areas shall only be located in Group H, Division 4 Occupancies.

4502.6.3 Job size. The aggregate surface area to be sprayed shall not exceed 9 square feet (0.84 m^2).

4502.6.4 Frequency. Spraying operations shall not be of a continuous nature.

4502.6.5 Ventilation. Positive mechanical ventilation shall be installed which provides a minimum of six complete air changes per hour. Such system shall meet the requirements of this code for handling flammable vapors.

4502.6.6 Electrical wiring. Electrical wiring within 10 feet (3048 mm) of the floor shall be designed for Class I, Division 2 locations in accordance with the Electrical Code.

4502.7 Storage, Use and Handling of Flammable and Combustible Liquids.

4502.7.1 General. The storage and handling of flammable and combustible liquids shall be in accordance with Article 79 and Section 4502.7.

4502.7.2 Storage. Where the quantity of liquid in 5-gallon (18.9 L) and smaller containers, other than original sealed containers, exceeds a total of 10 gallons (37.9 L), such liquids shall be stored in a storage cabinet, liquid storage room or a room or building for using, dispensing and mixing liquids in quantities exceeding exempt amounts. See Sections 7902.5.9, 7902.5.11 and 7903.2.3. Open containers and glass containers shall not be used.

4502.7.3 Handling. Original closed containers, approved portable tanks, approved safety cans or a properly arranged system of piping shall be used for bringing flammable or combustible liquids into spray-finishing areas.

4502.7.4 Use. Containers supplying spray nozzles shall be of a closed type or provided with metal covers which 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) capacity.

4502.7.5 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.

4502.7.6 Ignition sources. Heaters shall not be located in spray booths or other locations subject to accumulation of deposits or combustible residue.

4502.7.7 Pumped liquid supplies. If 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.

4502.7.8 Liquid transfer. When a flammable mixture is transferred from one portable container to another, a bond shall be provided between the two containers. At least one container shall be grounded. Piping systems for Class I and Class II liquids shall be permanently grounded.

4502.8 Fire-protection Equipment.

4502.8.1 General. Spray booths and spraying rooms shall be protected by approved automatic fire-extinguishing systems. Such systems shall be extended to protect exhaust plenums, exhaust ducts and both sides of dry filters when such filters are used. For installation of automatic sprinklers in ducts, see the Mechanical Code. (See U.M.C. Chapter 5.)

4502.8.2 Fire extinguishers. Portable fire extinguishers shall be provided for spraying areas in accordance with the requirements for an extra (high) hazard occupancy as set forth in U.F.C. Standard 10-1.

4502.9 Operations and Maintenance.

4502.9.1 General. Spraying areas shall be kept free from the accumulation of deposits of combustible residues, as practical, with cleaning conducted daily if necessary.

4502.9.2 Tools. Scrapers, spuds or other tools used for cleaning purposes shall be constructed of nonsparking materials.

4502.9.3 Residue. Residues removed during cleaning and debris contaminated with residue shall be immediately removed from premises and properly disposed of.

4502.9.4 Use of solvents.

4502.9.4.1 Class I liquids.

4502.9.4.1.1 General. Class I liquids used as solvents shall be used in spray gun and equipment cleaning machines which have been listed and approved for such purpose or shall be used in spray booths or spraying rooms in accordance with Section 4502.9.4.

4502.9.4.1.2 Listed devices. Spray gun and equipment cleaning machines shall be limited to an aggregate container capacity of 10 gallons (37.9 L). Such machines shall be located in areas not 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.

4502.9.4.1.3 Within spray booths and spraying rooms. When solvents are used for cleaning spray nozzles and auxiliary equipment, the ventilating equipment shall be operated during cleaning.

4502.9.4.2 Class II and Class III liquids. Solvents used outside of spray booths, spraying rooms or listed and approved spray gun and equipment cleaning machines shall be restricted to Class II and Class III liquids.

4502.9.5 Alternate use of materials. Spray booths shall not be alternately used with different types of coating materials where the combination of the materials could be conducive to spontaneous ignition, unless all deposits of the first-used material are removed from the booth and exhaust ducts prior to spraying with the second material.

4502.9.6 Waste receptacles. Approved metal waste cans shall be provided for rags and waste impregnated with finishing materials. Rags and waste impregnated with finishing materials shall be deposited in such waste cans immediately after use. The contents of waste cans shall be properly disposed of at least once daily and at the end of each shift.

4502.10 Drying Apparatus.

4502.10.1 General. Drying apparatus shall be in accordance with Section 4502.10 and Article 62.

4502.10.2 Spray booths and spraying rooms.

4502.10.2.1 General. Spray booths and spraying rooms shall not be alternately used for the purpose of drying by arrangements which could cause a material increase in the surface temperature of

the spray booth or spraying room unless such spray booths or spraying rooms are used for automobile refinishing in accordance with Section 4502.10.2.2.

4502.10.2.2 Automobile refinishing.

4502.10.2.2.1 General. Spray booths and spraying rooms which are used for automobile refinishing with drying conducted therein using drying apparatus shall be in accordance with Section 4502.10.2.2.

4502.10.2.2.2 Drying apparatus. Drying apparatus used in spraying rooms shall be of the portable infrared type.

Drying apparatus used in spray booths shall be of the portable infrared type, or if other types of drying apparatus are used, the spray booth, including drying apparatus, shall be listed and approved for use with flammable vapors and combustible residues and shall be provided with explosion control.

4502.10.2.2.3 Spraying procedure. The spraying procedure shall use low-volume spray application.

4502.10.2.2.4 Housekeeping. The interior of the spray booth or spraying room shall be kept free of overspray deposits.

4502.10.2.2.5 Interlocks. The spraying apparatus, drying apparatus and ventilating system for the spray booth or spraying room shall be equipped with suitable interlocks arranged to:

1. Prevent operation of spraying apparatus while drying operations are in progress,
2. Purge spray vapors from the spray booth or spraying room for a period of not less than three minutes before drying apparatus can be operated,
3. Have the ventilating system maintain a safe atmosphere within the spray booth or spraying room during the drying process and automatically shut off drying apparatus in the event of a failure of the ventilating system, and
4. Automatically shut off the drying apparatus if the air temperature within the booth exceeds 160°F. (71.1°C.) when other than portable infrared drying apparatus is used.

4502.10.2.2.6 Portable infrared apparatus. When portable infrared drying apparatus is used, electrical wiring and portable infrared drying equipment shall comply with Article 45 and the Electrical Code. 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 properly electrically bonded and grounded.

During spraying operations, portable drying apparatus and electrical connections and wiring thereto shall not be located within spray booths, spraying rooms or other areas where spray residue could be deposited thereon.

4502.10.3 Spraying areas. Drying or baking units using a heating system having open flames or which could produce sparks shall not be installed in a spraying area.

When such units are installed adjacent to a spraying area, they shall be equipped with an interlocked ventilating system arranged to:

1. Thoroughly ventilate the drying space before the heating system can be started,
2. Maintain a safe atmosphere at any source of ignition, and
3. Automatically shut down the heating system in the event of a failure of the ventilating system.

SECTION 4503 — DIPPING OPERATIONS

4503.1 Location of Dip Tank Operations. When conducted in buildings used for assembly, institutional or residential occupancies, dip tank operations shall be located in a room designed for the

purpose, protected with an approved automatic sprinkler system, and separated vertically and horizontally from other areas in accordance with the Building Code.

4503.2 Ventilation of Vapor Areas. Vapor areas shall be provided with mechanical ventilation adequate to prevent the dangerous accumulation of vapors.

Required ventilating systems shall be arranged such that the failure of any ventilating fan will automatically stop dipping conveyor systems.

4503.3 Construction of Dip Tanks and Appurtenances.

4503.3.1 General. Dip tanks, including drain boards if provided, shall be constructed of substantial noncombustible material and their supports shall be of heavy metal, reinforced concrete or masonry.

4503.3.2 Overflow. Dip tanks of over 150 gallons (568 L) in capacity or 10 square feet (0.93 m^2) in liquid surface area shall be equipped with a properly trapped overflow pipe leading to a safe location outside buildings.

The bottom of the overflow connection shall not be less than 6 inches (153 mm) below the top of the tank.

4503.3.3 Bottom drains. Dip tanks over 500 gallons (1893 L) in liquid capacity shall be equipped with automatic and manual bottom drains arranged to quickly drain the tank in event of fire, unless the viscosity of the liquid at normal atmospheric temperature makes this impractical. Manual operation shall be from a safely accessible location. Where gravity flow is not practical, automatic pumps shall be provided.

Such drains shall be trapped and discharged to a closed, properly vented salvage tank or to a safe outside location.

4503.3.4 Conveyor systems. Dip tanks utilizing a conveyor system shall be arranged such that the conveyor system will automatically stop and required bottom drains will open in the event of a fire.

4503.4 Storage and Handling of Flammable and Combustible Liquids. The storage and handling of flammable or combustible liquids shall be in accordance with Article 79.

4503.5 Sources of Ignition.

4503.5.1 General. Open flames and spark-producing devices shall not be located in vapor areas and shall not be located within 20 feet (6096 mm) of vapor areas unless separated by a tight partition.

EXCEPTION: Drying and baking apparatus complying with Section 4502.10.3.

4503.5.2 Hot surfaces. Heated surfaces having a temperature sufficient to ignite vapors shall not be located in vapor areas.

4503.5.3 Electrical wiring and equipment.

4503.5.3.1 Vapor areas. Electrical wiring and equipment in vapor areas shall be of an explosion-proof type approved for use in such hazardous locations. Such areas shall be considered to be Class I, Division 1, hazardous locations in accordance with the Electrical Code.

4503.5.3.2 Areas subject to deposits of residues. Electrical equipment in the vicinity of dip tanks or associated drain boards or drying operations which are subject to splashing or dripping of dip tank liquids shall be specifically approved for locations containing deposits of readily ignitible residue and explosive vapors.

EXCEPTIONS: 1. Wiring in rigid conduit, threaded boxes or fittings not containing taps, splices or terminal connections.

2. Equipment allowed by Section 4504 relating to electrostatic apparatus.

4503.5.3.3 Areas adjacent to vapor areas. Electrical wiring and equipment located outside of, but within 20 feet (6096 mm) of, a vapor area and not separated from the vapor area by tight partitions, shall be approved for Class I, Division 2, hazardous locations in accordance with the Electrical Code.

4503.6 Operations and Maintenance.

4503.6.1 General. Areas in the vicinity of dip tanks shall be kept as clear of combustible stock as practical and shall be kept entirely free of combustible debris.

4503.6.2 Waste receptacles. Approved metal waste cans shall be provided for waste and rags used in connection with dipping operations. Rags and waste impregnated with finishing material shall be deposited in such waste cans immediately after use. The contents of waste cans shall be disposed of at the end of each shift by methods approved by the chief.

4503.7 Fire-extinguishing Equipment.

4503.7.1 General. Areas in the vicinity of dip tanks shall be provided with portable fire extinguishers suitable for flammable liquid fires, as specified for extra (high) hazard occupancies in U.F.C. Standard 10-1.

4503.7.2 Fixed equipment. An approved automatic fire-extinguishing system or dip tank covers in accordance with Section 4503.8 shall be provided for:

1. Dip tanks of over 150-gallon (568 L) capacity or 10-square-foot (0.93 m^2) liquid surface area, and

2. Dip tanks containing a liquid with a flash point below 110°F. (43.3°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).

4503.8 Dip Tank Covers.

4503.8.1 General. Dip tanks shall be provided with an automatic-closing cover complying with Section 4503.8 unless they are provided with an approved automatic fire-extinguishing system as specified in Section 4503.7.2.

4503.8.2 Actuation. Covers shall be actuated by approved automatic-closing devices designed to operate in the event of fire and shall also be arranged for manual operation.

4503.8.3 Construction. Covers shall be of substantial noncombustible material or of tin-clad type with enclosing metal applied with locked joints.

4503.8.4 Cover support and operating mechanisms. Chains or wire rope shall be used for cover support or operating mechanisms where the burning of a cord would interfere with the action of a device.

4503.8.5 Tanks not in use. Covers shall be kept closed when tanks are not in use.

4503.9 Hardening and Tempering Tanks.

4503.9.1 General. Hardening and tempering tanks shall be in accordance with Sections 4503.3 through 4503.7 and Section 4503.9, but shall be exempt from other provisions of Section 4503.

4503.9.2 Ignition sources and exposures. Tanks shall be located as far as practical from furnaces and shall not be located on or near combustible floors.

4503.9.3 Venting. Tanks shall be provided with a noncombustible hood and vent or other equally effective means venting to the outside of the building to serve as a vent in case of fire. Such vent ducts shall be treated as flues and shall be kept away from combustible roofs and materials.

4503.9.4 Limit controls. 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.

4503.9.5 Fire protection. Hardening and tempering tanks of over 500-gallon (1893 L) capacity or 25-square-foot (2.32 m^2) liquid surface area shall be protected as specified in Section 4503.7.2.

4503.9.6 Use of air pressure. Air under pressure shall not be used to fill or to agitate oil in tanks.

4503.10 Coating Operations.

4503.10.1 General. Flow coat operations shall be in accordance with the requirements for dip tanks, considering the area of sump and any areas on which paint flows as the area of a dip tank.

4503.10.2 Paint supply. Paint shall be supplied by a direct low-pressure pumping arranged to automatically shut down in case of fire by means of approved heat-actuated devices, or by a gravity tank not exceeding 10 gallons (37.9 L) in capacity.

4503.10.3 Roll coating, spreading and impregnating. The process of roll coating, spreading and impregnating in which fabric, paper or other material is passed directly through a tank or trough containing Class I or II liquids, or over the surface of a roller that revolves partially submerged in a flammable liquid, shall be in accordance with Section 4503.10.4 and the applicable provisions of Sections 4501, 4502 and 4503.

4503.10.4 Ignition sources. Adequate arrangements shall be made to prevent sparks from static electricity by electrically bonding and grounding all metallic rotating and other parts of machinery and equipment and by the installation of static collectors or maintaining a conductive atmosphere by means such as high relative humidity.

SECTION 4504 — ELECTROSTATIC APPARATUS

4504.1 Equipment Type and Location.

4504.1.1 General. Electrostatic apparatus and devices used in connection with paint spraying and paint detearing operations shall be of approved types.

4504.1.2 Location of equipment. Transformers, power packs, control apparatus and other electric portions of the equipment, with the exception of high-voltage grids and electrostatic atomizing heads, the hand gun and their connections, shall be located outside of spraying or vapor areas or shall be in accordance with Sections 4502.4 and 4503.5.

4504.1.3 Construction of equipment. Electrodes and electrostatic atomizing heads shall be of substantial construction, shall be rigidly supported in permanent locations and shall be effectively insulated from ground. Insulators shall be nonporous and noncombustible. When used, fine wire elements shall be under tension at all times and shall be of unkinked hardened steel or material of comparable strength.

4504.2 Controls.

4504.2.1 Clear space. A space of at least twice the sparking distance shall be maintained between goods being painted or deteared and electrodes, electrostatic atomizing heads or conductors. A suitable sign stating the sparking distance shall be conspicuously posted near the assembly.

4504.2.2 Emergency shut down. Electrostatic apparatus shall be equipped with automatic controls which will operate without time delay to disconnect the power supply to the high-voltage transformer and to signal the operator under any of the following conditions:

1. Stopped ventilating fans or failure of ventilating equipment from any cause,
2. Stopped conveyor carrying goods past the high-voltage grid,

3. Occurrence of a ground or of an imminent ground at any point on the high-voltage system, or
4. Reduction of clearance below that specified in Section 4504.2.1.

4504.3 Guards and Signs.

4504.3.1 Barriers. Adequate booths, fencing, railings or guards shall be placed about the equipment such that either by their location or character, or both, they assure that a safe isolation of the process is maintained from plant storage and personnel. Such railings, fencing and guards shall be of conductive material, adequately grounded, and shall be at least 5 feet (1524 mm) from processing equipment.

4504.3.2 Signs. Signs designating the process zone as dangerous with respect to fire and accident hazards shall be posted.

4504.4 Maintenance.

4504.4.1 Insulator. Insulators shall be kept clean and dry.

4504.4.2 Drip plates and screens. Drip plates and screens subject to paint deposits shall be removable and shall be taken to a safe place for cleaning.

4504.5 Ventilation. The spraying area shall be adequately ventilated so as to ensure a safe condition from a fire and health standpoint.

4504.6 Fire Protection. Areas used for electrostatic spray finishing with fixed equipment shall be protected with an approved automatic fire-extinguishing system.

SECTION 4505 — POWDER COATING

4505.1 General. Operations using finely ground particles of protective finishing material applied in dry powder form by fluidized bed, electrostatic fluidized bed, powder spray guns or electrostatic powder spray guns shall be in accordance with Section 4505.

Each method requires certain essential protective measures which shall be compatible with the method employed.

4505.2 Location and Construction of Powder Coating Rooms and Booths. Powder coating operations shall be conducted in completely enclosed rooms constructed of noncombustible materials, enclosed powder coating facilities which are adequately ventilated, or adequately ventilated spray booths meeting the requirements of Section 4502.2.

4505.3 Sources of Ignition. Electrical equipment and other sources of ignition shall be in accordance with the Electrical Code.

When parts are heated prior to coating, the temperature of the parts shall not exceed the ignition temperature of the powder to be used.

Precautions shall be taken to minimize the possibility of ignition by static electrical sparks through static grounding, where possible, of powder transport, application and recovery equipment.

4505.4 Ventilation. Exhaust ventilation shall be sufficient to maintain the atmosphere below the lowest explosive limits for the material being applied. Nondeposited, air-suspended powders shall be safely removed through exhaust ducts to the powder recovery cyclone or receptacle.

4505.5 Drying, Curing and Fusion Equipment. Drying, curing and fusion equipment shall be in accordance with Article 62.

4505.6 Operation and Maintenance.

4505.6.1 Dust accumulation. Areas including but not limited to horizontal surfaces, such as ledges, beams, pipes, hoods, booths and floors, shall be kept free of accumulations of powder coating dusts.

4505.6.2 Cleaning methods. Surfaces shall be cleaned in a manner which avoids scattering dust to other places or creating dust clouds. Equipment shall be approved for use in hazardous locations.

4505.6.3 Spark-producing metals. Care shall be exercised to prevent iron or spark-producing metals from being introduced into the powders being applied. Acceptable methods include magnetic and filter-type separators.

4505.6.4 Smoking. NO SMOKING signs in accordance with Section 1109.4 shall be conspicuously posted at powder coating areas and powder storage rooms.

4505.7 Fixed Electrostatic Spraying Equipment. In addition to Section 4505, Section 4504 shall apply to fixed electrostatic equipment.

4505.8 Electrostatic Fluidized Beds.

4505.8.1 General. Electrostatic fluidized beds and associated equipment shall be of approved types. The maximum surface temperature of such equipment in the coating area shall not exceed 150°F. (65.6°C.). High voltage circuits shall not produce sparks of sufficient intensity to ignite powder-air mixtures or result in a shock hazard upon coming in contact with a grounded object under normal operating conditions.

4505.8.2 Location of equipment. Transformers, power packs, control apparatus and other electrical portions of equipment, with the exception of the charging electrodes and their connections to the power supply, shall be located outside of powder coating areas or shall be in accordance with Section 4505.

4505.8.3 Grounding. Electrically conductive objects within the charging influence of the electrodes shall be adequately grounded. The powder coating equipment shall carry a prominent, permanently installed warning regarding the necessity for grounding these objects.

Objects being coated shall be maintained in contact with the conveyor or other support in order to ensure proper grounding. Hangers shall be regularly cleaned to ensure effective contact, and areas of contact shall be sharp points or knife edges where possible.

4505.8.4 Ventilation interlock. Electrical equipment shall be interlocked with the ventilation system such that the equipment cannot be operated unless the ventilation fans are in operation.

4505.9 Fire Protection.

4505.9.1 General. Areas used for powder coating shall be protected by an approved automatic fire-extinguishing system.

4505.9.2 Additional protection for fixed systems. Fixed powder application equipment shall be protected by the installation of approved flame-detection devices designed to react to the presence of flame within one-half second. Upon detection of a fire by a flame-detection device, automatic controls shall initiate the following:

1. Electrical and pneumatic energy supplies to conveyor, ventilation, application, transfer and powder collection equipment shall be disconnected,

2. Dampers in associated ductwork shall close to interrupt airflows from the application equipment to the powder collectors, and

3. An alarm which is audible throughout the powder coating room or booth shall activate.

SECTION 4506 — ORGANIC PEROXIDES AND DUAL-COMPONENT COATINGS

4506.1 General.

4506.1.1 Contamination prevention. Extreme care should be exercised at all times to prevent the contamination of organic peroxide initiators with foreign substances. See also Section 4506.1.4.

4506.1.2 Equipment. Spray guns and related handling equipment used with organic peroxides shall be specifically manufactured for such use.

4506.1.3 Pressure tanks. Separate pressure vessels and inserts specific for the application shall be used for the resin and for the organic peroxide, and they shall not be interchanged. Organic peroxide pressure tank inserts shall be constructed of stainless steel or polyethylene.

4506.1.4 Residue control. Care shall be exercised to prevent contamination of materials by dusts and overspray residues resulting from the sanding or spraying of finishing materials containing organic peroxides.

4506.1.5 Spilled material. Spilled peroxides shall be promptly removed so there are no residues. Spilled material absorbed by using a noncombustible absorbent shall be promptly disposed of in accordance with the manufacturer's recommendation.

4506.2 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 meeting the requirements of Section 4502.

4506.3 Storage. The storage of organic peroxides shall be in accordance with Article 80.

4506.4 Handling. To avoid decomposition and violent reaction hazards, care shall be exercised in handling organic peroxides to avoid shock and friction.

4506.5 Mixing. To avoid violent decomposition and explosion hazards, organic peroxides shall not be mixed directly with accelerators or promoters.

4506.6 Sources of Ignition. Smoking shall be prohibited and NO SMOKING signs shall be prominently displayed. See Section 1109.4. Only nonsparking tools shall be used in areas where organic peroxides are stored, mixed or applied.

4506.7 Personnel Qualifications. Personnel working with organic peroxides and dual-component coatings shall be specifically trained to work with these materials.

ARTICLE 46 — FRUIT-RIPENING PROCESSES

SECTION 4601 — SCOPE

Ripening processes for green bananas and citrus fruits in tightly closed rooms heated with indirect fired heaters and ripening processes where ethylene gas is introduced into a room to assist the ripening process shall be in accordance with Article 46.

SECTION 4602 — PERMITS

For a permit for a fruit-ripening process, see Section 105, Permit f.4.

SECTION 4603 — USE OF ETHYLENE

4603.1 General. The location of buildings in which fruit-ripening processes utilizing ethylene are conducted shall be approved by the chief.

4603.2 Concentration Controls. Ethylene shall be introduced by a means under positive control and measured so that the quantity introduced does not exceed one part ethylene to 1,000 parts of air.

4603.3 Container Construction. Containers storing ethylene shall be in accordance with Section 7401.4.

4603.4 Storage. Containers other than those connected for use shall be stored outside of ripening process buildings or in a special building.

> **EXCEPTION:** Storage of not more than two portable containers complying with Section 7401.4 and approved for transportation is allowed in ripening process buildings. Such inside rooms or portions of buildings used for storage of these containers shall be constructed in accordance with Section 4909.3.

4603.5 Piping. Piping containing ethylene shall be constructed of iron. Flexible connectors and hose, when used, shall be of an approved type. Tubing shall be of brass or copper with not less than 0.049-inch (1.2 mm) wall thickness.

SECTION 4604 — ELECTRICAL EQUIPMENT AND ILLUMINATION

4604.1 Electrical Equipment. Electrical wiring and equipment shall be installed in accordance with the Electrical Code.

4604.2 Illumination. Sources other than electrical lighting shall not be used for supplemental illumination.

SECTION 4605 — HEATING

4605.1 General. Heating of ripening rooms shall be by indirect means with low-pressure steam; hot water or warm air; or approved electric, gas or kerosene heaters. Combustion type heaters shall have sealed combustion chambers.

4605.2 Clearance. Steam and hot-water pipes and radiators shall have a clearance of at least 1 inch (25.4 mm) to combustible material.

Gas heaters and their vents shall be installed in accordance with the Mechanical Code. Gas heaters shall be equipped with an automatic pilot device to shut off the gas supply when the flame is extinguished.

4605.3 Combustion Air. Combustion air for burners in gas and kerosene heaters shall be taken from outside the ripening room. Products of combustion shall be discharged to the outside.

4605.4 Installation. Fuel-fired heaters shall be installed in accordance with the Mechanical Code.

4605.5 Electric Heaters. Electric heaters shall be of a type which does not have exposed surfaces with temperatures higher than 800°F. (426.7°C.). Thermostatic elements in such heaters shall not produce sparks and shall be of a type approved for use in hazardous locations.

4605.6 Guards. Protective guards shall be provided around heaters to prevent heaters from being knocked over by other equipment such as vehicles or lift trucks.

SECTION 4606 — SOURCES OF IGNITION

4606.1 Open Flames and Lights. Open-flame heaters and open lights shall not be located in ripening rooms.

4606.2 Smoking. NO SMOKING signs shall be posted at every entrance, and smoking shall be prohibited in ripening rooms. See Section 1109.4.

SECTION 4607 — HOUSEKEEPING

Ripening rooms shall be frequently cleared of combustible materials.

ARTICLE 47 — FUMIGATION AND THERMAL INSECTICIDAL FOGGING

SECTION 4701 — SCOPE

Fumigation and thermal insecticidal fogging operations shall be in accordance with Article 47.

SECTION 4702 — PERMITS

For a permit to engage in the business of fumigation or thermal insecticidal fogging or to maintain a fumigation room, vault or chamber in which a toxic or flammable fumigant is used, see Section 105, Permit f.5.

SECTION 4703 — SOURCES OF IGNITION

4703.1 General. Fires, open flames and similar sources of ignition shall be eliminated from spaces under fumigation or thermal insecticidal fogging. Heating, if needed, shall be of an approved type.

4703.2 Electrical Equipment. If the fumigant used has a flammability rating of 2 or higher as set forth in Table 4703-A, the electric service shall be disconnected outside of the premises. If the fumigant has a flammability rating of less than 2, electric service need not be disconnected.

When fumigants having a flammability rating of 2 or higher are used, temporary remote control power leads with control switches located outside the fumigated space are allowed for powering fumigant-circulating fans in the fumigated space. Such fans shall be approved for the intended use.

SECTION 4704 — NOTIFICATION OF FUMIGATION

The chief shall be notified in writing at least 24 hours before any building, structure or ship is to be closed in connection with the use of toxic or flammable fumigants.

EXCEPTION: In warehouses or other structures used for the storage of produce, tarp-enclosed fumigation of not more than 5 percent of the total volume of the warehouse is allowed without notification when the fumigation is conducted by a licensed fumigator.

SECTION 4705 — BREATHING APPARATUS

Persons engaged in the business of fumigation or thermal insecticidal fogging shall maintain and have available approved protective breathing apparatus.

SECTION 4706 — WATCH DURING FUMIGATION

Where a flammable gas or substance generating a flammable gas is used for fumigation, the employer shall provide 24-hour supervision from the time the premises have been fumigated until ventilation work has been completed.

EXCEPTION: Approved gas-tight vaults and tanks.

SECTION 4707 — SEALING OF BUILDINGS

Paper and other similar materials which are not flame resistant shall not be used to wrap or cover a building in excess of that required for the sealing of cracks, casements and similar openings.

EXCEPTION: Approved tarps.

SECTION 4708 — WARNING SIGNS

Where fumigants are used or stored, conspicuous warning signs bearing the "skull and crossbones" emblem with the warning DANGER! POISON GAS! KEEP OUT! and designating the name of the

fumigant and the fumigator's name, address and telephone number shall be posted in a manner which provides adequate warning.

SECTION 4709 — VENTING AND CLEANUP

At the end of the exposure period, fumigators shall safely and properly ventilate the premises and contents; properly dispose of fumigant containers, residues, debris and other materials used for such fumigation; and clear obstructions from gas-fired appliance vents.

SECTION 4710 — THERMAL INSECTICIDAL FOGGING LIQUIDS

Thermal insecticidal fogging liquids having a flash point below 100°F. (37.8°C.) shall not be used.

SECTION 4711 — CARBON DISULFIDE AND HYDROGEN CYANIDE

The use of carbon disulfide (CS_2) and hydrogen cyanide (HCN) shall be restricted to agricultural fumigation.

TABLE 4703-A—CHARACTERISTICS OF SELECTED FUMIGANTS

CHEMICAL NAME	CHEMICAL FORMULA	BOILING POINT (°F.) $-32 \times 5/9$ for °C.	WATER SOLUBLE[1]	FLAMMABLE LIMITS (% VOL. IN AIR)	DEGREE OF HAZARDS[2] H	F	R	REMARKS
Acrylonitrile[3]	CH_2CHCN	171	No	3-17	4	3	2	May polymerize violently on contact with alkali unless inhibited. Decomposes and releases hydrogen cyanide at high temperatures or in contact with acids.
Aluminum Phosphide (formulated)	AlP	See Phosphine						Not flammable in dry state but reacts with moisture to produce phosphine gas.
Benzene[3]	C_6H_6	176	No	1.3-7.1	2	3	0	Can be absorbed through skin.
Calcium Cyanide	$Ca(CN)_2$	See Hydrogen Cyanide						Reacts slowly with moisture to release hydrogen cyanide.
Carbon Disulfide[3]	CS_2	115	No	1.3-44	2	3	0	Low ignition temperature—212°F. (100°C.).
Carbon Tetrachloride[3]	$C Cl_4$	170	No	None	2	0	0	Decomposes at elevated temperatures to form phosgene and hydrogen chloride.
Chloroform[3]	$CH Cl_3$	142	No	None	2	0	0	Decomposes at elevated temperatures to form phosgene and hydrogen chloride.
Chloropicrin	$CCl_3 NO_2$	233.6	No	None	4	0	1	Causes severe eye irritation (tear gas). May decompose violently when heated above 390°F. (199°C.).
Ethylene Dibromide	$CH_2Br CH_2Br$	268.7	No	None	3	0	0	
Ethylene Dichloride[3]	$CH_2Cl CH_2Cl$	183	No	6.2-16	2	3	0	Decomposes at elevated temperatures to give off phosgene.
Ethylene Oxide[3]	CH_2OCH_2	51	Yes	3-100	2	4	3	May polymerize violently in contact with highly reactive catalytic surfaces. Cannot depend upon odor for warning.
Hydrogen Cyanide	HCN	79	Yes	6-41	4	4	2	Almond-like odor, but do not depend upon odor for warning. May polymerize violently when unstabilized. Can be absorbed through skin.
Methyl Bromide	CH_3Br	40	No	10-16	3	1	0	
Phosphine	PH_3	-125	No	1.79	3	4	1	Decomposes when heated to give phosphorus oxides. Low ignition temperature 212 to 302°F. (100 to 150°C.). Explosive under vacuum fumigation conditions.
Propylene Oxide[3]	CH_2CHOCH_3	95	Yes	2.1-21.5	2	4	2	Cannot depend upon odor for warning.
Sulfur Dioxide[3]	SO_2	14	Slightly	None	3	0	0	Vapors are corrosive to some metals.
Sulfuryl fluoride	SO_2F_2	-67	No	None	2	0	0	Cannot depend upon odor for warning.

[1]From standpoint of use of water for extinguishment by dilution.

[2]H=Health, F=Flammability, R=Reactivity. If the fumigant is a mixture of compounds, use numbers corresponding to the properties of the mixture. See U.F.C. Standard 79-3.

[3]Seldom used singly as fumigant, but used as components of mixtures.

ARTICLE 48 — MAGNESIUM

SECTION 4801 — SCOPE

Storage, handling and processing of magnesium, including the pure metal and alloys of which the major part is magnesium, shall be in accordance with Article 48.

SECTION 4802 — PERMITS

For a permit for the melting, casting, heat treating, machining or grinding of magnesium, see Section 105, Permit m.1.

SECTION 4803 — STORAGE OF PIGS, INGOTS AND BILLETS

4803.1 Outdoor Storage. Outdoor storage of magnesium pigs, ingots and billets shall be in piles not exceeding 1,000,000 pounds (453 592.3 kg) each, separated by aisles not less in width than one half the pile height, and separated from combustible materials or buildings on the same or adjoining property by a distance of not less than the height of the nearest pile.

4803.2 Indoor Storage. Indoor storage of pigs, ingots and billets shall be on floors of noncombustible construction, in piles not larger than 500,000 pounds (226 796.2 kg) each, and separated by aisles not less in width than one half the pile height.

SECTION 4804 — MELTING POTS

Floors under and around melting pots shall be of noncombustible construction.

SECTION 4805 — STORAGE OF MAGNESIUM ARTICLES IN FOUNDRIES AND PROCESSING PLANTS

The size of storage piles of magnesium articles in foundries and processing plants shall not exceed 1,250 cubic feet (35.4 m^3). Storage piles shall be separated by aisles not less in width than one half the pile height.

SECTION 4806 — HEAT-TREATING OVENS

Approved means shall be provided for control of magnesium fires in heat-treating ovens.

SECTION 4807 — MAGNESIUM PROCESSING OPERATIONS

4807.1 Dust Collection.

4807.1.1 General. Magnesium grinding, buffing and wire brushing operations, other than rough finishing of castings, shall be provided with suitable hoods or enclosures for dust collection which are connected to a liquid precipitation type of separator that converts dust to sludge without contact in a dry state with any high-speed moving parts.

4807.1.2 Duct construction. Connecting ducts or suction tubes shall be completely grounded, as short as possible, and without unnecessary bends. Ducts shall be carefully fabricated and assembled, with a smooth interior, with internal lap joints pointing in the direction of air flow and without unused capped side outlets, pockets or other dead-end spaces which might allow an accumulation of dust.

4807.1.3 Independent dust separators. Each machine shall be equipped with an individual dust-separating unit.

EXCEPTIONS: 1. One separator is allowed to serve two dust-producing units on multi-unit machines.

2. One separator is allowed to serve not more than four portable dust-producing units in a single enclosure or stand.

4807.2 Power Supply Interlock. Power supply to machines shall be interlocked with exhaust air flow, and liquid pressure level or flow. Interlocks shall provide for improper functioning of the dust removal and separator system to shut down the machine it serves.

4807.3 Electrical Equipment. Electric wiring, fixtures and equipment in the immediate vicinity of and attached to dust-producing machines, including those used in connection with separator equipment, shall be of approved types and shall be approved for use in Class II, Division 1 hazardous locations in accordance with the Electrical Code.

4807.4 Grounding. Equipment shall be securely grounded by permanent ground wires in accordance with the Electrical Code.

SECTION 4808 — FIRE-EXTINGUISHING MATERIALS

A supply of approved extinguishing materials in a substantial container with a hand scoop or shovel for applying material on magnesium fires or an approved extinguisher unit designed for use with such material shall be kept within easy reach of every operator performing a machining, grinding or other processing operation on magnesium.

SECTION 4809 — STORAGE OF MAGNESIUM ARTICLES

4809.1 General. Magnesium storage in quantity greater than 50 cubic feet (1.4 m^3) shall be separated from storage of other materials that are either combustible or in combustible containers by aisles equal in width to not less than the height of the magnesium piles.

4809.2 Storage of Greater than 1,000 Cubic Feet (28.3 m^3). Magnesium storage in quantities greater than 1,000 cubic feet (28.3 m^3) shall be separated into piles, each not larger than 1,000 cubic feet (28.3 m^3) with aisles between equal in width to not less than the pile height. Such storage shall not be located in unsprinklered combustible buildings.

4809.3 Storage in Combustible Containers or within 30 Feet (9144 mm) of Other Combustibles. Magnesium stored in combustible containers or within 30 feet (9144 mm) of other combustibles shall not be stored in unsprinklered combustible buildings.

SECTION 4810 — FINE MAGNESIUM SCRAP

4810.1 Collection. Chips, turnings and other fine magnesium scrap shall be collected from the pans or spaces under machines and from other places where they collect at least once each working day. Such material shall be placed in a covered, vented steel container and removed to a safe location.

4810.2 Storage.

4810.2.1 General. Magnesium fines shall be kept separate from other combustible materials.

4810.2.2 Storage of 50 to 1,000 cubic feet (1.4 m^3 to 28.3 m^3). Storage of fine magnesium scrap in quantities greater than 50 cubic feet (1.4 m^3) [six 55-gallon (208 L) steel drums] shall be separated from other occupancies by an open space of at least 50 feet (15 240 mm) or by an area separation wall constructed in accordance with the Building Code.

4810.2.3 Storage of greater than 1,000 cubic feet (28.3 m^3). Storage of fine magnesium scrap in quantities greater than 1,000 cubic feet (28.3 m^3) shall be separated from all buildings other than those used for magnesium scrap recovery operations by a distance of not less than 100 feet (30 480 mm).

ARTICLE 49 — WELDING AND CUTTING

SECTION 4901 — GENERAL

4901.1 Equipment. In performance of welding and cutting operations, only approved equipment such as blowpipes, torches, regulators and acetylene generators that have been examined and tested and found to be safeguarded as completely as is practical shall be used.

4901.2 Cylinders and Containers. Cylinders or containers used for the storage of compressed gases shall be in accordance with Article 74.

4901.3 Permits. For a permit to conduct welding and cutting operations, see Section 105, Permit w.1.

SECTION 4902 — PIPING FOR OXYGEN AND FUEL GASES

4902.1 Piping Materials.

4902.1.1 General. Piping for other than oxygen or acetylene shall be of wrought iron, steel, brass or copper pipe, or approved seamless copper, brass or other approved gas tubing. Piping for conveying gas or liquid at pressures up to 150 pounds per square inch (1034 kPa) shall be suitable for a safe working pressure of not less than 150 pounds per square inch (1034 kPa). For pressures in excess of 150 pounds per square inch (1034 kPa), extra-heavy-duty pipe shall be used as a minimum.

4902.1.2 Acetylene piping. Acetylene piping shall be of steel or wrought iron pipe.

4902.1.3 Oxygen piping. Oxygen piping shall be of steel, wrought iron, brass or copper pipe or approved seamless nonferrous gas tubing. Tubing shall be used only for pressures of 150 pounds per square inch (1034 kPa) or less.

4902.2 Installation of Piping.

4902.2.1 General. Piping shall be protected against injury, and allowance made for contraction, expansion, jarring and vibration. If laid underground, piping shall be below the frost line and protected against corrosion. Buried pipe and tubing and outdoor ferrous pipe and tubing shall be covered or painted with a suitable corrosion-resisting material. Low points in piping shall be provided with drip pots and drain valves, the latter to be normally closed with screw caps or plugs.

4902.2.2 Oxygen piping. Oxygen piping shall not be placed in any location where it could be exposed to contact with oil.

4902.3 Joints and Fittings.

4902.3.1 Types. Joints in steel or wrought iron pipe shall be welded, threaded or flanged. Fittings shall be of rolled steel, forged steel, cast steel or malleable iron. Joints in brass or copper pipe shall be welded, threaded or flanged. Joints in approved seamless copper, brass or other approved nonferrous gas tubing shall be made by means of approved fittings or, if of the socket type, with silver solder or similar high-melting-point material. Cast-iron fittings shall not be used.

4902.3.2 Pressure ratings. Fittings for piping conveying gas or liquid at pressures up to 150 pounds per square inch (1034 kPa) shall be suitable for a safe working pressure of not less than 150 pounds per square inch (1034 kPa). For pressures in excess of 150 pounds per square inch (1034 kPa), extra-heavy-duty fittings shall be used as a minimum.

4902.3.3 Oxygen piping with threaded connections. Threaded connections in oxygen piping shall be tinned or made up with other suitable joint sealer applied to the male thread.

4902.4 Testing. Piping shall be tested and proven tight at one and one-half times its maximum working pressure. Mediums used for testing oxygen lines shall be oil free. Flames shall not be used to detect leaks.

SECTION 4903 — MANIFOLDING OF CYLINDERS

4903.1 Oxygen Manifolds. Oxygen manifolds shall not be located in an acetylene generator room or in close proximity to cylinders of combustible gases. Oxygen manifolds shall be located away from highly flammable material such as oil, grease or any substance likely to cause or accelerate fire.

4903.2 Fuel-gas Manifolds. The aggregate capacity of fuel-gas cylinders connected to one manifold inside a building shall not exceed 3,000 cubic feet (85 m^3) of gas, or 300 pounds (136 kg) of liquefied petroleum gas. When more than one such manifold, each supplying only one blowpipe or one machine, is located in the same room, a separation of at least 50 feet (15 240 mm) shall be provided.

Where it is necessary to manifold fuel-gas cylinders having an aggregate gas capacity in excess of 3,000 cubic feet (85 m^3), such manifolds shall be located outside or in a special building, or in a separate room constructed in accordance with Section 4909.2.

SECTION 4904 — STORAGE OF CYLINDERS

4904.1 General. Fuel-gas cylinders stored inside a building, except those in actual use or attached and ready for use, shall be limited to a total capacity of 3,000 cubic feet (85 m^3) of gas or 300 pounds (136 kg) of liquefied petroleum gas. Storage exceeding the above amount shall be in a separate room as provided for by Section 4909, or cylinders shall be kept outside or in a special building. Buildings, rooms or compartments provided for such storage shall be well ventilated and be without open-flame heating or lighting devices.

4904.2 Protection. Cylinders stored inside of buildings shall be away from highly combustible materials and in locations where they are not subject to excessive rise in temperature, mechanical injury or tampering. Cylinders, including empty ones, shall have their caps in place and valves tightly closed.

Compressed gas cylinders in service or in storage shall be adequately secured to prevent falling or being knocked over.

SECTION 4905 — LIQUID OXYGEN

Where liquid oxygen in a quantity exceeding 100 gallons (379 L) is to be used for welding or cutting, the container or containers shall be located outside or in a special building having no other occupancy except that related to the handling and gasification of the oxygen.

SECTION 4906 — HOSES AND HOSE CONNECTIONS

4906.1 Pressure Rating. Hoses shall be capable of withstanding a hydrostatic pressure of 800 pounds per square inch (5512 kPa).

4906.2 Construction. A single hose having more than one gas passage, a wall failure of which would permit the flow of one gas into the other gas passage, shall not be used. Where two hoses joined by a web so as to form integral lengths of double hose are used, the two hoses shall be identified as follows:

1. By exterior color, such as green for oxygen and red for acetylene, or
2. If the entire exterior of both passages is of the same color, the two sides shall be distinguished by feel or touch such as by smooth versus ribbed or rough exterior surfaces.

4906.3 Taping of Multiple Hoses. When parallel lengths of oxygen and acetylene hose are taped together for convenience and to prevent tangling, not more than 4 inches (102 mm) out of each 8 inches (204 mm) shall be covered by tape.

4906.4 Hose Connections. Hose connections shall be clamped or otherwise securely fastened in a manner that will withstand, without leakage, twice the pressure to which they are normally subjected in service, but not less than 300 pounds per square inch (2067 kPa).

4906.5 Inspection. Hose shall be inspected frequently for leaks, burns, tears, loose connections or other defects which could render the hose unfit for service. Where hose shows excessive wear or has been subjected to flashback, it shall be inspected and tested at twice the normal pressure to which it is subjected in service, but not less than 200 pounds per square inch (1378 kPa) before being returned to service. Defective lengths of hose shall be discarded.

SECTION 4907 — GENERAL SAFETY RULES

4907.1 Gas Mixing Devices. Devices or attachments facilitating or allowing mixture of air or oxygen with combustible gases prior to consumption shall not be used unless approved for the purpose or located at the burner in a standard torch or blowpipe.

4907.2 Gas Transfer and Mixing. The user shall not transfer gases from one cylinder to another or mix gases in a cylinder.

4907.3 Acetylene.

4907.3.1 Pressure limits for gas. Acetylene gas shall not be generated, piped or utilized at a pressure in excess of 15 pounds per square inch (103.4 kPa) gage unless dissolved in a suitable solvent in cylinders complying with Section 7401.4 and approved for transportation.

EXCEPTION: Acetylene gas piped in approved cylinder manifolds.

4907.3.2 Liquid. The use of liquid acetylene is prohibited.

4907.3.3 Contact with copper. Acetylene gas shall not be brought in contact with unalloyed copper except in a blowpipe or torch.

4907.4 Valves and Pressure-regulating Devices.

4907.4.1 Oxygen. Oxygen used from a cylinder or cylinder manifold shall be routed through a pressure-regulating device intended and marked for use with oxygen.

4907.4.2 Fuel gas. Fuel gas used from cylinders through torches or other devices equipped with shutoff valves shall be routed through a suitable regulator attached to the cylinder valve or manifold to reduce pressure.

4907.5 Housekeeping. Cylinders, valves, regulators, hose and other apparatus and fittings containing or using oxygen shall be kept free from oil or grease. Oxygen cylinders, apparatus and fittings shall not be handled with oily hands or gloves or greasy materials.

4907.6 Cylinder Handling. When moving compressed gas cylinders by crane, suitable cradles shall be used to reduce the possibility of dropping cylinders. Ordinary rope slings or electromagnets shall not be used.

4907.7 Separation of Cylinders from Operations. Oxygen cylinders, fuel-gas cylinders and acetylene generators shall be placed far enough away from welding operations that they will not be unduly heated by radiation from heated materials, sparks, slag, or misdirection of the torch flame.

4907.8 Separation of Operations from Combustibles. Gas welding or cutting shall not be performed in or near rooms or locations where flammable liquids or vapors, lint, dust or loose combustible stocks are located or arranged such that sparks or hot metal from the welding or cutting operations could cause ignition or explosion of such materials.

When gas welding or cutting is performed above or within 10 feet (3048 mm) of combustible construction or material or above a place where workers are employed, or where persons are likely

to pass, noncombustible shields shall be used to protect such materials and persons from sparks and hot metal or oxide.

4907.9 Fire Extinguishers. Fire-extinguishing appliances of an approved type shall be kept at locations where welding or cutting is performed.

4907.10 Fire Watch. When welding or cutting is performed above or within 10 feet (3048 mm) of combustible construction or materials, a fire watch shall be provided to operate fire-extinguishing equipment.

A fire watch shall be maintained for at least one-half hour after completion of cutting or welding operations to detect and extinguish smoldering fires.

SECTION 4908 — CONTAINERS FOR CALCIUM CARBIDE

Containers used for the storage of calcium carbide shall be of metal of sufficient strength to ensure handling without rupture and shall be provided with a screw top or equivalent. Such containers shall be of watertight construction. Solder shall not be used on joints in a manner that would fail upon fire exposure. Containers shall be marked CALCIUM CARBIDE—DANGEROUS IF NOT KEPT DRY.

SECTION 4909 — STORAGE OF CALCIUM CARBIDE IN BUILDINGS

4909.1 General. Storage of calcium carbide inside buildings shall be in a dry, waterproof and well-ventilated area.

4909.2 Quantities Exceeding 600 Pounds (272.2 kg). Calcium carbide in excess of 600 pounds (272.2 kg) stored in a building containing other occupancies shall be kept in an acetylene generator room or separate room in a one-story building without a basement underneath the carbide storage section. Such rooms shall be separated from the remainder of the building by a one-hour occupancy separation constructed in accordance with the Building Code. The room or compartments are also allowed to be used for storage of fuel-gas cylinders, but shall not be used for storage of oxygen. Adequate ventilation shall be provided.

4909.3 Quantities Exceeding 5,000 Pounds (2268 kg). Calcium carbide in excess of 5,000 pounds (2268 kg) shall be stored in a one-story building without a basement used exclusively for storage of fuel-gas cylinders, or in outside acetylene generator houses. Locations of such storage buildings shall be approved by the chief and shall be in accordance with the Building Code.

SECTION 4910 — ACETYLENE GENERATORS

Acetylene generators shall be of an approved type. Acetylene generators shall be plainly marked with the design rate of acetylene production per hour, the amount of weight of carbide necessary for a single charge, the manufacturer's name and address, and the name or number of the type of generator.

SECTION 4911 — ACETYLENE GENERATOR ROOMS

4911.1 Location. Stationary acetylene generators shall be installed in well-ventilated rooms located in one-story buildings or on the top floor or roof of multistory buildings. Such rooms shall be separated from the remainder of the building by a one-hour occupancy separation constructed in accordance with the Building Code. At least one wall of such rooms shall be an exterior wall.

4911.2 Explosion Control. Approved explosion control shall be provided. The venting area in exterior walls and roofs shall not be less than 0.02 square foot per cubic foot (0.0656 m^2 per m^3) of room volume.

4911.3 Storage of Fuel Gas. Fuel-gas cylinders stored in acetylene generator rooms shall not exceed a total capacity of 3,000 cubic feet (85 m^3) of gas, or 300 pounds (136 kg) of liquefied petroleum gas.

SECTION 4912 — PORTABLE ACETYLENE GENERATORS

4912.1 Location. Portable generators shall not be used in rooms having a total volume less than 35 times the total gas-generating capacity per charge of all generators in the room. The gas-generating capacity in cubic feet (m^3) per charge shall be assumed as 4.5 times the weight of carbide per charge in pounds (57.9 × weight of carbide per charge in kg). Generators shall not be used in rooms having a ceiling height less than 10 feet (3048 mm).

4912.2 Handling. Acetylene generators shall not be moved by derrick cranes or hoists when charged.

SECTION 4913 — PROTECTION FROM FREEZING

Acetylene generators shall not be placed in locations where water would freeze. Salt and other corrosive chemicals shall not be used as protection from freezing.

ARTICLE 50 — MANUFACTURE OF ORGANIC COATINGS

SECTION 5001 — SCOPE

Processes manufacturing protective and decorative finishes or coating for industrial, automotive, marine, transportation, institutional, household or other purposes, including the handling of flammable or combustible liquids, combustible solids and dusts, shall be in accordance with Article 50.

EXCEPTION: Processes manufacturing nonflammable or water-thinned coatings and operations applying coating materials.

SECTION 5002 — DEFINITIONS

For definition of ORGANIC COATING, see Article 2.

SECTION 5003 — PERMITS

For permits for organic coating manufacturing operations, see Section 105, Permit o.2.

SECTION 5004 — PROCESS BUILDINGS

5004.1 General. Manufacturing of organic coatings shall be performed only in buildings meeting the requirements of a Group H Occupancy as specified in the Building Code. Such buildings shall not have pits or basements and shall be provided with approved explosion control. See the Building Code.

5004.2 Location. Organic coating manufacturing operations and operations incidental to or connected with organic coating manufacturing shall not be located in buildings having other occupancies.

5004.3 Firefighting Access. Organic coating manufacturing operations shall be accessible from at least one side for the purpose of fire control.

5004.4 Drainage Control. Where topographical conditions are such that flammable or combustible liquids could flow from organic coating manufacturing operations and constitute a fire hazard to properties of others, drainage facilities shall be provided in accordance with Section 5006.

5004.5 Ventilation. Enclosed buildings in which Class I liquids are processed or handled shall be ventilated at a rate of not less than $^1/_2$ cubic foot per minute per square foot (2.55 L/s per m^2) of solid floor area. Ventilation shall be accomplished by exhaust fans taking suction at floor levels and discharging to a safe location outside of the building. Provision shall be made for introduction of noncontaminated intake air in such a manner that all portions of solid floor areas will be subject to a continuous distributed movement of air.

5004.6 Heating. When provided, heating in hazardous areas shall be provided by indirect means. Ignition sources such as open flames and electrical heating elements shall not be used within process buildings unless in accordance with Section 5011.

SECTION 5005 — STORAGE OF RAW MATERIALS AND FINISHED PRODUCTS

5005.1 General. The storage, use and handling of flammable and combustible liquids shall be in accordance with Article 79.

5005.2 Tanks in Buildings. Tank storage for flammable and combustible liquids inside of buildings shall be in storage areas at or above grade which are separated from the processing area by a two-hour occupancy separation constructed in accordance with the Building Code.

EXCEPTION: Quantities in processing equipment essential to the continuity of operations.

5005.3 Tank Car and Tank Vehicle Loading and Unloading Facilities. Tank car and tank vehicle loading and unloading stations for Class I liquids shall be separated from processing areas, other plant buildings, property lines to property that could be built upon, or public thoroughfares by a clear space of not less than 25 feet (7620 mm).

Loading and unloading structures and platforms for flammable and combustible liquids shall be designed and installed in accordance with Section 7904.5.

Tank cars for Class I or II liquids shall be unloaded in a manner which is reasonably safe to persons and property.

Tank vehicles for flammable and combustible liquids shall be loaded and unloaded in accordance with Section 7904.5.

5005.4 Storage of Finished Products. Finished products that are flammable or combustible liquids shall be stored outside of buildings, in a separate building, or in a room separated from the processing area by a two-hour occupancy separation constructed in accordance with the Building Code. The storage of finished products shall be in tanks or in closed containers in accordance with Article 79.

5005.5 Nitrocellulose Storage.

5005.5.1 Location. The nitrocellulose storage area shall be in a separate building or in a room which is separated from the processing area by a two-hour occupancy separation constructed in accordance with the Building Code. Nitrocellulose storage areas shall not be used for other purposes. Electrical wiring and equipment shall be installed in accordance with the Electrical Code.

5005.5.2 Containers. Nitrocellulose shall be stored in closed containers. Barrels shall be stored on end and, if tiered, not more than two high. Barrels and other containers of nitrocellulose shall not be opened in the main storage building. Barrels and other containers shall be opened at the point of use or another location set aside for this purpose.

5005.5.3 Spills. Spilled nitrocellulose shall be promptly wetted with water and disposed of by use or by burning in the open at a suitable detached location.

5005.6 Organic Peroxides. The storage of organic peroxides shall be in accordance with Article 80.

The size of packages containing organic peroxides shall be selected so that, as nearly as practical, full packages are utilized at one time. Spilled peroxide shall be promptly cleaned up and disposed of as recommended by the supplier.

SECTION 5006 — DRAINAGE FACILITIES

Drainage facilities shall be provided to direct flammable and combustible liquid leakage and fire-protection water to a safe location away from buildings, adjoining property or other areas as required by the chief.

SECTION 5007 — PROCESS MILLS, MIXERS AND KETTLES

5007.1 Mill Location. Mills operating with close clearances and used for the processing of flammable and heat-sensitive materials, such as nitrocellulose, shall be located in a detached building or in a noncombustible structure without other occupancies. The amount of nitrocellulose or other flammable material brought into the area shall not be more than that required for a batch.

5007.2 Mixers. Mixers shall be of an enclosed type or an open type provided with properly fitted covers. Where gravity flow is used, a shutoff valve shall be installed as close as practical to the mixer, and a control valve shall be provided near the end of the fill pipe.

5007.3 Kettles.

5007.3.1 Location. Open-fire kettles shall be located in an outside area, provided with a protective roof or in a separate building of noncombustible construction or separated from other areas by a two-hour occupancy separation constructed in accordance with the Building Code.

5007.3.2 Vaporizer location. The vaporizer section of heat-transfer systems heating closed kettles containing solvents shall be remotely located.

5007.3.3 Safety features. Contact-heated kettles containing solvents shall be equipped with safety devices that turn the process heat off, turn the cooling medium on and inject inert gas into the kettle in the event of fire.

Kettles and thin-down tanks shall be instrumented, controlled and interlocked so that any failure of the controls will result in a safe condition. The kettle shall be provided with a pressure rupture disc in case the normal vent becomes inoperative. The vent piping from the rupture disc shall be of a minimum length and shall discharge to a safe location. Thin-down tanks shall be adequately vented. Thinning operations shall be provided with an adequate vapor-removal system.

SECTION 5008 — PROCESS PIPING

5008.1 General. Piping, valves and fittings shall be designed for the working pressures and structural stresses to which they could be subjected. Piping, valves and fittings shall be constructed of steel or other material approved for the intended service.

5008.2 Valves. Valves shall be of an indicating type. Terminal valves on remote pumping systems shall be of the "dead-man" type which will shut off both the pump and the flow of solvent.

5008.3 Flexible Connectors and Hoses. Approved flexible connectors are allowed where vibration exists or where frequent movement is necessary. Approved hose shall be used at dispensing stations.

5008.4 Installation. Piping systems shall be substantially supported and protected against physical damage. Piping shall be pitched to avoid unintentional trapping of liquids or suitable drains shall be provided.

5008.5 Testing. Before being placed in service, piping shall be free of leaks when tested to not less than one and one-half times the working pressure, and not less than 5 psig (34.5 kPa) at the highest point in the system. Tests shall continue for a minimum of 30 minutes.

SECTION 5009 — TRANSFER OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN PROCESS AREAS

5009.1 General. The transfer of large quantities of flammable and combustible liquids shall be through piping by means of pumps. Compressed air shall not be used as a transfer medium.

5009.2 Pumps. Pumps shall be selected for the flammable and combustible liquid, working pressures and structural stresses to which they could be subjected.

5009.3 Emergency Controls. Where solvents are pumped from storage to points of use, approved switches shall be provided in the processing areas and at the pumps to shut down the pumps in case of fire.

5009.4 Storage of Containers. Empty and filled containers shall be stored outside the filling area.

SECTION 5010 — RAW MATERIALS IN PROCESS AREAS

5010.1 Nitrocellulose. The amount of nitrocellulose brought into process areas shall not exceed that required for a shift. Spilled nitrocellulose shall be promptly swept up, put into a pail of water,

removed at the end of the day or shift, and disposed of by use or by burning in the open at a suitable detached location.

5010.2 Organic Peroxides. Organic peroxides brought into process areas shall be in the original shipping container and shall not exceed the quantity required for a shift. When in the process area, peroxide shall not be placed in areas exposed to ignition sources, heat or mechanical shocks.

SECTION 5011 — ELECTRICAL EQUIPMENT

5011.1 General. Electrical wiring and equipment shall comply with the Electrical Code.

5011.2 Class I, Division 1 Areas. Where Class I liquids are exposed to the air, the design of equipment and ventilation of buildings shall limit the Class I, Division 1 locations to pits, the interior of equipment and the immediate vicinity of pumps or equipment locations such as dispensing stations, open centrifuges, plate and frame filters, opened vacuum filters, change cans and the surfaces of open equipment. The immediate vicinity shall include a zone extending from the vapor liberation point 20 feet (6096 mm) horizontally in all directions and vertically from the floor to a level 6 feet (1829 mm) above the highest point of vapor liberation.

5011.3 Class I, Division 2 Areas. Locations not covered by Section 5011.2 where Class I liquids are handled shall be Class I, Division 2. If the flash point of the liquid processed is higher than ambient temperature and at least 100°F. (37.8°C.), ordinary electrical equipment is allowed. Care shall be used in locating electrical apparatus to prevent hot metal from falling into open processing equipment.

5011.4 Other Areas. Ordinary electrical equipment, including switch gear, is allowed in rooms which are maintained under positive pressure with respect to hazardous areas. Air and other mediums for pressurization shall be taken from locations where entrainment of flammable vapor is improbable.

SECTION 5012 — PROTECTION FROM STATIC ELECTRICITY AND LIGHTNING

5012.1 Fixed Equipment. Equipment, such as tanks, machinery and piping, where an ignitable mixture could be present, shall be bonded and connected to ground. The bond or ground or both shall be physically applied or shall be inherently present by the nature of installation. This electrically conductive path shall have a resistance of not more than 1 million ohms.

Electrically isolated sections of metallic piping or equipment shall be bonded to the other portions of the system or grounded.

5012.2 Tank Vehicles. Tank vehicles loaded or unloaded through open connections shall be grounded and bonded to the receiving system.

5012.3 Portable Containers. When a flammable mixture is transferred from one portable container to another, a bond shall be provided between the two containers.

5012.4 Buildings. Steel framing of buildings shall be grounded with resistance of not more than 5 ohms.

SECTION 5013 — FIRE PROTECTION

5013.1 Fire Alarm System. An approved fire alarm system shall be provided. See Section 1007.

5013.2 Maintenance. Plant fire-protection facilities shall be adequately maintained, periodically inspected and tested.

SECTION 5014 — MAINTENANCE

5014.1 Tanks and Vessels. The cleaning of tanks or vessels which have contained flammable or combustible liquids shall be under the supervision of persons who understand the fire and explosion potential.

5014.2 Ignition Sources. When necessary to make repairs involving potential ignition sources, the work shall be authorized by the responsible individual in charge before the work is started.

Open flames and direct-fired heating devices shall not be used in areas where flammable vapor-air mixtures could exist.

Smoking shall be prohibited except in designated areas.

5014.3 Confined Space Entry. When necessary to enter a tank, pit, manhole or other confined spaces, such entry shall be authorized by the responsible individual in charge.

5014.4 Powered Industrial Trucks. Powered industrial trucks shall be of a type approved for the location and shall be in accordance with nationally recognized standards. See Article 90, Standard n.2.2.

5014.5 Empty Containers. Empty containers previously used for flammable or combustible liquids shall be removed to a well-detached, outside location and, if not cleaned on the premises, removed from the plant as soon as practical.

5014.6 Outside Storage in Containers. Storage of flammable and combustible liquids in containers outside of buildings shall be in accordance with Section 7902.3.

5014.7 Aisles. Adequate aisles shall be maintained for the unobstructed movement of personnel and fire-protection equipment.

ARTICLE 51 — SEMICONDUCTOR FABRICATION FACILITIES

SECTION 5101 — GENERAL

5101.1 Scope. Group H, Division 6 Occupancies shall be in accordance with Article 51.

The storage, handling and use of hazardous production materials (HPM) shall be in accordance with Article 51 and other applicable provisions of this code. Required devices and systems shall be maintained in operable condition.

5101.2 Definitions.

5101.2.1 General. For definitions of FABRICATION AREA, HAZARDOUS PRODUCTION MATERIAL, HPM FLAMMABLE LIQUID, HPM STORAGE ROOM, INSIDE HPM STORAGE ROOM AND USE (Material), see Article 2.

5101.2.2 Limited application. For the purpose of Article 51, certain terms are defined as follows:

EMERGENCY ALARM SYSTEM is a system intended to provide the indication and warning of abnormal conditions and summon appropriate aid.

SERVICE CORRIDOR is a fully enclosed passage used for transporting HPM and purposes other than required exiting.

WORKSTATION is a defined space or an independent principal piece of equipment using HPM within a fabrication area where a specific function, a laboratory procedure or a research activity occurs. Approved cabinets serving a workstation are included as a part of the workstation. A workstation may contain ventilation equipment, fire-protection devices, sensors for gas and other hazards, electrical devices and other processing and scientific equipment.

5101.3 Permits. For a permit for the storage, handling and use of HPM, see Section 105, Permit h.2.

SECTION 5102 — EMERGENCY CONTROL STATION AND ALARMS

5102.1 Emergency Control Station. An emergency control station shall be provided at an approved location, outside of the fabrication area, on the premises of a Group H, Division 6 Occupancy. The emergency control station shall receive signals from emergency equipment and shall be continually staffed by trained personnel.

5102.2 Sprinkler System Alarm. Sprinkler systems shall be supervised in accordance with the Building Code. Alarm signals shall be sent to the emergency control station.

5102.3 Fire Alarm System. A manual fire alarm system shall be installed throughout buildings containing Group H, Division 6 Occupancies. Activation of the alarm system shall sound a local alarm with the alarm signal sent to the emergency control station. Manual fire alarm systems shall be designed and installed in accordance with U.F.C. Standard 10-2.

SECTION 5103 — FABRICATION AREAS

5103.1 General. Fabrication areas shall be in accordance with the Building Code.

5103.2 Location. Occupied levels of fabrication areas shall be located at or above the first story.

5103.3 Maximum Quantities of HPM. The quantities of HPM in a single fabrication area shall not exceed the quantities set forth in Table 5103-A.

EXCEPTION: The quantity limitations for any hazard category in Table 5103-A shall not apply when the fabrication area contains quantities of hazardous materials not exceeding the exempt amounts established by Article 80.

5103.4 Ventilation Requirements.

5103.4.1 General. Exhaust ventilation shall be provided to produce not less than 1 cubic foot per minute per square foot (5.1 L/s per m^2) of floor area over the design area. For ventilation system design, see the Building and Mechanical codes.

5103.4.2 Separate systems. The return-air system of one fabrication area shall not connect to another system within the building.

5103.4.3 Ventilation controls. There shall be a manual control switch for supply or recirculation air systems, or both, located outside of the fabrication area. The chief is authorized to require additional manual control switch locations.

5103.5 Special Provisions.

5103.5.1 Excess flow control. Where HPM supply gas is carried in pressurized piping, a fail-safe system shall shut off flow due to a rupture in the piping. Where the piping originates from within the HPM storage room, the excess flow valve shall be located within the HPM storage room. Where the piping originates from outside the building, the excess flow valve shall be located outside the building as close to the bulk source as practical.

5103.5.2 Piping and tubing installation. Piping and tubing shall be installed in accordance with nationally recognized standards. See Article 90, Standard a.2.2. Supply piping for HPM having a health hazard ranking of 3 or 4 shall have welded connections throughout unless an exhausted enclosure is provided. See U.F.C. Standard 79-3.

EXCEPTION: Material which is incompatible with ferrous piping is allowed to be transported in nonmetallic piping with approved connections.

5103.5.3 Gas-detection system. When hazardous production material gas is used or dispensed and the physiological warning properties for the gas are at a higher level than the accepted permissible exposure limit for the gas, a continuous gas-detection system shall be provided to detect the presence of a short-term hazard condition. When dispensing occurs and flammable gases or vapors could be present in quantities in excess of 20 percent of the lower explosive limit, a continuous gas-detection system shall be provided. The detection system shall be connected to the emergency control station.

SECTION 5104 — WORKSTATIONS WITHIN FABRICATION AREAS

5104.1 Construction. Workstations within fabrication areas shall be constructed of materials compatible with the materials used at the station. The portion of the workstation that serves as a cabinet for hazardous gases and flammable liquids shall be noncombustible and, if of metal, shall not be less than 0.044-inch (1.12 mm) (18 gage) steel. Hazardous gases and liquid containers within the workstation shall be protected from seismic forces in an approved manner.

5104.2 Maximum Quantities of HPM. The quantity of HPM in use in a workstation shall not exceed the quantities listed in Table 5104-A.

5104.3 Exhaust Ventilation.

5104.3.1 Design criteria. A ventilation system shall be provided to capture and exhaust fumes and vapors at workstations.

5104.3.2 Duct systems.

5104.3.2.1 Materials. Materials for ducts shall be in accordance with the Mechanical Code.

5104.3.2.2 Reactives. Two or more operations shall not be connected to the same exhaust system when either one or the combination of the substances removed could constitute a fire, explosion or chemical reaction hazard within the duct system.

5104.3.2.3 Penetrations. Exhaust duct systems penetrating occupancy separations shall be contained in a shaft of equivalent fire-resistive construction. Ducts shall not penetrate area separation walls. Fire dampers shall not be installed in exhaust ducts.

5104.3.2.4 Fire protection. Exhaust ducts shall be internally sprinklered when all of the following conditions apply:

1. When the largest cross-sectional diameter is equal to or greater than 10 inches (254 mm),
2. The ducts are within the building, and
3. The ducts are conveying gases or vapors in a flammable range.

Combustible nonmetallic ducts whose largest cross-sectional diameter is equal to or greater than 10 inches (254 mm) shall be internally sprinklered.

EXCEPTIONS: 1. Ducts listed for nonsprinklered applications.

2. Ducts not more than 12 feet (3657 mm) in length installed below ceiling level.

5104.3.3 Ventilation power and controls—emergency power. The exhaust ventilation system shall have an emergency source of power. The emergency power shall be designed and installed in accordance with the Electrical Code.

The emergency power is allowed to operate the exhaust system at not less than one-half fan speed when it is demonstrated that the level of exhaust will maintain a safe atmosphere.

5104.4 Fire Protection. Sprinkler coverage of the horizontal surface at workstations shall not be obstructed. A sprinkler shall be installed within the exhaust connection or plenum of workstations of combustible construction. The sprinkler shall be located not more than 2 feet (609.6 mm) from the point of the duct connection or the connection to the plenum. The sprinkler and connecting piping to the duct shall be coated with approved materials to prevent corrosion, when necessary. The sprinkler shall be accessible for periodic inspection. The design of the sprinkler system in the area shall take into consideration the spray pattern and the effect on the equipment.

EXCEPTIONS: 1. Approved alternate fire-extinguishing systems are allowed. Activation of such systems shall deactivate the related processing equipment.

2. Process equipment which operates at temperatures exceeding 500°C. and which is provided with automatic shutdown capabilities for HPM.

3. Exhaust ducts 10 inches (254 mm) or less in diameter from flammable gas storage cabinets that are part of a workstation.

5104.5 Electrical Equipment. Electrical equipment and devices within 5 feet (1524 mm) of workstations in which flammable liquids or gases are used shall be in accordance with the Electrical Code for Class I, Division 2 hazardous locations. Workstations shall not be energized without adequate exhaust ventilation.

EXCEPTION: The requirements for Class I, Division 2 locations do not apply when the air removal from the workstation or dilution will provide nonflammable atmospheres on a continuous basis.

5104.6 Special Provisions.

5104.6.1 Chemical drainage and containment. Each workstation utilizing HPM liquids shall have:

1. Drainage piping systems connected to a compatible system for disposition of such liquids,
2. The work surface provided with slope or other means for directing spilled materials to the containment or drainage system, and
3. An approved means of containing or directing spilled or leaked liquids to the drainage system.

5104.6.2 Identification. Systems utilized in hazardous materials supply and drainage shall be identified. Labels shall be affixed so as to be conspicuously visible at all times.

5104.6.3 Shutoff valves. Readily accessible shutoff valves for HPM supply piping shall be provided at the workstation and as required by Section 5106.4.2.

5104.6.4 Protection of containers from damage. Hazardous material containers located in or connected to a workstation shall be protected from damage and shall not project from the workstation.

5104.6.5 Workstation clearances. Workstations involving hazardous material shall be provided with horizontal servicing clearances of not less than 3 feet (914 mm) for electrical equipment, gas cylinder connections and similar hazardous conditions. These clearances apply only to normal operational procedures and not to repair or maintenance-related work.

SECTION 5105 — STORAGE AND DISPENSING OF HPM WITHIN FABRICATION AREAS

5105.1 General. The storage of HPM liquids, gases and solids shall be within fully enclosed storage cabinets or within a workstation. See Sections 7902.5.9 and 8003.3.1.3.2.

Separate cabinets shall be provided for each class of hazardous material. Flammables, acids, bases, oxidizers, toxics and other incompatible materials shall not be stored within the same cabinet. Inert materials are allowed to intermingle with other materials.

5105.2 Special Requirements for HPM Gases.

5105.2.1 General. Cabinets used for the containment of HPM gases shall be in accordance with Sections 5105.1 and 5105.2. Gas cabinets containing HPM gases shall be internally sprinklered.

EXCEPTION: Sprinklers are not required in gas cabinets that are located within an HPM storage room other than those cabinets used to contain pyrophoric gases.

Self-closing limited-access ports shall be installed on gas cabinets to give access to equipment controls.

5105.2.2 Gas detection. Gas cabinets for HPM gases shall be provided with a continuous gas-detection system in accordance with Section 5103.5.3 regardless of whether dispensing occurs. Activation of the detection system shall automatically shut the valves on all HPM gas lines from the cabinets and initiate an alarm to the emergency control station.

5105.2.3 Ventilation. Gas cabinets shall be provided with ventilation. When a gas cabinet contains highly toxic or toxic gases, the average velocity of ventilation at the face of access ports shall be not less than 200 feet per minute (fpm) (61 m/min.) with a minimum of 150 fpm (45.7 m/min.) at any point of the access port.

Gas cabinets shall be operated at a negative pressure in relation to the surrounding area. The gas cabinet ventilation system shall be in accordance with Sections 5104.3.2 and 5104.3.3 and is allowed to connect to a workstation ventilation system.

5105.2.4 Excess flow control. Excess flow control valves shall be installed when required by Section 5103.5.1.

SECTION 5106 — HANDLING OF HPM WITHIN EXIT CORRIDORS

5106.1 New Buildings. In new buildings, exit corridors shall not contain HPM.

5106.2 Existing Buildings.

5106.2.1 General. When existing fabrication areas are altered or modified, HPM may be transported in exit corridors when approved by the chief. Such corridors shall be in accordance with the Building Code. (See U.B.C. Section 307.11.3.) Transportation in exit corridors shall be in accordance with Section 5106.2.

5106.2.2 Containers. Containers, tanks, drums and other means of transporting hazardous materials shall be of an approved type.

Liquids in quantities not exceeding 5 gallons (18.9 L) are allowed to be transported in individual original containers not exceeding a 5-gallon (18.9 L) capacity. When more than two such containers are transported within a corridor, they shall be in an approved cart. Glass containers shall not be used except where necessary to prevent contamination. Glass containers shall not exceed 1 gallon (3.79 L) in size.

5106.2.3 Carts and trucks. Carts and trucks shall be used for transporting HPM and shall be of an approved design complying with Section 5106.3.

EXCEPTIONS: 1. Two HPM liquid containers, each not exceeding 5 gallons (18.9 L), hand carried in acceptable safety carriers, and single drums not exceeding 55 gallons (208.2 L) transported by suitable drum trucks.

2. Cylinders of HPM gases transported by acceptable gas cylinder hand trucks, and hand-carried cylinders not exceeding 25 pounds (11.3 kg).

3. Solid HPM not exceeding 100 pounds (45.4 kg) transported by approved hand trucks, and a hand-carried single container not exceeding 50 pounds (22.7 kg).

5106.2.4 Precautions for gas cylinders. Hazardous production material gas cylinders in transit shall have their valves capped or plugged with an approved closure device and shall have their protective cylinder caps in place. Cylinders placed on carts and trucks shall be individually restrained.

5106.2.5 Dispensing. Hazardous production materials shall not be dispensed in exit corridors.

5106.2.6 Supervision. Carts or trucks shall not be stored unattended while they are within exit corridors.

5106.2.7 Hazardous production materials pass-throughs in exit corridors. When pass-throughs are provided, self-closing doors having a fire-protection rating of not less than one hour shall be installed between the pass-through and the existing exit corridor. The pass-through shall be fully enclosed with wall protection as required for the exit corridor. Pass-throughs shall be protected by an approved automatic fire-extinguishing system.

5106.2.8 Emergency alarm. An emergency telephone system, a local alarm manual pull station or an approved signaling device shall be provided at not more than 150-foot (45 720 mm) intervals or fractions thereof and at each exit stair doorway. The alarm signal shall be relayed to the emergency control station and a local signaling device shall be provided.

5106.2.9 Fire protection. Sprinkler protection shall be designed in accordance with the Building Code as required for ordinary hazard Group 2. (See U.B.C. Standard 9-1.) When the design area of the sprinkler system consists of one row of sprinklers in the corridor, the maximum number of sprinklers to be calculated need not exceed 13.

5106.3 Cart and Truck Design.

5106.3.1 General. Carts and trucks shall be designed to provide a stable base for the commodities to be transported and shall have a means of restraining containers against accidental dislodgement. Carts and trucks shall be provided with a device which will enable the operator to safely control movement by providing stops or speed-reduction devices. Power carts and trucks shall be approved for Class I, Division 1 or Class I, Division 2 hazardous locations. Internal combustion engines shall not be used.

5106.3.2 Liquid transporters. Construction materials for HPM carts or trucks utilized for HPM flammable or combustible liquids shall not be less than 0.044-inch (1.12 mm) (18 gage) steel or approved materials.

EXCEPTION: Materials utilized for casters, gaskets, trim and drains.

Hazardous production material liquid carts and trucks shall be designed such that the contents to be transported will be fully enclosed. They shall be capable of containing a spill from the largest single container transported up to a maximum individual container size of 5 gallons (18.9 L).

5106.3.3 Size. Neither the length nor width of a cart shall exceed 48 inches (1219 mm) or one half of the width of existing exit corridors, whichever is more restrictive. The capacity of carts and

trucks used for transportation of HPM shall not exceed 55 gallons (208.2 L) of liquids; 7 cylinders of gases, up to 400 pounds (181.4 kg) each; and 500 pounds (226.8 kg) of solid material.

5106.3.4 Identification. Carts and trucks shall bear a marking indicating the contents therein. Incompatible materials shall not be transported on the same cart or truck.

5106.4 Piping.

5106.4.1 General. When HPM is transported in piping placed within the space defined by the walls of the exit corridor and the floor or roof above the exit corridor, shutoff valves, excess flow control, gas detection, and electrical wiring and equipment shall be in accordance with Section 5106.4.

5106.4.2 Shutoff valves. Readily accessible manual or automatic remotely activated fail-safe emergency shutoff valves shall be provided as follows:

1. At the entry of the piping system into the exit corridor, and

2. At the branch piping connection into the fabrication area. Such valves shall be identified and the location shall be clearly visible.

5106.4.3 Excess flow control. Excess flow control shall be provided as set forth in Section 5103.5.1.

5106.4.4 Gas detection. Gas detectors shall be installed as set forth in Section 5103.5.3.

5106.4.5 Electrical. Electrical wiring and equipment located in the piping space shall be approved for Class I, Division 2 hazardous locations.

SECTION 5107 — HANDLING OF HPM WITHIN SERVICE CORRIDORS

5107.1 Transportation Criteria.

5107.1.1 General. A service corridor shall be provided when necessary to transport HPM to and from an HPM storage room, or from the outside of a building to the perimeter wall of a fabrication area. Service corridors shall not be used as a required exit corridor. Service corridors used for transporting HPM shall be in accordance with Section 5107.1.

5107.1.2 Containers. Containers shall be in accordance with Section 5106.2.2.

5107.1.3 Corridor width. The minimum clear width of the service corridor shall be 5 feet (1524 mm).

> **EXCEPTION:** When carts or trucks are used, the minimum width shall be 33 inches (838.2 mm) wider than the widest cart or truck.

5107.1.4 Quantities. The maximum quantities of HPM transported in a service corridor at one time shall not exceed two times that set forth in Section 5106.3.

5107.1.5 Emergency alarm. There shall be a local manual alarm station or other approved signaling device in the service corridor. See Section 5106.2.8.

The chief is authorized to require additional alarm devices.

5107.1.6 Fire protection. Sprinklers shall be installed in accordance with Section 5106.2.9.

5107.2 Prohibited Procedures. Hazardous production materials shall not be dispensed in a service corridor.

5107.3 Construction Requirements. See the Building Code.

5107.4 Exits. See the Building Code.

5107.5 Piping. Piping shall be in accordance with Section 5103.5.2.

SECTION 5108 — STORAGE OF HPM

5108.1 Outside Storage.

5108.1.1 General. General storage of HPM outside the building shall be in accordance with the separation, construction and fire-safety requirements of the Building Code and this code.

5108.1.2 Flow control and shut-offs in piping from outside storage. Hazardous production material gaseous supply piping from the outside storage shall be provided with excess flow control in accordance with Section 5103.5.1.

A manual emergency shutoff valve located outside the building shall be installed on each HPM supply pipe from outside storage. The valve shall be identified, readily accessible, and its location clearly visible.

5108.1.3 Special provisions. Outside storage of HPM shall be safeguarded from public access. See Section 8001.9.2.

5108.2 Storage of HPM within Buildings.

5108.2.1 Construction. When required by the Building Code, storage of HPM shall be in a room complying with the requirements of the Building Code for a liquid storage room (see U.B.C. Section 307.1.4) or an HPM storage room. (See U.B.C. Section 307.11.) Hazardous production material storage rooms shall not exceed 6,000 square feet (557.4 m^2) in area and shall be separated from all other areas by not less than a two-hour fire-resistive occupancy separation when the area is 300 square feet (27.9 m^2) or more. The occupancy separation shall not be less than one-hour fire-resistive construction when the area is less than 300 square feet (27.9 m^2). Except for surfacing, floors of storage rooms shall be of noncombustible liquid-tight construction. (See U.B.C. Section 307.11.5.1.) When HPM storage rooms are used for dispensing of Class I or II flammable HPM liquids or gases, the area of the HPM storage room shall not exceed 1,000 square feet (92.9 m^2).

5108.2.2 Location within buildings. Hazardous production material storage rooms shall have at least one exterior wall and such wall shall be not less than 30 feet (9144 mm) from property lines, including property lines adjacent to public ways. Explosion control shall be provided when required by the Building Code. Explosion control design shall be in accordance with the Building Code.

5108.2.3 Separation requirements. Hazardous production materials shall be separated from each other in accordance with Table 5108-A.

When a separation by a partial noncombustible partition is required, a partition constructed of noncombustible materials shall be provided to separate the materials. The partition shall extend 18 inches (457 mm) or more above and to the front and rear of the HPM storage in the same room.

When separate rooms are required to separate the materials, materials shall be kept in different rooms. The walls of such rooms are not required to be rated.

When a one-hour separation is required, a one-hour fire-resistive occupancy separation constructed of noncombustible materials shall be provided to separate the materials.

5108.2.4 Determining quantities in HPM storage rooms. The quantity of HPM within each HPM storage room shall not exceed the amounts allowed by this code. See Section 5108.2. Highly toxic liquids shall be counted as flammable liquids. Corrosive liquids shall be counted as Class III combustible liquids. Highly toxic solids shall be counted as flammable solids.

The quantities of HPM gases shall not exceed the quantities listed in Table 5108-B.

5108.2.5 Ventilation requirements. Ventilation shall be provided in accordance with Section 5103.4.1.

5108.2.6 Emergency alarm. A manual alarm box or approved emergency alarm-initiating device connected to a local alarm system shall be installed outside of each interior exit door which initiates a signal at the emergency control station and a local alarm when activated.

5108.2.7 Special provisions.

5108.2.7.1 Spill control and drainage control. Hazardous production material storage rooms for HPM liquids shall have spill control and drainage control in accordance with Section 8003.1.7. Hazardous production material flammable liquid drains shall be separated from other HPM liquid drains. Other HPM liquids in drains that are not compatible shall be separated from each other unless they have been rendered acceptable for discharge by an approved means into the public sewers.

5108.2.7.2 Gas detection. Gas-detection systems shall be provided as set forth in Section 5103.5.3.

5108.2.8 Electrical requirements. Electrical wiring and equipment located in HPM storage rooms shall be approved for Class I, Division 1 hazardous locations, and shall be in accordance with the Electrical Code.

EXCEPTION: When separate storage rooms are used, the storage rooms without flammable liquids or gases need not be approved for Class I, Division 1 hazardous locations.

5108.2.9 Special hazards. Energy-consuming equipment shall be in accordance with the Building Code. See U.B.C. Section 307.8.

SECTION 5109 — EMERGENCY PLAN

5109.1 Plans and Diagrams. Plans and diagrams shall be maintained in approved locations indicating the approximate plan for each area, the amount and type of HPM stored, handled and used, locations of shutoff valves for HPM supply piping, emergency telephone locations and locations of exits.

5109.2 Plan Updating. Plans and diagrams shall be maintained up-to-date and the fire department shall be informed of major changes.

5109.3 Emergency Response Team. Responsible persons shall be designated to an on-site emergency response team and trained to be liaison personnel for the fire department. These persons shall aid the fire department in preplanning emergency responses; identifying locations where HPM is stored, handled and used; and shall be familiar with the chemical nature of HPM. An approved number of personnel for each work shift shall be designated.

5109.4 Emergency Drills. Emergency drills of the on-site emergency response team shall be conducted on a regular basis but not less than once every three months. Records of drills conducted shall be maintained.

TABLE 5103-A—QUANTITY LIMITS FOR HPM IN A SINGLE FABRICATION AREA IN A GROUP H, DIVISION 6 OCCUPANCY

HAZARD CATEGORY	SOLID (lbs/sq.ft.) × 4.882 for kg/m²	LIQUID (gals/sq.ft.) × 40.74 for L/m²	GAS (ft.³ @ NTP/sq. ft.) × 0.305 for m³ at NTP/m²
Combustible liquid			
II	—	0.01	—
III-A	—	0.02	—
III-B	—	NL	—
Combination Class I, II and III-A	—	0.04	—
Combustible dust	Footnote 1	—	—
Combustible fiber			
Loose	Footnote 1	—	—
Baled	Footnote 1	—	—
Cryogenic			
Flammable	—	—	Footnote 2
Oxidizing	—	—	1.25
Explosives	Footnote 1	Footnote 1	Footnote 1
Flammable solid	0.001	—	—
Flammable gas			
Gaseous	—	—	Footnote 2
Liquefied	—	—	Footnote 2
Flammable liquid			
I-A	—	0.0025	—
I-B	—	See Combination flammable	—
I-C	—	See Combination flammable	—
Combination Class I-A, I-B and I-C	—	0.025	—
Combination Class I, II and III-A	—	0.04	—
Organic peroxide			
UD	Footnote 1	Footnote 1	—
I	Footnote 1	Footnote 1	—
II	0.025	0.0025	—
III	0.1	0.01	—
IV	NL	NL	—
V	NL	NL	—
Oxidizing gas			
Gaseous	—	—	1.25
Liquefied	—	—	1.25
Combination of Gaseous and Liquefied	—	—	1.25
Pyrophoric	Footnote 1	Footnote 1	Footnotes 2 and 3

Oxidizer 4 3 2 1 Combination oxidizer Class 1, 2, 3	 Footnote 1 See Combination oxidizer See Combination oxidizer See Combination oxidizer 0.003	 Footnote 1 See Combination oxidizer See Combination oxidizer See Combination oxidizer 0.03	 N/A N/A N/A N/A N/A
Unstable (reactive) 4 3 2 1	 Footnote 1 0.025 0.1 NL	 Footnote 1 0.0025 0.01 NL	 Footnote 1 Footnote 1 Footnote 1 NL
Water reactive 3 2 1	 Footnote 1 0.25 NL	 Footnote 1 0.025 NL	 — — —
Carcinogen	NL	NL	NL
Corrosive	NL	NL	NL
Highly toxic	NL	NL	Footnote 2
Irritants	NL	NL	NL
Radioactive	NL	NL	NL
Sensitizers	NL	NL	NL
Other health hazards	NL	NL	NL
Toxic	NL	NL	Footnote 2

NL—The quantity of hazardous material in a single fabrication area is not limited.

[1]Quantity of hazardous material in a single fabrication area shall not exceed exempt amounts in Tables 8001.13-A and 8001.13-B.

[2]The aggregate quantity of flammable, pyrophoric, toxic and highly toxic gases shall not exceed 9,000 cubic feet (254.9 m^3) at NTP.

[3]The aggregate quantity of pyrophoric gases in the building shall not exceed quantity limits set forth in Table 8003.1-A.

TABLE 5104-A—MAXIMUM QUANTITIES OF HPM AT A WORKSTATION

MATERIAL	STATE	MAXIMUM QUANTITY × 3.785 for L × 0.45 for kg
Flammables and toxics combined	gas liquid solid	3 cylinders 15 gallons 5 pounds
Corrosives	gas liquid solid	3 cylinders 25 gallons[1] 20 pounds
Oxidizers	gas liquid solid	3 cylinders 12 gallons[1] 20 pounds

[1]An equal amount of nonflammable HPM liquid in reservoirs of filtering systems of connected materials in use is allowed.

TABLE 5108-A—MINIMUM SEPARATION OF HPM[1,2]

MATERIALS	HIGHLY TOXIC	TOXIC	ACID	BASE	FLAM-MABLE	OXIDIZER	WATER REAC-TIVE	PYRO-PHORIC
Highly toxic		N.R.	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.	1 hr.
Toxic	N.R.		S	S	S	S	S	S
Acid	1 hr.	S		S	S[3]	S	S	S[3]
Base	1 hr.	S	S		S	S	S	S
Flammable	1 hr.	S	S[3]	S		S	R	S
Oxidizers	1 hr.	S	S	S	S		S	S[3]
Water reactives	1 hr.	S	S	S	R	S		S
Pyrophoric	1 hr.	S	S[3]	S	S	S[3]	S	

[1]N.R. = not required.
S = separation by a partial noncombustible partition.
R = separate rooms.
1 hr. = one-hour fire-resistive separation.

[2] Hazardous production material gas shall be separated from all HPM liquids and solids by a one-hour fire-resistive separation or shall be kept in approved gas cabinets. See Section 8003.3.1.3.2. Hazardous production material gases shall be separated from gases in other HPM categories as shown in Table 5108-A, or shall be kept in approved gas cabinets. See Section 8003.3.1.3.2.

[3]Separation by not less than 20 feet (6096 mm) is allowed in lieu of a noncombustible partition.

TABLE 5108-B—MAXIMUM QUANTITIES OF HPM GASES IN HPM STORAGE ROOMS

MATERIAL	MAXIMUM QUANTITY × 0.0283 for m^3
Oxidizer	20,000 cubic feet at NTP
Corrosive	30,000 cubic feet at NTP
Flammable	15,000 cubic feet at NTP
Highly toxic/toxic	Toxic and highly toxic gas quantities shall be counted as flammable gases

ARTICLE 52 — MOTOR VEHICLE FUEL-DISPENSING STATIONS

SECTION 5201 — GENERAL

5201.1 Scope. Automotive, marine and aircraft motor vehicle fuel-dispensing stations shall be in accordance with Article 52 and U.F.C. Standard 52-1. Such operations shall include both public accessible and private operations. Flammable and combustible liquids and LP-gas shall also be in accordance with Articles 79 and 82.

5201.2 Definitions. For definitions of CNG, COMBUSTIBLE LIQUID, FLAMMABLE LIQUID and MOTOR VEHICLE FUEL-DISPENSING STATION, see Article 2.

5201.3 Permits and Plans.

5201.3.1 Permits. Permits are required for motor vehicle fuel-dispensing stations. See Section 105, Permit m.4.

5201.3.2 Plans and specifications. Plans and specifications shall be submitted for review and approval prior to the installation or construction of a motor vehicle fuel-dispensing station. A site plan shall be submitted which illustrates the location of flammable liquid, LP-gas or CNG storage vessels, and their spatial relation to each other, property lines and building openings. Both aboveground and underground storage vessels shall be shown on plans. For each type of station, plans and specifications shall include, but not be limited to, the following:

1. **Flammable and Combustible Liquids:** the type and design of underground and aboveground liquid storage tanks; the location and design of the fuel dispensers and dispenser nozzles; the design and specifications for related piping, valves and fittings; the location and classification of electrical equipment, including emergency fuel shutdown devices; and specifications for fuel storage and venting components.

2. **Liquefied Petroleum Gas:** equipment and components as required in U.F.C. Standard 82-1; the location and design of the LP-gas dispensers and dispenser nozzles; the design, specifications and location for related piping, valves and fittings; the location and classification of electrical equipment, including emergency fuel shutdown devices; and specifications for fuel storage and pressure-relief components.

3. **Compressed Natural Gas:** when provided, the location of CNG compressors; the location and design of CNG dispensers and vehicle fueling connections; the design, specification and location for related piping, valves and fittings; the location and classification of electrical equipment, including emergency fuel shutdown devices; and specifications for fuel storage and pressure-relief components.

5201.4 Location of Dispensing Operations and Storage Vessels.

5201.4.1 Dispensing operations.

5201.4.1.1 General. Flammable and combustible liquids, CNG and LP-gas shall not be dispensed in buildings and dispensers for such products shall not be located in buildings.

> **EXCEPTION:** Dispensing of flammable and combustible liquids inside buildings in accordance with Section 5202.

See Sections 5202, 5203 and 5204 for additional requirements.

5201.4.1.2 Dispensing devices. Dispensing devices shall be located as follows:

1. Ten feet (3048 mm) or more from property lines,

2. Ten feet (3048 mm) or more from buildings having combustible exterior wall surfaces or buildings having noncombustible exterior wall surfaces that are not part of a one-hour fire-resistive assembly,

EXCEPTION: Canopies constructed in accordance with the Building Code.

3. Such that all portions of the vehicle being fueled will be on the premises of the motor vehicle fuel-dispensing station,

4. Such that the nozzle, when the hose is fully extended, will not reach within 5 feet (1524 mm) of building openings, and

5. Twenty feet (6096 mm) or more from fixed sources of ignition.

5201.4.1.3 Bulk plants. Motor vehicle fuel-dispensing stations located at bulk plants shall be separated by a fence or similar barrier from the area in which bulk operations are conducted. See also Section 5202.3.1.

5201.4.2 Storage vessels. Storage vessels for LP-gas and CNG shall be located 20 feet (6096 mm) or more from aboveground tanks containing flammable or combustible liquids.

5201.5 Installation of Dispensing Devices.

5201.5.1 Protection of dispensers. Dispensing devices shall be protected against physical damage from vehicles by mounting on a concrete island 6 inches (152.4 mm) or more in height or by other approved methods.

5201.5.2 Dispenser installation. Dispensing devices shall be secured in an approved manner. Dispensers shall not be secured to the island using piping or conduit.

5201.5.3 Emergency shutdown devices. Emergency shutdown devices shall be provided for all fuel dispensers. Emergency shutdown devices for exterior fuel dispensers shall be located within 75 feet (22 860 mm) of, but not less than 25 feet (7620 mm) from, dispensers. For interior fuel-dispensing operations, the emergency shutdown devices shall be installed at approved locations. Activation of the emergency shutdown devices shall stop the transfer of fuel to the dispensers and close all valves which supply fuel to the dispensers. Such devices shall be distinctly labeled EMERGENCY FUEL SHUTDOWN DEVICE. Signs shall be provided in approved locations.

5201.5.4 Dispenser electrical disconnects. An electrical disconnect switch shall be provided for all dispensers in accordance with the Electrical Code. The disconnect shall be placed in the OFF position before repairing dispensers and before closing a motor vehicle fuel-dispensing station.

5201.6 Supervision of Dispensing Operations.

5201.6.1 General. The dispensing of fuel into the fuel tanks of automobile, marinecraft or aircraft, or portable containers shall be under the supervision of a qualified attendant at all times.

EXCEPTION: Unsupervised dispensing of flammable and combustible liquids, LP-gas and CNG as a motor fuel is allowed in accordance with Sections 5201.6.3, 5202, 5203 and 5204.

5201.6.2 Attendants. The attendant's primary function shall be to supervise, observe and control the dispensing of motor fuels. The attendant shall prevent the dispensing of flammable and combustible liquids and flammable gases into containers not in compliance with this code, control sources of ignition, give immediate attention to accidental spills or releases, and be prepared to use fire extinguishers. A method of communicating with the fire department shall be provided for the attendant.

5201.6.3 Unsupervised dispensing. Unsupervised dispensing is allowed when the owner or operator provides, and is accountable for, daily site visits, regular equipment inspection and maintenance, conspicuously posted instructions for the safe operation of dispensing equipment, and posted telephone numbers for the owner or operators. A sign, in addition to the signs required by Section 5201.8, shall be posted in a conspicuous location reading:

IN CASE OF FIRE, SPILL OR RELEASE

1. Use emergency pump shutoff!
2. Report the accident!
   Fire Department Telephone No._____
   Facility address_____

During hours of operation, stations having unsupervised dispensing shall be provided with a fire alarm transmitting device. A telephone not requiring a coin to operate is acceptable.

5201.7 Sources of Ignition. Electrical equipment shall be in accordance with the Electrical Code.

Smoking and open flames shall be prohibited in areas where fuel is dispensed. The engines of vehicles being fueled shall be stopped.

5201.8 Signs. Signs prohibiting smoking, prohibiting dispensing into unapproved containers and requiring vehicle engines to be stopped during fueling shall be conspicuously posted within sight of each dispenser.

5201.9 Fire Protection. Portable fire extinguishers shall be provided as set forth in U.F.C. Standard 10-1.

5201.10 Clearance from Combustible Materials. Weeds, grass, brush, trash and other combustible materials shall be kept not less than 10 feet (3048 mm) from fuel storage vessels and fuel-handling equipment.

5201.11 Maintenance. Fueling systems shall be maintained in proper operating condition.

SECTION 5202 — FLAMMABLE AND COMBUSTIBLE LIQUID MOTOR VEHICLE FUEL-DISPENSING STATIONS

5202.1 General. Automotive, marine and aircraft motor vehicle fuel-dispensing stations utilizing flammable or combustible liquids shall be in accordance with Section 5202. See also Article 79.

5202.2 Approvals.

5202.2.1 General. Equipment and appliances used for the storage or dispensing of flammable and combustible liquids shall be approved or listed in accordance with Section 5202.2.

5202.2.2 Approved equipment. Pits and piping used for flammable and combustible liquids shall be approved.

5202.2.3 Listed equipment. Tanks, electrical equipment, dispensers, hose, nozzles, and submersible or subsurface pumps used for the storage or dispensing of flammable and combustible liquids shall be listed.

5202.3 Storage of Fuel.

5202.3.1 General. Class I liquids shall be stored in closed containers, in tanks located underground or in special enclosures in accordance with Section 5202.3.6. Classes II and III-A liquids shall be stored in containers or in tanks located underground or in special enclosures in accordance with Section 5202.3.6. See also Appendix II-F.

5202.3.2 Interconnection of aboveground tanks and underground tanks. A connection shall not be made between an aboveground tank and an underground tank.

5202.3.3 Fueling from portable tanks. Portable and semiportable tanks are allowed to be temporarily used in conjunction with the dispensing of Class I, II or III-A liquids into the fuel tanks of motor vehicles or other motorized equipment on premises not normally accessible to the public when approved by the chief.

5202.3.4 Fuel tanks at bulk plants. Storage tanks used for fueling operations shall not be connected to or serve as bulk plant tanks.

5202.3.5 Class I liquids in basements or pits. Class I liquids shall not be stored or used within a building having a basement or pit into which flammable vapors could travel unless such area is provided with ventilation designed to prevent the accumulation of flammable vapors therein.

5202.3.6 Special enclosures. When installation of tanks in accordance with Section 7902.6 is impractical, or because of property or building limitations, tanks for Class I, II or III-A liquids are allowed to be installed in buildings in special enclosures as follows:

1. The special enclosure shall be liquidtight and vaportight.

2. The special enclosure shall not contain backfill.

3. Sides, top and bottom of the special enclosure shall be of reinforced concrete at least 6 inches (152.4 mm) thick, with openings for inspection through the top only.

4. Tank connections shall be piped or closed such that neither vapors nor liquid can escape into the enclosed space between the special enclosure and any tanks inside the special enclosure.

5. Means shall be provided whereby portable equipment can be employed to discharge to the outside any vapors which might accumulate inside the special enclosure should leakage occur.

6. Tanks containing Class I, II or III-A liquids inside a special enclosure shall not exceed 6,000 gallons (37 854 L) individual or 18,000 gallons (151 416 L) aggregate capacity.

7. Each tank within special enclosures shall be surrounded by a clear space of not less than 3 feet (910 mm) to allow for maintenance and inspection.

5202.3.7 Container storage inside buildings. Class I, II or III-A liquids stored inside motor vehicle fuel-dispensing station buildings shall be in approved containers and in accordance with Section 7902.5.

5202.3.8 Testing or leak-detection devices. Leak-detecting devices shall be tested annually by the owner or occupant of the property on which they are located. Test results shall be maintained on the premises and available to the chief on request.

5202.3.9 Inventory control. Accurate daily inventory records shall be maintained and reconciled on Class I, II and III-A liquid storage tanks for indication of possible leakage from tanks and piping. The records shall be kept at the premises and available to the chief upon request and shall include records showing, by product, daily reconciliation between sales, use, receipts and inventory on hand. If there is more than one system consisting of tanks serving separate pumps or dispensers for a product, the reconciliation shall be ascertained separately for each tank system. A consistent or accidental loss of Class I, II or III-A liquids shall be immediately reported to the fire department.

5202.4 Dispensing.

5202.4.1 Aboveground tanks. Class I and Class II liquids shall not be dispensed into the fuel tank of a motor vehicle from aboveground tanks except when such tanks are installed inside special enclosures in accordance with Section 5202.3.6. See also Appendix II-F.

5202.4.2 Filling of portable containers and tanks and cargo tanks. Class I, II and III-A liquids shall not be dispensed into portable containers unless such container is of approved material and construction, and having a tight closure with screwed or spring cover so designed that the contents can be dispensed into without spilling. Liquids shall not be dispensed into portable tanks.

Cargo tanks shall be filled at bulk plants or terminals.

5202.4.3 Design and construction.

5202.4.3.1 General. Class I and II liquids shall be transferred from underground tanks by means of fixed pumps so designed and equipped as to allow control of the flow and to prevent leakage or accidental discharge.

Supplemental means shall be provided outside of the dispensing device whereby the source of power can readily be disconnected in the event of fire or other accident.

Dispensing devices for Class I, II or III-A liquids shall be of an approved type. See Article 90, Standard u.1.6. Class I, II or III-A liquids shall be dispensed by approved pumps taking suction

through the top of the container. Class I, II or III-A liquids shall not be dispensed by a device that operates through pressure within a storage tank or container unless the tank or container has been approved as a pressure vessel for the use to which it is subjected. Air and oxygen pressure shall not be used for dispensing Class I, II or III-A liquids.

See Section 5202.5 for pressure-delivery motor vehicle fuel-dispensing stations.

5202.4.3.2 Nozzles. A listed automatic-closing-type hose nozzle valve with or without a latch-open device shall be provided on island-type dispensers used for dispensing Class I, II or III-A liquids.

Overhead-type dispensing units shall be provided with a listed automatic-closing-type hose nozzle valve without a latch-open device.

> **EXCEPTION:** A listed automatic-closing-type hose nozzle valve with latch-open device is allowed to be used if the design of the system is such that the hose nozzle valve will close automatically in the event the valve is released from a fill opening or upon impact with a driveway.

Where dispensing of Class I, II or III-A liquids is performed by someone other than a qualified attendant, a listed automatic-closing-type hose nozzle valve shall be used incorporating the following features:

1. The hose nozzle valve shall be equipped with an integral latch-open device.

2. When the flow of product is normally controlled by devices or equipment other than the hose nozzle valve, the hose nozzle valve shall not be capable of being opened unless the delivery hose is pressurized. If pressure to the hose is lost, the nozzle shall close automatically.

> **EXCEPTION:** Vapor-recovery nozzles incorporating insertion interlock devices designed to achieve shut-off upon disconnect with vehicle fill pipe.

3. The hose nozzle shall be designed such that the nozzle is retained in the fill pipe during the filling operation.

5202.4.3.3 Transferring apparatus for fueling aircraft. Transferring apparatus used or intended to be used for fueling aircraft shall be approved and shall be installed, operated and maintained in accordance with Section 2402.1.2.

5202.4.4 Supervision. In addition to the requirements in Section 5201.6, dispensing equipment used at unsupervised locations shall comply with one of the following:

1. The amount of fuel being dispensed is limited in quantity by a preprogrammed card,

2. Dispensing devices are programmed or set to limit uninterrupted fuel delivery to 25 gallons (94.6 L) and require a manual action to resume continued delivery, or

3. Product delivery hoses are equipped with a listed emergency breakaway device designed to retain liquid on both sides of the breakaway point. Such devices shall be installed and maintained in accordance with manufacturer's instructions.

5202.4.5 Dispensing inside garages. Where an outside location is impractical, dispensing devices approved for inside use are allowed to be installed inside a garage or similar establishment which stores, parks, services or repairs automotive equipment. The location of and safeguards for such dispensing devices shall be approved. Dispensing devices shall be protected from physical damage by vehicles by mounting such devices on a concrete island, or by equivalent means, and shall be located in a position where they cannot be struck by an out-of-control vehicle descending a ramp or other slope.

The dispensing area shall be provided with an approved mechanical or gravity ventilation system. When dispensing units are located below grade, only approved mechanical ventilation shall be used and the entire dispensing area shall be protected by an approved automatic sprinkler system. Ventilating systems shall be electrically interlocked with Class I liquid dispensing units such that the dispensing units cannot be operated unless the ventilating fan motors are energized. See also Section 5202.10.

5202.4.6 Electrical controls. A control shall be provided that will allow the pump to operate only when a dispensing nozzle is removed from its bracket or normal position with respect to the dispensing unit and the switch on the dispensing unit is manually actuated. This control shall also stop the pump when all nozzles have been returned, either to their brackets or to the normal nondispensing position.

5202.4.7 Special-type dispensers. Approved special-dispensing systems such as, but not limited to, coin-operated and remote preset types, are allowed at motor vehicle fuel-dispensing stations, provided there is at least one qualified attendant on duty while the station is open to the public, and:

1. The attendant or supervisor on duty shall be capable of performing the functions and assuming the responsibilities set forth in Sections 5201 and 5202.4.4,

2. Instructions for the operation of dispensers shall be conspicuously posted,

3. Remote preset-type devices shall be set in the off position while not in use so that the dispenser cannot be activated without the knowledge of the attendant,

4. The dispensing device shall be in clear view of the attendant at all times and obstacles shall not be placed between the dispensing devices and the attendant, and

5. The attendant shall be able to communicate with persons in the dispensing area at all times.

5202.5 Pressure Delivery Motor Vehicle Fuel-dispensing Stations.

5202.5.1 General. Systems used for the dispensing of Class I or II liquids that transfer the liquid from storage to individual or multiple dispensing units by pumps that are not located at dispensing units shall be in accordance with Section 5202.5.

EXCEPTION: The chief is authorized to alter or impose additional regulations where such systems are located within buildings.

Notification shall be given to the chief prior to abandonment, alteration or repair of any part of a pressure delivery system, except the dispenser.

5202.5.2 Pits. Pits intended to contain subsurface pumps or fittings from submersible pumps shall not be larger than necessary to contain the intended equipment and to allow the free movement of hand tools operated from above grade.

Pits and covers shall be designed and constructed to withstand the external forces to which they could be subjected. When located above an underground tank, at least 1 foot (305 mm) of earth or sand cover shall be maintained over the top of the tank.

Pits shall be protected against ignition of vapors by one of the following methods:

1. Sealing the unpierced cover with mastic or by bolting against a gasket in an approved manner, or

2. Filling the pit with a noncombustible inert material.

5202.5.3 Piping, valves and fittings.

5202.5.3.1 General. Piping, valves and fittings shall be designed for the working pressures and structural stresses to which they could be subjected. Metallic piping in contact with the ground shall be provided with cathodic protection. Threaded joints or connections shall be made up tight with the use of an approved pipe joint sealing compound. Nonmetallic joints shall be approved and shall be installed in accordance with the manufacturer's instructions.

5202.5.3.2 Valves. A check or manual valve shall be provided in the discharge dispensing supply line from the pump with a union between the valve and the same pump discharge.

An approved emergency shutoff impact valve incorporating a fusible link designed to close automatically in the event of severe impact or fire exposure shall be rigidly mounted and connected by a union in the dispensing supply line at the base of each dispensing device. The shear section of the

impact valve shall be mounted flush with the top of the surface upon which the dispenser is mounted.

5202.5.3.3 Leak detection. Pumps shall have installed on the discharge an approved leak-detection device which will provide an indication if the piping and dispensers are not essentially liquid-tight.

5202.5.3.4 Testing. Upon completion of the installation, the system shall be tested in accordance with Section 7901.11.

5202.6 Electrical Equipment.

5202.6.1 General. Areas where Class I liquids are stored, handled or dispensed shall be in accordance with Section 5202.6. See also Section 7901.4.

5202.6.2 Electrical wiring and equipment. Electrical wiring and equipment shall be installed in a manner which provides reasonable safety to persons and property. Evidence that wiring and equipment are of the type approved for use in the hazardous locations as set forth in Table 5202.6-A and that wiring and equipment have been installed in accordance with the Electrical Code shall be provided.

5202.6.3 Classified area. In Table 5202.6-A, a classified area need not extend beyond an unpierced wall, roof or other solid partition.

For area classifications not covered in Section 5202.6.2 and not listed in Table 5202.6-A, the chief is authorized to classify the extent of the hazardous area.

5202.7 Heating Equipment.

5202.7.1 Electrical heating equipment. Electrical heating equipment shall be in accordance with Section 5202.6.

5202.7.2 Fuel-burning equipment. Fuel-burning equipment, other than wet heat systems and direct-fired makeup air heaters, shall not be located in dispensing rooms or in areas where vapors could migrate. Such systems shall be in accordance with the Mechanical Code.

5202.8 Drainage Control. Provisions shall be made to prevent liquids spilled during dispensing operations from flowing into buildings. Acceptable methods include grading driveways, raising doorsills, or other approved means.

5202.9 Fire Protection. A fire extinguisher with a minimum rating of 2-A, 20-B:C shall be provided and located such that it is not more than 75 feet (22 860 mm) from any pump, dispenser or fill-pipe opening.

5202.10 Motor Vehicle Fuel-dispensing Stations Located inside Buildings.

5202.10.1 General. Automotive motor vehicle fuel-dispensing stations which dispense fuels into vehicles in areas that are wholly or partially enclosed by the walls, floors or ceilings of the buildings shall be in accordance with Section 5202.10. See also Section 5202.4.5.

> **EXCEPTION:** Motor vehicle fuel-dispensing stations located inside a building with two or more sides of the dispensing area open to the building exterior so that normal ventilation can be expected to dissipate flammable vapors.

Dispensing of fuel into motor vehicles inside of buildings is allowed only when approved by the chief.

5202.10.2 Construction. Automotive motor vehicle fuel-dispensing stations within buildings shall be constructed in accordance with the Building Code.

5202.10.3 Ventilation.

5202.10.3.1 General. Heating, ventilation and air-conditioning systems shall be in accordance with the Mechanical Code.

5202.10.3.2 Interlocks on dispensers. When mechanical systems for ventilation are installed serving only the area where fuels are dispensed, the system shall operate when the motor vehicle fuel-dispensing station is open for business and shall be interlocked to dispensing units so that fuel cannot be dispensed unless the ventilation system is in operation.

5202.10.3.3 Exhaust system design. The exhaust system shall be designed to provide air movement across all portions of the dispensing floor area and to prevent the flow of flammable vapors beyond the dispensing area. Exhaust inlet ducts shall not be less than 3 inches (76.2 mm) or more than 12 inches (304.8 mm) above the floor. Exhaust ducts shall not be located in floors or penetrate the floor of the dispensing area and shall discharge to a safe location outside the building.

5202.10.4 Piping.

5202.10.4.1 General. Piping systems shall be in accordance with Section 7901.11.

5202.10.4.2 Enclosure of vent piping. Fuel and flammable vapor piping inside buildings, but outside of the motor vehicle fuel-dispensing station area, shall be enclosed within a horizontal or a vertical shaft used only for this piping. Vertical and horizontal shafts shall be constructed of materials having a fire-resistance rating of not less than two hours.

5202.10.5 Spill control and drainage control. Spill control and drainage control shall be provided as set forth in Section 7901.8.

5202.11 Marine Motor Vehicle Fuel-dispensing Stations.

5202.11.1 General. The construction of marine motor vehicle fuel-dispensing stations shall be in accordance with the Building Code. The storage of Class I, II or III-A liquids at such locations shall, except as otherwise provided in Section 5202.11, be in accordance with Articles 52 and 79.

5202.11.2 General construction. Piers, wharves and floats where Class I, II or III-A liquid dispensers are located shall be of fire-resistive construction and shall be impervious to spills of such liquids and oils within the immediate area of the dispenser.

5202.11.3 Storage and handling.

5202.11.3.1 General. Class I, II or III-A liquids stored in buildings used for marine motor vehicle fuel-dispensing buildings shall be stored in approved containers or portable tanks. Storage of Class I liquids shall not exceed 10 gallons (37.9 L).

EXCEPTION: Storage in liquid storage rooms in accordance with Section 7902.5.11.

Class II or III-A liquids stored or dispensed inside of buildings used for marine motor vehicle fuel dispensing shall be stored in and dispensed from approved containers or portable tanks. Storage of Class II and III-A liquids shall not exceed 120 gallons (454.2 L). Heating equipment shall comply with Section 5202.7.

5202.11.3.2 Connections between aboveground and underground tanks. Connections shall not be made between an aboveground tank and an underground tank, except that aboveground tanks located in an adjoining bulk plant are allowed to connect, by piping, to marine motor vehicle fuel-dispensing station underground tanks if, in addition to valves at the aboveground tanks, a valve is also installed within control of marine motor vehicle fuel-dispensing station personnel.

5202.11.3.3 Piping. Piping at marine motor vehicle fuel-dispensing stations shall be protected against physical damage, external corrosion and excessive stresses.

5202.11.3.4 Emergency valve. A valve whereby supply from shore can be shut off shall be provided in each product line at or near the approach to the pier, wharf or other structure, and an approved quick-throw valve shall be provided above each flexible connection to stop flow to float in the event of rupture of such flexible connections.

5202.11.3.5 Flexible connections. Not more than two flexible connections shall be installed in lines leading from piers or wharves to a float, except when unusual conditions exist. In such cases, additional flexible connections may be allowed when approved by the chief.

5202.11.3.6 Piping materials. Commodity piping at marine motor vehicle fuel-dispensing stations shall be welded or welded flanged steel construction.

EXCEPTION: Pipe less than 2 inches (50.8 mm) in diameter is allowed to be threaded provided it is constructed of steel or other approved material.

5202.11.3.7 Electrical grounding. Piping used for transporting Class I liquids shall be grounded to control stray electrical current.

5202.11.3.8 Testing. Testing of piping systems shall be in accordance with Section 7901.11.10.

5202.11.4 Dispensing.

5202.11.4.1 General. Wharves, piers or floats at marine motor vehicle fuel-dispensing stations 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. Ship stores and merchandise shall not be sold from an area where fuel is dispensed into the tanks of motor craft.

5202.11.4.2 Location of tanks and pumps. Tanks and pumps, other than those integral with approved dispensing devices, supplying Class I, II or III-A liquids at marine motor vehicle fuel-dispensing stations shall be located only on shore or, when approved by the chief, on piers of solid-fill type. Approved dispensing devices with or without integral pumps are allowed to be located on shore, piers of solid-fill type, open piers, wharves or floating docks.

5202.11.4.3 Supervision. Dispensing of Class I, II or III-A liquids or flammable gases shall be under the direct control of a competent person at all times who is fully aware of the operation, mechanics and hazards inherent to fueling of boats.

5202.11.4.4 Hoses and nozzles. Dispensing of Class I, II or III-A liquids into the fuel tanks of marine craft shall be by means of an approved-type hose equipped with a listed automatic-closing nozzle with or without latch-open device.

Hoses used for dispensing or transferring Class I, II or III-A liquids, when not in use, shall be reeled, racked or otherwise protected from mechanical damage.

5202.11.4.5 Portable containers. Class I, II or III-A liquids shall not be dispensed into portable containers unless such container is approved.

5202.11.4.6 Liquefied petroleum gas. Liquefied petroleum gas cylinders shall not be filled at marine motor vehicle fuel-dispensing stations unless approved by the chief. Approved storage facilities for LP-gas cylinders shall be provided. See also Section 5204.

5202.11.4.7 Access. The dispensing area shall be located from other structures so as to provide room for safe ingress and egress of craft to be fueled. Dispensing units shall be at least 20 feet (6096 mm) from activities involving fixed sources of ignition.

5202.11.5 Fire-prevention regulations.

5202.11.5.1 Housekeeping. Marine motor vehicle fuel-dispensing stations shall be maintained in a neat and orderly manner and accumulations of rubbish or waste oils in excessive amounts shall be prohibited.

5202.11.5.2 Spills. Spills of Class I, II or III-A liquids at or on the water of marine motor vehicle fuel-dispensing stations shall be reported immediately to the fire department and jurisdictional authorities.

5202.11.5.3 Rubbish containers. Metal containers with tightfitting or self-closing metal lids shall be provided for the temporary storage of combustible trash or rubbish.

5202.11.5.4 Marine vessels and craft. Vessels or craft shall not be made fast to or berthed at fuel docks serving a marine motor vehicle fuel-dispensing station, except during fueling operations, and

craft shall not be made fast to other vessels or craft occupying a berth at a marine motor vehicle fuel-dispensing station.

5202.11.5.5 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 vehicle fuel-dispensing stations 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 chief. Fueling shall not be conducted at the pier, wharf or float during the course of such emergency repairs.

Smoking or open flames shall be prohibited within 50 feet (15 240 mm) of fueling operations. NO SMOKING signs shall be posted conspicuously about the premises. Such signs shall have letters not less than 4 inches (101.6 mm) in height on a background of contrasting color.

5202.11.5.6 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.

5202.11.5.7 Warning signs. Warning signs shall be predominantly 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 (76.2 mm) in height on a background of contrasting color bearing the following or equivalent wording:

WARNING
NO SMOKING—STOP ENGINE WHILE FUELING. SHUT OFF ELECTRICITY. DO NOT START ENGINE UNTIL AFTER BELOW-DECK SPACES ARE VENTILATED.

5202.11.6 Fire protection.

5202.11.6.1 Standpipes. Piers, wharves and floats at marine motor vehicle fuel-dispensing stations shall be equipped with an approved wet standpipe system installed in accordance with Article 10.

Hose stations shall be spaced to provide protection to any portion of docks, piers, wharves or floating craft. An approved and listed hose reel or approved and listed semiautomatic hose rack shall be provided and shall be located such that the hose is accessible. Hose shall be enclosed within a cabinet, and hose stations shall be labeled FIRE HOSE EMERGENCY USE ONLY. Tests and valving shall be approved by the chief.

5202.11.6.2 Fire extinguishers. Fire extinguishers, 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.

5202.12 Vapor Recovery.

5202.12.1 General. Vapor-recovery and vapor-processing systems shall be in accordance with Section 5202.12.

5202.12.2 Vapor-balance systems.

5202.12.2.1 Dispensing devices. Dispensing devices incorporating provisions for vapor recovery shall be listed and labeled. When existing listed or labeled dispensing devices are modified for vapor recovery, such modifications shall be listed by report by a nationally recognized testing laboratory. The listing by report shall contain a description of the component parts used in the modification and recommended method of installation on specific dispensers. Such report shall be made available on request to the chief.

Means shall be provided to shut down fuel dispensing in the event the vapor-return line becomes blocked.

5202.12.2.2 Vapor-return line closeoff. An acceptable method shall be provided to close off the vapor-return line from dispensers when the product is not being dispensed.

5202.12.2.3 Piping. Piping in vapor-balance systems shall be in accordance with Sections 7901.11, 7902.2 and 7902.6. Nonmetallic piping shall be installed in accordance with the manufacturer's installation instructions.

Existing and new vent piping shall be in accordance with Sections 7901.11, 7902.2 and 7902.6. Vapor-return piping shall be installed in a manner which drains back to the tank, without sags or traps in which liquid can become trapped. If necessary, due to grade, condensate tanks are allowed in vapor-return piping. Condensate tanks shall be designed and installed such that they can be drained without opening.

5202.12.2.4 Flexible joints and shear joints. Flexible joints shall be installed in accordance with Section 7901.11.7.

An approved shear joint shall be rigidly mounted and connected by a union in the vapor-return piping at the base of each dispensing device. The shear joint shall be mounted flush with the top of the surface on which the dispenser is mounted.

5202.12.2.5 Testing. Vapor-return lines and vent piping shall be tested in accordance with Section 7901.11.10.

5202.12.3 Vapor processing.

5202.12.3.1 Equipment. Equipment in vapor-processing systems, including hose nozzle valves, vapor pumps, flame arresters, fire checks or systems for prevention of flame propagation, controls and vapor-processing equipment, shall be individually listed for the intended use in a specified manner.

Vapor-processing systems that introduce air into the underground piping or storage tanks shall be provided with equipment for prevention of flame propagation that has been tested and listed as suitable for the intended use.

5202.12.3.2 Location. Vapor-processing equipment shall be located at or above grade. Sources of ignition shall be located not less than 50 feet (15 240 mm) from fuel-transfer areas and not less than 18 inches (457.2 mm) above tank fill openings and tops of dispenser islands.

Vapor-processing units shall be located not less than 10 feet (3048 mm) from the nearest building or property line of a property which can be built upon.

EXCEPTION: Where the required distances to buildings, property lines or fuel-transfer areas cannot be obtained, means shall be provided to protect equipment against fire exposure. Acceptable means include:

1. Approved protective enclosures, which extend at least 18 inches (6096 mm) above the equipment, constructed of fire-resistant or noncombustible materials, or

2. Fire protection using an approved water-spray system.

Vapor-processing equipment shall be located a minimum of 20 feet (6096 mm) from dispensing devices. Processing equipment shall be protected against physical damage by guardrails, curbs,

protective enclosures or fencing. When approved protective enclosures are used, approved means shall be provided to ventilate the volume within the enclosure to prevent pocketing of flammable vapors.

If a downslope exists toward the location of the vapor-processing unit from a fuel-transfer area, the chief is authorized to require additional separation by distance and height.

5202.12.3.3 Installation. Vapor-processing units shall be securely mounted on concrete, masonry or structural steel supports on concrete or other noncombustible foundations.

Vapor-recovery and vapor-processing equipment is allowed to be installed on roofs when approved by the chief.

5202.12.3.4 Piping. Piping in a mechanical-assist system shall be in accordance with Sections 7901.11, 7902.2 and 7902.6.

Nonmetallic piping shall be installed in accordance with the manufacturer's installation instructions.

Existing and new vent lines shall be in accordance with Section 7902.1.10. Vapor-return lines shall be installed in a manner which drains back to the tank, without sags or traps in which liquid can become trapped. If necessary, due to grade, condensate tanks are allowed in vapor-return piping. Condensate tanks shall be designed and installed such that they can be drained without opening.

5202.12.3.5 Flexible joints and emergency shutoff impact valves. Flexible joints shall be installed in accordance with Section 7901.11.7.

An approved emergency shutoff impact valve incorporating a fusible link designed to close automatically in event of severe impact or fire exposure shall be rigidly mounted and connected by a union in the vapor-return line at the base of each dispensing device. The shear section of the valve shall be mounted flush with the top of the surface on which the dispenser is mounted.

5202.12.3.6 Vapor-return line closeoff. An acceptable method shall be provided to close off the vapor-return line from dispensers when product is not being dispensed.

5202.12.3.7 Component design. If a component is likely to contain a flammable vapor/air mixture under operating conditions and can fail in a manner which could ignite the mixture, the component shall be designed to withstand an internal explosion without failure to the outside and protected to prevent flame propagation to other parts of the system.

5202.12.3.8 Fire checks. Approved fire checks or other positive means of automatic isolation of underground storage tanks shall be installed in vapor-return piping to prevent a flashback from reaching the underground tanks. Such devices also shall be installed in all vapor/air piping as close as practical to each burner or group of burners in a vapor incineration unit, and in all vapor-transfer piping as close as practical to refrigeration, absorption or similar types of processing equipment.

5202.12.3.9 Vent termination. Vents from vapor-processing units shall not be less than 12 feet (3658 mm) above adjacent ground level and not less than 8 feet (2438 mm) above the processing unit itself. Vent outlets shall be directed and located such that flammable vapors will not accumulate, travel to an unsafe location or enter buildings.

5202.12.3.10 Testing. Vapor-return lines, vapor-transfer lines and vent piping shall be tested in accordance with Section 7901.11.10.

5202.12.3.11 Electrical equipment. Electrical equipment shall be in accordance with Table 5202.6-A. Electrically energized vapor-recovery equipment shall be directly connected to and controlled by the emergency pump shutoff switch in Section 5202.4.6.

5202.12.3.12 Site control. Fences, bumper posts or other control measures shall be provided where necessary to protect from tampering, trespassing and vehicle traffic. The area within 15 feet (4572 mm) of the installed vapor-processing unit shall be kept clear of combustible materials.

5202.12.4 Maintenance, tests and inspection. Vapor-recovery and vapor-processing equipment shall be subject to periodic maintenance, tests and inspections. Maintenance, tests and inspections set forth in the listing document, or other tests required by the chief, shall be the responsibility of the owner or occupant of the premises on which such equipment is located.

Maintenance on a vapor-recovery system or vapor-processing equipment shall be performed by the manufacturer of the affected equipment, or an equally qualified person. Written records of maintenance, tests, inspections and the results and recommendations therefrom shall be maintained on the premises where the equipment is located, and shall be made available to the chief on request.

Incidents involving leaks, fires, explosions, overheating or requiring shutting down equipment, other than for routine maintenance or tests, shall be immediately reported to the fire department.

TABLE 5202.6-A—CLASS I LOCATIONS[1]

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 (457.2 mm) above grade level within a horizontal radius of 10 feet (3048 mm) from a loose fill connection and within a horizontal radius of 5 feet (1524 mm) from a tight fill connection.
Vent—Discharging upward	1	Within 3 feet (914 mm) of open end of vent, extending in all directions.
	2	Area between 3 feet (914 mm) and 5 feet (1524 mm) of open end of vent, extending in all directions.
Dispensing device[2]—(except overhead type[3])		
Pits	1	Pits, boxes or spaces below grade level, any part of which is within the Division 1 or 2 classified area.
Dispenser[4]	2	Within 18 inches (457.2 mm) horizontally in all directions extending to grade from (1) the dispenser enclosure or (2) that portion of the dispenser enclosure containing liquid-handling components.
Outdoor	2	Up to 18 inches (457.2 mm) above grade level within 20 feet (6096 mm) horizontally of any edge of enclosure.
Indoor		
with mechanical ventilation	2	Up to 18 inches (457.2 mm) above grade or floor level within 20 feet (6096 mm) horizontally of any edge of enclosure.
with gravity ventilation	2	Up to 18 inches (457.2 mm) above grade or floor level within 25 feet (7620 mm) horizontally of any edge of enclosure.
Dispensing device—overhead type[3]	1	The space within the dispenser enclosure and all electrical equipment integral with the dispensing hose or nozzle.
	2	A space extending 18 inches (457.2 mm) horizontally in all directions beyond the enclosure and extending to grade.
	2	Up to 18 inches (457.2 mm) above grade level within 20 feet (6096 mm) horizontally measured from a point vertically below the edge of any dispenser enclosure.
Remote pump—outdoor	1	Pits, boxes or spaces below grade level if any part is within a horizontal distance of 10 feet (3048 mm) from any edge of pump.
	2	Within 3 feet (914 mm) of any edge of pump, extending in all directions. Also, up to 18 inches (457.2 mm) above grade level within 10 feet (3048 mm) horizontally from any edge of pump.

Remote pump—indoor	1 2	Entire area within a pit. Within 5 feet (1524 mm) of any edge of pump, extending in all directions. Also up to 3 feet (914 mm) above floor or grade level within 25 feet (7620 mm) horizontally from any edge of pump.
Lubrication or service room —with dispensing	1 2 2 2	Pits within an unventilated area. Pits with ventilation. Area up to 18 inches (457.2 mm) above floor or grade level and 3 feet (914 mm) horizontally from a lubrication pit. Within 3 feet (914 mm) of any fill or dispensing point, extending in all directions.
Dispenser for Class I liquids		
Lubrication or service room —without dispensing	2 2 2 2 Non-Classified	Entire area within pits used for lubrication or similar service where Class I liquids could be released. Area up to 18 inches (457.2 mm) above such pits, and extending a distance of 3 feet (914 mm) horizontally from any edge of the pit. Entire unventilated area within any pit, below-grade area or subfloor area. Area up to 18 inches (457.2 mm) above any such unventilated pit, below-grade work area or subfloor work area and extending a distance of 3 feet (914 mm) horizontally from the edge of any such pit, below-grade work area or subfloor work area. Any pit, below-grade work area or subfloor work area that is ventilated at a rate of not less than 1 cfm per square foot (5.1 L/s per m^2) of floor area at all times that the building is occupied or when vehicles are parked in or over these areas. Exhaust air shall be taken from a point within 12 inches (304.8 mm) of the floor of the pit, below-grade area or subfloor area.
Special enclosure inside building (See Section 5202.3.6)	1	Entire enclosure.
Sales, storage and restrooms	Non-Classified	If there is an opening to these rooms within the extent of a Division 1 area, the entire room shall be classified as Division 1.
Vapor-processing systems pits	1	Pits, boxes or spaces below grade level, any part of which is within a Division 1 or 2 classified area or which houses equipment used to transport or process vapors.
Vapor-processing equipment located within protective enclosures (See Section 5202.12.3)	2	

(Continued)

TABLE 5202.6-A—CLASS I LOCATIONS[1]—(Continued)

Vapor-processing equipment not within protective enclosures (excluding piping and combustion devices)	2	The space within 18 inches (457.2 mm) in all directions of equipment containing flammable vapor or liquid extending to grade level. Up to 18 inches (457.2 mm) above grade level within 10 feet (3048 mm) horizontally of the vapor-processing equipment.
Equipment enclosures	1	Areas within the enclosure where vapor or liquid is present under normal operating conditions.
	2	The entire area within the enclosure other than Division 1.
Vacuum-assist blowers	2	The space within 18 inches (457.2 mm) in all directions extending to grade level. Up to 18 inches (457.2 mm) above grade level within 10 feet (3048 mm) horizontally.

[1]Locations as classified in the Electrical Code.

[2]Refer to Figure 5202.6-A for classified location around dispensing devices.

[3]Ceiling-mounted hose reels are considered overhead-type dispensing devices.

[4]For classification of space inside the dispenser enclosure, see Article 90, Standard u.1.6.

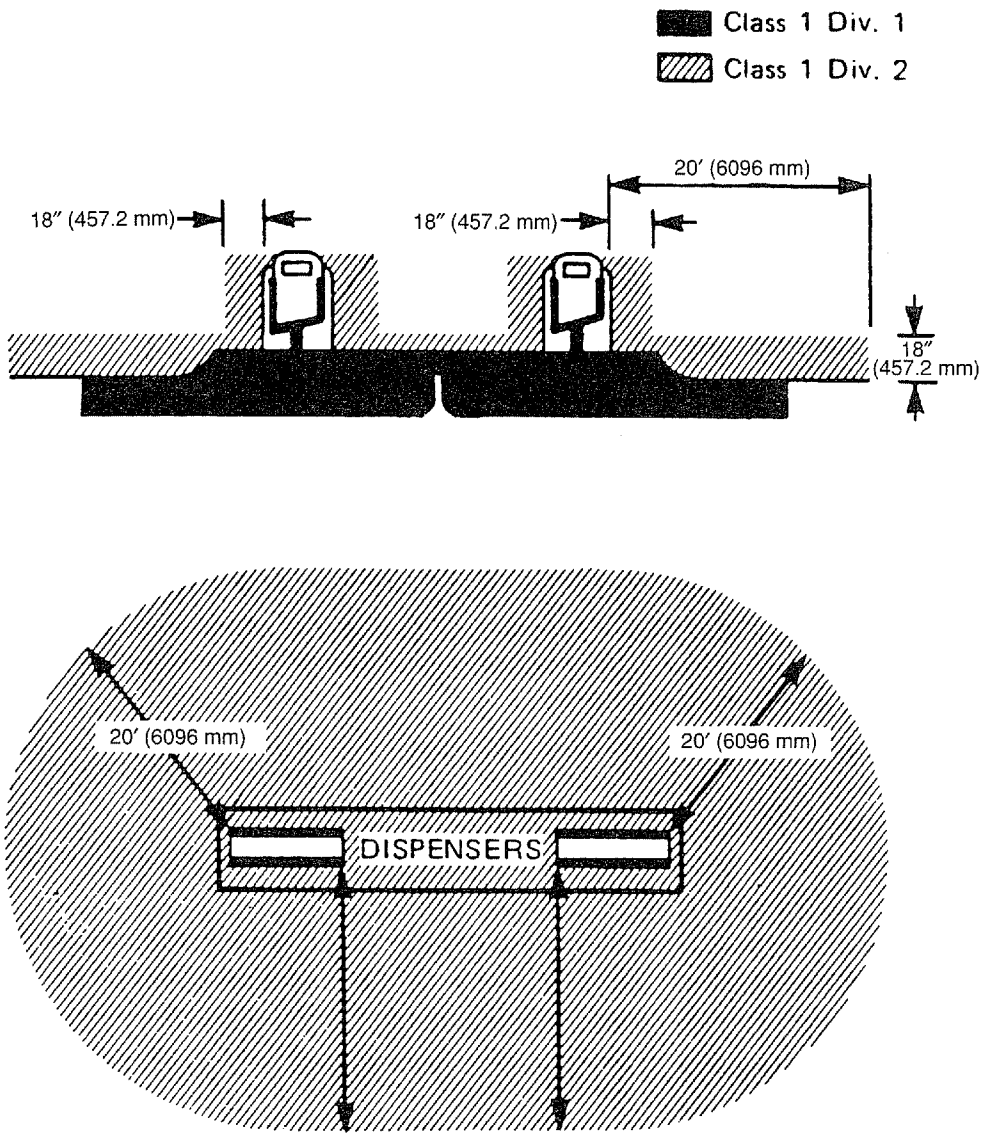


FIGURE 5202.6-A—CLASSIFIED LOCATIONS ADJACENT TO DISPENSERS AS DETAILED IN TABLE 5202.6-A

SECTION 5203 — LIQUEFIED PETROLEUM GAS MOTOR VEHICLE FUEL-DISPENSING STATIONS

5203.1 General. Automotive, marine and aircraft motor vehicle fuel-dispensing stations utilizing LP-gas shall be in accordance with Section 5203. See also Article 82.

5203.2 Approvals.

5203.2.1 General. Storage vessels and equipment used for the storage or dispensing of LP-gas shall be approved or listed in accordance with Section 5203.2.

5203.2.2 Approved equipment. Containers; pressure-relief devices, including pressure-relief valves; and pressure regulators and piping used for LP-gas shall be approved.

5203.2.3 Listed equipment. Hoses, hose connections, vehicle fuel connections, dispensers, LP-gas pumps and electrical equipment used for LP-gas shall be listed.

5203.3 Attendants. Motor vehicle fueling operations shall be conducted by qualified attendants or in accordance with Section 5203.6 by persons trained in the proper handling of LP-gas.

5203.4 Location. In addition to the requirements of Section 5201.4, the point of transfer for dispensing operations shall be 25 feet (7620 mm) or more from buildings having combustible exterior wall surfaces or buildings having noncombustible exterior wall surfaces that are not part of a one-hour fire-resistive assembly, property which may be built on, public streets, or sidewalks and railroads; and at least 10 feet (3048 mm) from driveways and buildings having noncombustible exterior wall surfaces that are part of a fire-resistive assembly having a rating of one-hour or more.

Liquefied petroleum gas vehicle fuel dispensers shall not be located in the same island as a gasoline dispenser.

Liquefied petroleum gas containers shall be located in accordance with Article 82. Liquefied petroleum gas storage and dispensing equipment shall be located outdoors and in accordance with Section 5201.5.

5203.5 Installation of Dispensing Devices and Equipment.

5203.5.1 General. The installation and operation of LP-gas dispensing systems shall be in accordance with Section 5203.5 and U.F.C. Standard 82-1. Liquefied petroleum gas dispensers and dispensing stations shall be installed in accordance with manufacturers specifications and their listing.

5203.5.2 Vehicle fuel dispensers.

5203.5.2.1 Valves. A manual shutoff valve and an excess flow-control valve shall be located in the liquid line between the pump and the dispenser outlet and at the termination of the liquid piping at the point of attachment of the dispenser hose.

EXCEPTION: When approved by the chief, an emergency shutoff valve may be installed in lieu of the excess flow-control valve at the point where the dispenser hose is attached to the liquid piping.

A listed shutoff valve shall be located at the discharge end of the transfer hose.

5203.5.2.2 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.

5203.5.2.3 Vehicle impact protection. Vehicle impact protection for LP-gas storage containers, pumps and dispensers shall be provided in accordance with Section 8001.9.3.

5203.6 Private Fueling of Motor Vehicles. Self-service LP-gas dispensing systems, including key, code and card lock dispensing systems, shall not be open to the public and shall be limited to the filling of permanently mounted fuel containers on LP-gas powered vehicles.

In addition to the requirements in Section 5201.6, self-service LP-gas dispensing systems shall be in accordance with the following:

1. The system shall be provided with an emergency shutoff switch located within 75 feet (22 860 mm) of, but not less than 25 feet (7620 mm) from, dispensers.

2. The owner of the dispensing facility shall ensure the safe operation of the system and the training of users.

5203.7 Overfilling. Liquefied petroleum gas containers shall not be filled in excess of the fixed outage installed by the manufacturer or the weight stamped on the tank.

SECTION 5204 — COMPRESSED NATURAL GAS MOTOR VEHICLE FUEL-DISPENSING STATIONS

5204.1 General. Automotive, marine and aircraft motor vehicle fuel-dispensing stations utilizing CNG shall be in accordance with Section 5204.

5204.2 Standards. Compressed natural gas motor vehicle fuel-dispensing operations and facilities shall be in accordance with U.F.C. Standard 52-1.

5204.3 Approvals.

5204.3.1 General. Storage vessels and equipment used for the storage, compression or dispensing of CNG shall be approved or listed in accordance with Section 5204.3.

5204.3.2 Approved equipment. Containers; compressors; pressure-relief devices, including pressure-relief valves; and pressure regulators and piping used for CNG shall be approved.

5204.3.3 Listed equipment. Hoses, hose connections, dispensers, gas-detection systems and electrical equipment used for CNG shall be listed. Vehicle fueling connections shall be listed and labeled.

5204.4 Attendants. Motor vehicle fueling operations shall be conducted by qualified attendants or in accordance with Section 5204.6 by persons trained in the proper handling of CNG.

5204.5 Location of Dispensing Operations and Equipment.

5204.5.1 General. Compression, storage and dispensing equipment shall be located aboveground.

> **EXCEPTION:** Compression, storage or dispensing equipment is allowed in buildings of noncombustible construction, as set forth in the Building Code, which are unenclosed for three quarters or more of the perimeter.

5204.5.2 Maximum capacity within established limits. Within the limits established by law restricting the storage of CNG for the protection of heavily populated or congested commercial areas, the aggregate capacity of any one installation shall not exceed 183,000 cubic feet (5 181 974 L).

5204.5.3 Location on property. In addition to the requirements of Section 5201.4, compression, storage and dispensing equipment shall be installed as follows:

1. Not beneath power lines,

2. Ten feet (3048 mm) or more from the nearest building or property line which could be built on, public street, sidewalk, or source of ignition, and

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.

5204.6 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 5201.6, self-service CNG-dispensing systems shall be in accordance with the following:

1. The system shall be provided an emergency shutoff switch located within 75 feet (22 860 mm) of, but not less than 25 feet (7620 mm) from, dispensers, and

2. The owner of the dispensing facility shall ensure the safe operation of the system and the training of users.

5204.7 Pressure Regulators. Pressure regulators shall be designed, installed or protected so their operation will not be affected by the elements (freezing rain, sleet, snow or ice), mud or debris. This protection is allowed to be integral with the regulator.

5204.8 Valves. Gas piping to equipment shall be provided with a remote, readily accessible manual shutoff valve.

5204.9 Emergency Shutdown Equipment. An emergency shutdown device shall be located within 75 feet (22 860 mm) of, but not less than 25 feet (7620 mm) from, dispensers and shall also be provided in the compressor area. Upon activation, the emergency shutdown 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.

5204.10 Discharge of CNG from Motor Vehicle Fuel Storage Containers.

5204.10.1 Applicability. 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 Section 5204.10.

5204.10.2 Methods.

5204.10.2.1 General. The discharge of CNG from motor vehicle fuel cylinders shall be accomplished through a use-closed transfer system or an approved method of atmospheric venting.

5204.10.2.2 Use-closed transfer system. A documented procedure which explains the logical sequence for discharging the cylinder shall be provided to the chief 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 chief 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.

5204.10.2.3 Atmospheric venting.

5204.10.2.3.1 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 chief for review and approval.

5204.10.2.3.2 Cylinder stability. A method of rigidly supporting the vessel during the venting of CNG shall be provided. The selected method shall provide not more 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.

5204.10.2.3.3 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 5204.10-A.

TABLE 5204.10-A—SEPARATION DISTANCE FOR ATMOSPHERIC VENTING OF CNG

EQUIPMENT OR FEATURE	MINIMUM SEPARATION	
	(feet)	(mm)
Buildings	25	7620
Building openings	25	7620
Property lines	15	4572
Public ways	15	4572
Vehicles	25	7620
CNG compressor and storage vessels	25	7620
CNG dispensers	25	7620

5204.10.2.3.4 Grounding and bonding. The structure or appurtenance used for supporting the cylinder shall be grounded in accordance with the Electrical Code. The cylinder valve shall be bonded prior to the commencement of venting operations.

5204.10.2.3.5 Vent tube. A vent tube which will divert the gas flow to atmosphere shall be installed on the cylinder prior to the commencement of venting and purging operation. The vent tube shall be constructed of pipe or tubing materials in accordance with Article 90, Standard No. a.1.5.

Piping materials specified in Section 2-8.4 of U.F.C. Standard 52-1 shall not be used. The vent tube shall be capable of dispersing the gas a minimum of 10 feet (3048 mm) above grade level. The vent tube shall not be provided with a rain cap or other feature which 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.

5204.10.2.3.6 Signage. Approved NO SMOKING signs 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.

PART VI

SPECIAL EQUIPMENT

ARTICLE 61 — OIL-BURNING EQUIPMENT

SECTION 6101 — SCOPE

Oil-burning equipment other than internal combustion engines, oil lamps and portable devices such as blow torches, melting pots and weed burners shall be in accordance with Article 61.

SECTION 6102 — GENERAL

The design, construction and installation of oil-burning equipment shall be in accordance with the Mechanical Code. Oil-burning equipment shall be of an approved type.

SECTION 6103 — ELECTRICAL WIRING AND EQUIPMENT

Electrical wiring and equipment used in connection with oil-burning equipment shall be installed in accordance with the Electrical Code.

SECTION 6104 — FUEL OIL

The fuel oil used in a burner shall be of a type approved for the burner and in accordance with the burner manufacturer's recommendations.

SECTION 6105 — PORTABLE UNVENTED OIL-BURNING HEATING APPLIANCES

6105.1 General. The design, construction and use of portable unvented oil-burning heating appliances shall be in accordance with Section 6105 and other applicable provisions of this code.

6105.2 Equipment. Portable unvented oil-burning heating appliances shall be listed and shall be limited to a fuel tank capacity of 2 gallons (7.6 L).

EXCEPTION: Appliances approved for temporary use during construction processes are allowed to have a greater fuel tank capacity, provided such capacity does not exceed the terms of the listing of the appliance.

6105.3 Location. The use of listed portable unvented oil-burning heating appliances shall be limited to supplemental heating in Group S, Divisions 3, 4 and 5 and Group U Occupancies.

EXCEPTION: When approved by the chief, portable unvented oil-burning heating appliances may be used in any occupancy during construction when such use is necessary for the construction and the use does not represent a hazard to life or property.

6105.4 Fuel. The grade and type of fuel shall be in accordance with the listing for the appliance. Storage and handling of fuel shall be in accordance with Article 79.

ARTICLE 62 — INDUSTRIAL BAKING AND DRYING OVENS

SECTION 6201 — SCOPE

Location, construction and operation of industrial baking and drying ovens which are heated with oil or gas fuel or which during operation contain flammable vapors from the products being baked or dried shall be in accordance with Article 62. This article provides requirements for the operation of these ovens within certain limitations of control depending on oven design, paint formulation and ventilation requirements. In addition to the requirements of Article 62, industrial baking and drying ovens shall comply with U.F.C. Standard 62-1.

SECTION 6202 — PERMITS AND PLANS

For a permit to operate an oven regulated by Article 62, see Section 105, Permit o.3. Application for a permit shall be accompanied by plans showing essential details and calculations demonstrating safe operation.

SECTION 6203 — LOCATION AND CONSTRUCTION

6203.1 General. When locating ovens, oven heaters and related equipment, the possibility of fire resulting from overheating or from the escape of fuel gas or fuel oil and the possibility of damage to the building and injury to persons resulting from explosion shall be considered.

6203.2 Elevation. Ovens shall be located at or above grade.

EXCEPTION: Ovens are allowed in basements having at least 50 percent of the wall area of the room in which the oven is located above grade.

6203.3 Clearances. Ovens shall be readily accessible for inspection and maintenance and shall have adequate clearances to allow the proper functioning of explosion vents. Roofs and floors of ovens shall be sufficiently insulated and ventilated to keep temperatures at combustible ceilings and floors below 160°F. (71.1°C.).

6203.4 Construction. Ovens with a maximum oven-operating temperature exceeding 160°F. (71.1°C.) shall be constructed of noncombustible materials. The amount of insulation used in oven panel construction shall be adequate to prevent the outside surface temperature from exceeding 160°F. (71.1°C.), or adequate guards shall be provided to protect personnel.

6203.5 Explosion control. Ovens which could contain flammable air-gas mixtures shall be equipped with explosion venting.

6203.6 Ducts. Ducts shall be constructed of noncombustible material. Ducts shall be tight and shall not have openings other than those required for the proper operation and maintenance of the system. Ducts passing through combustible walls, floors or roofs shall have adequate insulation and clearances to prevent surface temperatures from exceeding 160°F. (71.1°C.). Exhaust ducts shall not discharge near doors, windows or other air intakes in a manner that will risk reentry of vapors into the building.

SECTION 6204 — VENTILATION

6204.1 General. Ovens in which flammable or toxic vapors are liberated or through which products of combustion are circulated shall be ventilated by the introduction of fresh air and proper exhaust to outdoors. Discharge pipes shall not terminate within 10 feet (3048 mm), measured horizontally, from doors, windows or wood frame walls of buildings. Oven ventilation shall be arranged to provide vigorous and well-distributed air circulation within the oven and to ensure that the flammable vapor concentration will be below the lower explosive limit at all times. Unless the

oven is operated in accordance with specific approval specifying particular solvents and rate of ventilation, the rate of ventilation shall not be less than 10,000 cubic feet of fresh air per gallon of solvent evaporated (74.8 m^3/L) in continuous process ovens and not less than 380 cubic feet per minute per gallon (0.047 m^3/s per L) of flammable solvent evaporated in batch process ovens.

6204.2 Duct Intake Openings. Exhaust duct intake openings shall be located in the area of greatest concentration of vapors.

6204.3 Conveying Means. Exhaust shall be conveyed by mechanical means using power-driven fans.

SECTION 6205 — SAFETY CONTROLS

6205.1 General. Safety controls specified in U.F.C. Standard 62-1 shall be provided in sufficient number and substantially constructed and arranged to maintain the required conditions of safety and prevent the development of fire and explosion hazards.

6205.2 Ventilation Controls. Suitably interlocked ventilation controls shall be provided which will ensure required ventilation of the system.

6205.3 Fuel-safety Controls. Suitably interlocked fuel-safety controls shall be provided and arranged to minimize the possibility of dangerous accumulations of explosive air-fuel mixtures in the heating system.

6205.4 Excess Temperature Controls. Excess temperature controls shall be provided to maintain a safe operating temperature within the oven.

6205.5 Conveyor Interlocks. Conveyor interlocks shall be provided in conveyor ovens having a flammable vapor hazard such that the conveyor cannot move unless ventilating fans are operating and discharging the required volume of air.

ARTICLE 63 — REFRIGERATION

SECTION 6301 — SCOPE

Refrigeration unit and system installations having a refrigerant circuit containing more than 220 pounds (100 kg) of Group A1 or 30 pounds (13.6 kg) of any other group refrigerant shall be in accordance with Article 63 and the Mechanical Code. See the Mechanical Code for refrigerant group descriptions. See also Sections 8001.1.2 and 8002.

EXCEPTION: The chief is authorized to exempt temporary or portable installations.

SECTION 6302 — CLASSIFICATION

Refrigerants shall be classified into groups in accordance with the Mechanical Code. See Appendix VI-F.

SECTION 6303 — DEFINITIONS

For definitions of IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH), LOWER FLAMMABILITY LIMIT (LFL), PERMISSIBLE EXPOSURE LIMIT (PEL) and REFRIGERANT, See Article 2. For refrigerant groups, see Appendix VI-F.

SECTION 6304 — PERMITS AND PLANS

For a permit to install or operate a refrigeration system, see Section 105, Permit r.2. When required by the chief, applications for permits shall also be in accordance with Section 8001.3.

Plans and specifications for devices and systems required by Article 63 shall be submitted to the fire department for review and approval prior to installation.

SECTION 6305 — INSTALLATION AND MAINTENANCE

Refrigeration systems shall be installed and maintained in a safe manner which will minimize the life, health and fire hazard of the installation. Installation shall be in accordance with the Mechanical Code. Also see Sections 6313.5 and 6320.2.

Refrigeration systems shall be safely maintained in an operable condition, free from accumulations of oil, dirt, waste, excessive corrosion, other debris or leaks.

SECTION 6306 — ACCESS

Refrigeration systems shall be accessible to the fire department at all times as required by the chief. See also Sections 6310.2 and 6315.3.

SECTION 6307 — EMERGENCY CONTROL BOX

6307.1 Location. When required by Article 63 or the Mechanical Code, control boxes shall be located outside of the building adjacent to a street or at an approved accessible location. All portions of the control box shall be 6 feet (1829 mm) or less above the adjoining grade.

6307.2 Valve Operational Procedure. Valves and switches shall be adequately identified as to the sequential procedure to be followed in the event of an emergency.

6307.3 Control Boxes. Control boxes shall be of iron or steel not less than 0.055 inch (1.4 mm) (16 gage) thickness and provided with a hinged cover and lock.

6307.4 Identification. Control boxes shall be provided with a permanent label on the outside cover reading FIRE DEPARTMENT—EMERGENCY CONTROL BOX and including the name of the refrigerant in the system. Hazard identification in accordance with U.F.C. Standard 79-3 shall be posted inside and outside of the control box.

SECTION 6308 — TREATMENT AND FLARING SYSTEMS FOR DISCHARGE

6308.1 General.

6308.1.1 Applicability. Refrigeration systems which are designed to discharge refrigerant vapor to atmosphere shall be provided with an approved treatment or flaring system when required by Section 6308.1. Also see Section 6314.1.

EXCEPTIONS: 1. Ammonia systems complying with Section 6309.

2. Ammonia absorption systems serving a single dwelling unit.

6308.1.2 Toxic and highly toxic refrigerants. Systems containing refrigerants which are toxic or highly toxic shall discharge vapor to atmosphere only through an approved treatment system. Treatment systems shall be in accordance with Sections 8003.3.1.3.5.1, 8003.3.1.3.5.2 and 8003.3.1.3.5.3.

6308.1.3 Flammable refrigerants. Systems containing refrigerants which are flammable shall discharge vapor to the atmosphere only through an approved treatment or flaring system. Flaring systems shall be in accordance with Section 6308.2.

6308.2 Flaring System Design Requirements. Flaring systems for incineration of flammable refrigerants shall be designed to incinerate the entire discharge. The products of refrigerant incineration shall not pose health or environmental hazards. Incineration shall be automatic upon initiation of discharge, shall be designed to prevent blowback, and shall not expose structures or materials to threat of fire. Standby fuel, such as LP-gas, and standby power shall have the capacity to operate for one and one half the required time for complete incineration of refrigerant in the system.

SECTION 6309 — AMMONIA DISCHARGE

Ammonia refrigeration systems shall be provided with an emergency discharge into a tank of water provided exclusively for ammonia absorption. At least 1 gallon (3.79 L) of fresh water shall be provided for each pound (kg) of ammonia in the system. The water used shall be prevented from freezing without the use of salt or chemicals by burial below frost depth or other approved means. The tank shall be substantially constructed of not less than $^1/_8$-inch (2.51 mm) (10 gage) steel. The horizontal dimensions of the tank shall be equal to or less than one half of the height. The tank shall have a hinged cover or, if of the enclosed type, shall have a vent hole at the top. Pipe connections shall be through the top of the tank. The discharge pipe from the pressure-relief valves shall discharge ammonia in the center of the tank near the bottom but not more than 30 feet (9144 mm) below the surface of the water.

EXCEPTION: An emergency discharge is not required for ammonia-water absorption unit systems installed outdoors serving a dwelling unit provided that the discharge is shielded and dispersed.

SECTION 6310 — REFRIGERATION MACHINERY ROOMS

6310.1 When Required. Refrigeration systems shall be provided with a refrigeration machinery room when any of the following conditions exist:

1. The quantity of refrigerant in a single system exceeds quantities specified in the Mechanical Code. See U.M.C. Table 11-A.

2. Direct-fired absorption equipment.

EXCEPTION: Lithium bromide absorption systems using water as the refrigerant.

3. A Group A1 system, as determined by the Mechanical Code, having an aggregate compressor energy of 100 horsepower (351.6 kW) or more.

4. The system contains other than a Group A1 refrigerant, as determined by the Mechanical Code.

6310.2 Dimensions. Refrigeration machinery rooms shall be of such dimensions that all system parts are readily accessible with adequate space for maintenance and operations. An unobstructed walking space at least 3 feet (914.4 mm) in width and 6 feet 8 inches (2032 mm) in height shall be maintained throughout allowing free access to at least two sides of all moving machinery and approaching each stop valve. Access to refrigeration machinery rooms shall be restricted to authorized personnel and posted with a permanent sign.

6310.3 Exits. Exits shall comply with the Building Code for special hazards. See U.B.C. Chapter 10.

6310.4 Refrigerant-vapor Alarms. Machinery rooms shall have approved refrigerant-vapor detectors, located in an area where refrigerant from a leak is likely to concentrate, and shall activate visual and audible alarms. Alarms shall be activated at a value not greater than one half IDLH, or measurement consistent therewith, the PEL, or measurement consistent therewith, or 25 percent of the LFL, whichever is less.

6310.5 Separation. Refrigeration machinery rooms shall be separated from other portions of the building as required in the special hazards provisions of the Building Code. Penetrations shall be sealed to inhibit the passage of refrigerant vapor.

6310.6 Combustion Air and Return Air. Combustion air or return air shall not be taken from or through a refrigeration machinery room.

EXCEPTIONS: 1. Refrigeration machinery rooms used exclusively for direct-fired absorption equipment.

2. Direct-vented combustion equipment.

6310.7 Special Requirements. Open flames or devices having an exposed surface exceeding 800°F. (427°C.) are prohibited in refrigeration machinery rooms.

EXCEPTIONS: 1. Momentary temperature excursions such as electrical contacts in Group A1 and B1 systems.

2. Refrigeration machinery rooms used exclusively for direct-fired absorption equipment.

SECTION 6311 — REFRIGERATION MACHINERY ROOM VENTILATION

6311.1 General. Refrigeration machinery rooms shall be provided with a continuous source of outside air for ventilation and removal of rejected heat.

6311.2 Distribution of Ventilation. Exhaust inlets or permanent openings shall be located to provide ventilation throughout the entire refrigeration machinery room.

6311.3 Intermittent Control of Ventilation Systems. Fans providing refrigeration machinery room temperature control or automatic response to refrigerant gas in order to maintain concentrations below the PEL are allowed to be automatically controlled to provide intermittent ventilation as conditions require.

6311.4 Emergency Control of Ventilation Systems. Fans providing emergency purge ventilation for refrigerant escape shall have a clearly identified switch of the break-glass type providing on-only control immediately adjacent to and outside of each refrigerant machinery room exit. Purge fans shall also respond automatically to the refrigerant concentration detection system set to activate the ventilation system at no more than 25 percent of the LFL or 50 percent of the IDLH or a

measure equivalent thereto, whichever is less. An emergency purge control shall be provided with a manual reset only.

6311.5 Central Control of Ventilation Systems. Mechanical ventilation systems shall have switches to control power to each fan. The switches shall be key operated or within a locked glass-covered enclosure at an approved location adjacent to and outside of the principal entrance to the machinery room. Necessary keys shall be located in a single approved location. Switches controlling fans providing continuous ventilation shall be of the two-position, on/off type. Switches controlling fans providing intermittent or emergency ventilation shall be of the three-position, automatic/on/off type. Switches shall be labeled identifying both function and specific fan controlled. Two-colored and labeled indicator lamps responding to the differential pressure created by air flow shall be provided for each switch. One lamp shall indicate flow, the other shall indicate no flow.

6311.6 Ventilation Discharge. Exhaust from mechanical ventilation systems shall be discharged 20 feet (6096 mm) or more from a property line or openings into buildings. Discharges capable of exceeding 25 percent of the LFL or 50 percent of the IDLH shall be equipped with approved treatment systems to reduce the discharge concentrations to these values or lower. Also see Section 6308.

6311.7 Fans. Fans and associated equipment intended to operate the emergency purge of other than Group A1 or Group B1 refrigerants shall meet the requirements for a Class I, Division 1 hazardous location as specified in the Electrical Code.

6311.8 Ventilation Intake. Makeup-air intakes to replace the exhaust air shall be provided to the refrigeration machinery room directly from outside the building. Intakes shall be located as required by the Mechanical Code and fitted with backdraft dampers or similar approved flow-control means to prevent reverse flow. Distribution of makeup air shall be arranged to provide thorough mixing within the refrigeration machinery room to prevent short circuiting of the makeup air directly to the exhaust.

6311.9 Ventilation Rate. Ventilation rate shall be in accordance with the Building and Mechanical codes.

SECTION 6312 — REFRIGERATED PROCESS AND STORAGE AREAS

Refrigerant quantities in evaporators and piping within rooms or spaces used exclusively for processing or storage of materials under refrigerated conditions shall not be limited provided that exiting is provided in accordance with the Building Code for special hazards and:

1. The refrigerated room or space is equipped with a refrigerant vapor-detection and alarm system complying with Section 6313, and

2. The refrigerated room or space is sealed from all other portions of the building by vaportight construction and tightfitting, gasketed doors.

EXCEPTION: Adjoining refrigerated rooms need not be separated by vaportight construction.

SECTION 6313 — DETECTION AND ALARM SYSTEMS

6313.1 General. When required by this article, approved refrigerant vapor-detection devices shall be connected to alarm systems utilizing listed fire alarm signaling devices capable of generating a sound level of at least 15 dB above the operating ambient sound pressure level of the space in which they are installed and providing an approved, distinctive audible and visual alarm. See Sections 6314.1 and 8003.1.15.

6313.2 Detection Thresholds.

6313.2.1 Alarm. Refrigerant vapor alarms shall be activated whenever the refrigerant vapor PEL is exceeded.

6313.2.2 Automatic shutdown. In other than machinery rooms, such systems shall also automatically stop the flow of refrigerant to evaporators within the space and stop the flow of refrigerant in all supply lines leaving the machinery room whenever the refrigerant vapor concentration is detected at or above 50 percent of the IDLH or 25 percent of the LFL. Detection of refrigerant vapor concentrations at or above 25 percent of the LFL shall automatically de-energize electrical power within the space which does not meet the requirements for a Class I, Division 1, Group D electrical installation.

6313.3 Power and Supervision. Detection and alarm systems shall be powered and supervised as required for fire alarm systems in accordance with U.F.C. Standard 10-2.

6313.4 Monitoring and Annunciation. Detection and alarm systems shall be remotely annunciated at an approved constantly attended location as required for fire alarm systems in accordance with Article 10.

6313.5 Installation and Maintenance. Detection and alarm systems shall be installed and maintained as required for fire alarm systems in accordance with Article 10 and U.F.C. Standards 10-2 and 10-4. Also see Section 6320.1.

SECTION 6314 — REFRIGERATION MACHINERY ROOM EQUIPMENT AND CONTROLS

6314.1 General. Equipment, piping, ducts, vents or similar devices which are not essential for the refrigeration process, maintenance of the equipment, or illumination, ventilation or fire protection of the room shall not be placed in or pass through a refrigeration machinery room.

Equipment essential to the refrigeration process often includes, but is not always limited to, the following: refrigeration compressors; condensing units; pumps, associated piping and automatic control valves for refrigerant, condenser water, and brine or chilled water; refrigeration control devices and panels; machinery room ventilation equipment; cooling towers or portions thereof; refrigerant receivers and accumulators; refrigerant vapor-detection and alarm systems; machinery room fire sprinkler system exclusive of its shutoff valves; machinery room lighting and service receptacles; and motor control centers and electrical panels for machinery room systems.

6314.2 Electrical. Electrical equipment and installations shall comply with the Electrical Code. The refrigeration machinery room shall not be required to be classified as a hazardous location for electrical equipment except as provided in the Mechanical Code and Article 63.

6314.3 Storage. Storage of materials in a refrigeration machinery room shall be in accordance with other applicable articles of this code.

6314.4 Emergency Control. A clearly identified switch of the break-glass type providing off-only control of electrically energized equipment and devices within the refrigeration machinery room shall be provided immediately adjacent to and outside of each refrigeration machinery room exit. In addition, emergency shutoff shall also be automatically activated when the concentration of refrigerant vapor exceeds 25 percent of the LFL.

SECTION 6315 — REFRIGERANT CONTROL VALVES

6315.1 Location. Stop valves shall be installed in the refrigerant piping of a refrigeration system at the following locations:

1. At the inlet and outlet of a positive-displacement-type compressor, compressor unit or condensing unit,
2. At the refrigerant outlet from a liquid receiver, and
3. At the refrigerant inlet of a pressure vessel containing liquid refrigerant and having an internal gross volume exceeding 3 cubic feet (85 L).

EXCEPTIONS: 1. Systems with nonpositive-displacement compressors.
2. Systems having a pump-out receiver for storage of the charge.
3. Systems containing less than 110 pounds (50 kg) of Group A1 refrigerant.
4. Self-contained systems do not require a stop valve at the inlet of the receiver.

6315.2 Support. Stop valves installed in copper refrigerant lines of $^3/_4$ inch (19 mm) or less outside diameter shall be securely supported independently of the tubing or piping.

6315.3 Access. Stop valves required by Section 6315 shall be readily accessible from the refrigeration machinery room floor or a level platform.

6315.4 Identification. Stop valves shall be identified by tagging in accordance with Section 6319. A valve chart shall be mounted under glass at an approved location near the principal entrance to a refrigeration machinery room.

6315.5 Piping Identification. Piping shall be identified in accordance with Section 6319. The type of refrigerant, function and pressure shall be indicated.

SECTION 6316 — PROTECTION FROM MECHANICAL DAMAGE

Refrigeration systems and portions thereof shall not be located in an elevator shaft, dumbwaiter shaft or a shaft having moving objects therein, nor in a location where they will be subject to mechanical damage. Equipment subject to vehicular damage shall be protected in accordance with Section 8001.9.3.

SECTION 6317 — ELECTRICAL

6317.1 General. Electrically energized components of refrigeration systems shall conform to the Electrical Code. See also Section 6314.2.

6317.2 Secondary Source. When treatment, detection or alarm systems are required, such systems shall be connected to a secondary source of power to automatically supply electrical power in the event of loss of power from the primary source. See Electrical Code.

SECTION 6318 — INSTRUCTIONS

The person in charge of premises on which a refrigeration unit or system is installed shall provide an approved card located in the emergency control box designating:

1. Instructions for suspending operation of the system in the event of an emergency,
2. The name, address and emergency telephone numbers to obtain emergency service,
3. The name, address and telephone number of the fire department with instructions to notify the fire department in the event of an emergency, and
4. The location and operation of emergency discharge systems when such systems are required by Article 63.

SECTION 6319 — EMERGENCY SIGNS AND LABELS

Refrigeration units or systems shall be provided with approved emergency signs, charts and labels in accordance with the Mechanical Code, U.F.C. Standard 79-3 and the Mechanical Code (see U.M.C. Standard 11-2). See also Appendix VI-F.

SECTION 6320 — TESTING OF EQUIPMENT

6320.1 Acceptance Testing. The following emergency devices or systems shall be tested to demonstrate their safety and effectiveness upon completion or alteration:

1. Treatment and flaring systems,

2. Ammonia diffusion systems,

3. Valves and appurtenances necessary to the operation of emergency refrigeration control boxes,

4. Fans and associated equipment intended to operate emergency purge ventilation systems, and

5. Detection and alarm systems.

Fire alarm systems shall be tested in accordance with U.F.C. Standards 10-2 and 10-4.

6320.2 Periodic Testing. The following emergency devices or systems shall be tested in accordance with the manufacturer's instructions and as required by the chief:

1. Treatment and flaring systems,

2. Valves and appurtenances necessary to the operation of emergency refrigeration control boxes,

3. Fans and associated equipment intended to operate emergency purge ventilation systems,

4. Detection and alarm systems. See Section 6313.5.

Also see Section 6305.

6320.3 Records. A written record of required testing shall be maintained on the premises.

6320.4 Frequency of Testing. Unless otherwise required by the chief, testing frequency shall be in accordance with Section 6320.2.

6320.5 Personnel Qualifications. Tests of emergency devices or systems required by Article 63 shall be conducted by approved persons.

SECTION 6321 — NOTIFICATION OF DISCHARGES

The fire department shall be notified immediately upon discharge of refrigerant, whether automatic or manual. Refrigerant shall not be discharged except in an emergency. Notification shall comply with Section 8001.5.2.2.

EXCEPTIONS: 1. Refrigeration systems operating at pressures below atmospheric and incorporating automatic purge cycles.

2. Incidental operation of automatic pressure-relief valves resulting in minor release of the refrigerant charge.

3. Incidental minor releases associated with service operations after system pump down has been accomplished.

SECTION 6322 — STORAGE, HANDLING AND USE

Flammable and combustible materials shall not be stored in machinery rooms. Storage, use and handling of extra refrigerant or refrigerant oils shall be as required by other articles of this code. See Articles 74, 75, 79 and 80 for storage, use and handling other than within refrigeration systems.

EXCEPTION: Spare parts, tools and incidental materials necessary for the safe and proper operation and maintenance of the system.

SECTION 6323 — CHANGING OF REFRIGERANT TYPE

Refrigerant types shall not be changed without prior notification and approval of the chief.

SECTION 6324 — RECORDS

The person in charge of the premises on which a refrigeration unit or system subject to these regulations is installed or maintained shall keep a written record of refrigerant quantities brought onto and removed from the premises. Such records shall be available to the fire department.

PART VII

SPECIAL SUBJECTS

ARTICLE 74 — COMPRESSED GASES

SECTION 7401 — GENERAL

7401.1 Scope. Storage, use and handling of compressed gases in compressed gas containers, cylinders, tanks and systems shall be in accordance with Article 74, 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.

EXCEPTIONS: 1. Off-site transportation in accordance with DOT requirements.

2. Gases within approved refrigeration systems complying with the Mechanical Code are not regulated by Article 74. See Article 63.

For requirements pertaining to bulk oxygen systems at industrial and institutional consumer sites, see U.F.C. Standard 74-1.

For requirements pertaining to cutting and welding, see Article 49.

For requirements pertaining to CNG, see Article 52.

For requirements pertaining to cryogenic fluids, see Article 75.

For requirements pertaining to compressed gases classified as hazardous materials, see Article 80.

For requirements pertaining to LP-gas, see Article 82.

7401.2 Definitions. For definitions of COMPRESSED GAS, COMPRESSED GAS SYSTEM, COMPRESSED GAS CONTAINER, DOT, FLAMMABLE GAS, FLAMMABLE LIQUEFIED GAS, HANDLING, NESTING and USE, see Article 2.

7401.3 Permits. Permits are required to store, transport on site, dispense, use or handle compressed gases in excess of quantities specified in Section 105, Permit c.7.

7401.4 Containers, Cylinders and Tanks. Compressed gas containers, cylinders and tanks shall be in accordance with Section 8001.4. Compressed gas containers, cylinders or tanks which are not designed for refillable use shall not be refilled after use of the original contents.

7401.5 Marking.

7401.5.1 General. Compressed gas containers, cylinders, tanks and systems shall be marked in accordance with nationally recognized standards and in accordance with Section 7401.5. See Article 90, Standards a.2.1 and c.1.1.

7401.5.2 Stationary compressed gas containers, cylinders and tanks. Stationary compressed gas containers, cylinders and tanks shall be marked in accordance with U.F.C. Standard 79-3. Markings shall be visible from any direction of approach.

7401.5.3 Piping systems. Markings used for piping systems shall consist of the content's name and include a direction of flow arrow. Markings shall be provided at each valve; at wall, floor or ceiling penetrations; at each change of direction; and at a minimum of every 20 feet (6096 mm) or fraction thereof throughout the piping run.

EXCEPTION: Piping which could carry more than one gas at various times shall have appropriate signs or markings posted at the manifold, along the piping and at each point of use to provide clear identification and warning.

7401.6 Security.

7401.6.1 General. Compressed gas containers, cylinders, tanks and systems shall be secured against accidental dislodgement and against access by unauthorized personnel in accordance with Section 7401.6.

7401.6.2 Security of areas. The storage, use and handling of compressed gas containers, cylinders, tanks and systems shall be safeguarded in accordance with Section 8001.9.2.

7401.6.3 Physical protection. Compressed gas containers, cylinders, tanks and systems which could be exposed to physical damage shall be protected. Guard posts or other means shall be provided to protect compressed gas containers, cylinders, tanks and systems indoors and outdoors from vehicular damage. When such guards are provided, see Section 8001.9.3 for design criteria.

7401.6.4 Securing compressed gas containers, cylinders and tanks. Compressed gas containers, cylinders and tanks shall be secured to prevent falling due to contact, vibration or seismic activity. Securing of compressed gas containers, cylinders and tanks shall be by one of the following methods:

EXCEPTION: Compressed gas containers, cylinders and tanks in the process of examination, filling, transport or servicing.

1. Securing containers, cylinders and tanks to a fixed object with one or more restraints.

2. Securing containers, cylinders and tanks on a cart or other mobile device designed for the movement of compressed gas containers, cylinders or tanks.

3. Nesting of compressed gas containers, cylinders and tanks at container filling or servicing facilities or in seller's warehouses not accessible to the public. Nesting shall be allowed provided the nested containers, cylinders or tanks, if dislodged, do not obstruct the required means of egress.

4. Securing of compressed gas containers, cylinders and tanks to or within a rack, framework, cabinet or similar assembly designed for such use.

7401.7 Valve Protection.

7401.7.1 General. Compressed gas container, cylinder and tank valves shall be protected from physical damage by means of protective caps, collars or similar devices in accordance with Section 7401.7.

7401.7.2 Compressed gas container, cylinder or tank protective caps or collars. Compressed gas containers, cylinders and tanks designed for protective caps, collars or other protective devices shall have the caps or devices in place except when the containers, cylinders or tanks are in use or are being serviced or filled.

7401.7.3 Caps and plugs. Compressed gas containers, cylinders and tanks designed for valve protection caps or other protective devices shall have the caps or devices attached. When outlet caps or plugs are installed, they shall be in place.

EXCEPTION: When compressed gas containers, cylinders or tanks are in use, being serviced or being filled.

7401.8 Separation from Hazardous Conditions.

7401.8.1 General. Compressed gas containers, cylinders and tanks and systems in storage or use shall be separated from materials and conditions which present exposure hazards to or from each other. Compressed gas containers, cylinders, tanks and systems in storage or use shall be separated in accordance with Section 7401.8.

7401.8.2 Incompatible materials. Compressed gas containers, cylinders and tanks shall be separated from each other based on the hazard class of their contents. Compressed gas containers, cylinders and tanks shall be separated from incompatible materials in accordance with Section 8001.9.8.

7401.8.3 Combustible waste, vegetation and similar materials. Combustible waste, vegetation and similar materials shall be kept a minimum of 10 feet (3048 mm) from compressed gas containers, cylinders, tanks and systems. An unpierced noncombustible barrier extending not less than 18 inches (457 mm) above and to the front and rear of the area of storage or use is allowed in lieu of such distance.

7401.8.4 Ledges, platforms and elevators. Compressed gas containers, cylinders and tanks shall not be placed near elevators, unprotected platform ledges or other areas where falling would result in compressed gas containers, cylinders or tanks being allowed to drop distances exceeding one half the height of the container, cylinder or tank.

7401.8.5 Temperature extremes. Compressed gas containers, cylinders and tanks, whether full or partially full, shall not be exposed to artificially created high temperatures exceeding 125°F. (51.7°C.) or subambient (low) temperatures unless designed for use under the exposed conditions.

7401.8.6 Falling objects. Compressed gas containers, cylinders, tanks and systems shall not be placed in areas where they are likely to be damaged by falling objects.

7401.8.7 Heating. Compressed gas containers, cylinders and tanks, whether full or partially full, shall not be heated by devices which could raise the surface temperature of the container, cylinder or tank to above 125°F. (51.7°C.). Heating devices shall be in accordance with the Mechanical and Electrical codes. Approved heating methods involving temperatures of less than 125°F. (51.7°C.) are allowed to be used by trained personnel. Devices designed to maintain individual compressed gas containers, cylinders or tanks at constant temperature shall be approved and shall be designed to be fail safe.

7401.8.8 Sources of ignition. Open flames and high-temperature devices shall not be used in a manner which creates a hazardous condition.

7401.8.9 Exposure to chemicals. Compressed gas containers, cylinders, tanks and systems shall not be exposed to corrosive chemicals or fumes which could damage containers, cylinders, tanks, valves or valve-protective caps.

7401.9 Wiring and Equipment. Electrical wiring and equipment shall be in accordance with the Electrical Code.

Compressed gas containers, cylinders, tanks and systems shall not be located where they could become part of an electrical circuit. Compressed gas containers, cylinders, tanks and systems shall not be used for electrical grounding.

7401.10 Service and Repair. Service, repair, modification or removal of valves, pressure-relief devices or other compressed gas container, cylinder or tank appurtenances shall be performed by trained personnel in accordance with nationally recognized standards. See Article 90, Standard u.3.3.

7401.11 Unauthorized Use. Compressed gas containers, cylinders, tanks and systems shall not be used for any purpose other than to serve as a vessel for containing the product which it is designed to contain.

7401.12 Exposure to Fire. Compressed gas containers, cylinders and tanks which have been exposed to fire shall be removed from service. Containers, cylinders and tanks so removed shall be handled by qualified persons approved by the chief.

7401.13 Leaks, Damage or Corrosion. Leaking, damaged or corroded compressed gas containers, cylinders and tanks shall be removed from service. Leaking, damaged or corroded compressed gas systems shall be replaced or repaired in accordance with the following:

1. Compressed gas containers, cylinders and tanks which have been removed from service shall be handled in an approved manner.

2. Compressed gas systems which are determined to be leaking, damaged or corroded shall be repaired to a serviceable condition or removed from service.

7401.14 Surface of Unprotected Storage or Use Areas. Unless otherwise specified, compressed gas containers, cylinders and tanks are allowed to be stored or used without being placed under overhead cover. (See Section 7401.15.) To prevent bottom corrosion, containers, cylinders

and tanks shall be protected from direct contact with soil or unimproved surfaces. The surface of the area on which the containers are placed shall be graded to prevent accumulation of water.

7401.15 Overhead Cover. Compressed gas containers, cylinders and tanks are allowed to be stored or used in the sun except in locations where extreme temperatures prevail. When extreme temperatures prevail, overhead covers shall be provided.

7401.16 Lighting. Adequate lighting by natural or artificial lighting means shall be provided in accordance with Section 8004.1.11.

SECTION 7402 — STORAGE

7402.1 General.

7402.1.1 Applicability. The storage of compressed gas containers, cylinders and tanks shall be in accordance with Section 7402.

7402.1.2 Upright storage. Liquefied gas compressed gas containers, cylinders and tanks, except those designed for use in a horizontal position, and all compressed gas containers, cylinders and tanks containing nonliquefied gases shall be stored in a "valve end up" upright position. An upright position shall include conditions where the container, cylinder or tank axis is inclined as much as 45 degrees from the vertical.

> **EXCEPTION:** Compressed gas containers, cylinders and tanks with a water volume less than 1.3 gallons (5 L) are allowed to be stored in a horizontal position.

7402.2 Material-specific Regulations.

7402.2.1 Indoor storage. Indoor storage of compressed gases shall be in accordance with the material-specific provisions of Section 8003.

7402.2.2 Exterior storage.

7402.2.2.1 General. Exterior storage of compressed gases shall be in accordance with the material-specific provisions of Section 8003.

7402.2.2.2 Separation. Distances from property lines, buildings and exposures shall be in accordance with the material-specific provisions of Section 8003.

SECTION 7403 — USE AND HANDLING

7403.1 General.

7403.1.1 Applicability. The use and handling of compressed gas containers, cylinders, tanks and systems shall be in accordance with Section 7403.

7403.1.2 Compressed gas systems. Compressed gas systems shall be suitable for the use intended and shall be designed by persons competent in such design. Where nationally recognized good practices or standards have been established for the process employed, such practices and standards shall be followed. Compressed gas equipment, machinery and processes shall be in accordance with Section 8001.4.4.

7403.1.3 Controls. Compressed gas system controls shall be designed to prevent materials from entering or leaving process or reaction systems at other than the intended time, rate or path. Automatic controls shall be designed to be fail safe.

7403.1.4 Piping systems. Piping, including tubing, valves, fittings and pressure regulators, shall be in accordance with Sections 7403 and 8001.4.3. Piping, tubing, pressure regulators, valves and other apparatus shall be kept gas-tight to prevent leakage.

7403.1.5 Valves. Valves utilized on compressed gas systems shall be suitable for the use intended and shall be accessible. Valve handles or operators for required shutoff valves shall not be removed or otherwise altered to prevent access.

7403.1.6 Venting. Venting of gases shall be directed to an approved location. Venting shall be in accordance with the Mechanical Code.

7403.1.7 Upright use. Liquefied gas compressed gas containers, cylinders and tanks, except those designed for use in a horizontal position, and all compressed gas containers, cylinders and tanks containing nonliquefied gases shall be used in a "valve end up" upright position. An upright position shall include conditions where the container, cylinder or tank axis is inclined as much as 45 degrees from the vertical. Nonflammable liquefied gases may be used in the inverted position when the liquid phase is used, provided that the container, cylinder or tank is properly secured and the dispensing apparatus is designed for liquefied gas use.

EXCEPTION: Compressed gas containers, cylinders and tanks with a water volume less than 1.3 gallons (5 L) are allowed to be used in a horizontal position.

7403.1.8 Transfer. Transfer of gases between containers, cylinders and tanks shall be performed by qualified personnel using equipment and operating procedures in accordance with nationally recognized standards. See Article 90, Standard c.1.2.

7403.1.9 Use of compressed gas for inflation. Inflatable equipment, devices or balloons shall only be pressurized or filled with compressed air or inert gases.

7403.2 Material-specific Regulations.

7403.2.1 Indoor use. In addition to the requirements of Section 7403, indoor use of compressed gases shall be in accordance with material-specific provisions of Section 8004.

7403.2.2 Exterior use. In addition to the requirements of Section 7403, exterior use of compressed gases shall be in accordance with material-specific provisions of Section 8004.

7403.3 Handling.

7403.3.1 Application. The handling of compressed gas containers, cylinders and tanks shall be in accordance with Section 7403.3.

7403.3.2 Carts and trucks. Containers, cylinders and tanks shall be moved using an approved method. Where containers, cylinders or tanks are moved by hand cart, hand truck or other mobile device, such carts, trucks or devices shall be designed for the secure movement of containers, cylinders or tanks. Carts and trucks utilized for transport of compressed gas containers, cylinders and tanks within buildings shall be in accordance with Section 8001.10.3. Carts and trucks utilized for transport of compressed gas containers, cylinders and tanks exterior to buildings shall be designed so that the containers, cylinders and tanks will be secured against dropping or otherwise striking violently against each other or other surfaces.

7403.3.3 Lifting devices. Ropes, chains or slings shall not be used to suspend compressed gas containers, cylinders and tanks unless provisions at time of manufacture have been made on the container, cylinder or tank for appropriate lifting attachments, such as lugs.

SECTION 7404 — MEDICAL GAS SYSTEMS

7404.1 General. Compressed gases at hospitals and similar facilities intended for inhalation or sedation including, but not limited to, analgesia systems for dentistry, podiatry, veterinary and similar uses shall be in accordance with Section 7404 in addition to other requirements of Article 74.

7404.2 Supply Location.

7404.2.1 Interior supply location.

7404.2.1.1 General. Medical gases shall be stored in areas dedicated to the storage of such gases without other storage or uses. When containers of medical gases in quantities greater than the per-

mit amount are located inside buildings, they shall be in a one-hour exterior room, a one-hour interior room or a gas cabinet in accordance with Sections 7404.2.1.2, 7404.2.1.3 or 7404.2.1.4.

7404.2.1.2 One-hour exterior rooms. A one-hour exterior room shall be a room or enclosure separated from the rest of the building by not less than one-hour-rated fire-resistive construction. Openings between the room or enclosure and interior spaces shall be self-closing smoke- and draft-control assemblies having a fire-protection rating of not less than one hour. Rooms shall have at least one exterior wall which is provided with at least two vents. Each vent shall not be less than 36 square inches (0.023 m^2) in area. One vent shall be within 6 inches (152.4 mm) of the floor and one shall be within 6 inches (152.4 mm) of the ceiling. Containers of medical gases shall be provided with at least one fire sprinkler to provide container cooling in case of fire.

7404.2.1.3 One-hour interior room. When an exterior wall cannot be provided for the room, automatic sprinklers shall be installed within the room. The room shall be exhausted through a duct to the exterior. Makeup air to the room shall be taken from the exterior. Both separate air streams shall be enclosed in a one-hour-rated shaft enclosure from the room to the exterior. Approved mechanical ventilation shall be in accordance with the Mechanical Code and provided at a minimum rate of 1 cubic foot per minute per square foot (5.1 L/s per m^2) of the area of the room.

7404.2.1.4 Gas cabinets. Gas cabinets shall be in accordance with the following:

1. Operated at a negative pressure in relation to surrounding area,
2. Provided with self-closing limited-access ports or noncombustible windows to give access to equipment controls. The average velocity of ventilation at the face of access ports or windows shall not be less than 200 feet per minute (61 m/min.) with a minimum of 150 feet per minute (45.7 m/min.) at any point of the access port or window,
3. Connected to an exhaust system,
4. Provided with a self-closing door,
5. Constructed of not less than 0.097-inch (2.46 mm) (12 gage) steel, and
6. Internally sprinklered.

7404.2.2 Exterior supply locations. Oxidizer medical gas systems located on the exterior of a building with quantities greater than the permit amount shall be located in accordance with Section 8004.

7404.2.3 Medical gas systems. Medical gas systems including, but not limited to, distribution piping, supply manifolds, connections, pressure regulators, and relief devices and valves, shall be in accordance with U.F.C. Standard 74-2 and the general provisions of Article 74.

ARTICLE 75 — CRYOGENIC FLUIDS

SECTION 7501 — GENERAL

7501.1 Scope. Storage, handling and transportation of cryogenic fluids shall be in accordance with Article 75.

EXCEPTION: Fluids within an approved closed-cycle refrigeration system complying with the Mechanical Code are not regulated by Article 75. See Article 63.

7501.2 Definitions.

7501.2.1 General. For definitions of BELOWGROUND CONTAINER, CRYOGENIC FLUID, CRYOGENIC INGROUND CONTAINER, CRYOGENIC VESSEL, FLAMMABLE CRYOGENIC FLUID, SAFETY FACTOR and SYSTEM, see Article 2.

7501.2.2 Limited application. For the purpose of Article 75, certain terms are defined as follows:

CONTAINER is any cryogenic vessel used for transportation, handling or storage.

7501.3 Permits. For a permit to store, handle or transport cryogens, see Section 105, Permit c.9.

EXCEPTION: Permits are not required for vehicles properly equipped for and using cryogenic fluids as the primary fuel for propelling the vehicle or for refrigerating the lading.

7501.4 Quantity Limits, Classification and Properties.

7501.4.1 Quantity limits. For quantity limits for storage in buildings, see Section 8003.11.

7501.4.2 Classification. Cryogenic fluids shall be classified according to Table 7501.4-A.

7501.4.3 Properties. Low-temperature physical properties of gases are set forth in Table 7501.4-B.

7501.5 Containers, Equipment and Devices.

7501.5.1 General. Containers, equipment and devices used for the storage, handling and transportation of cryogenic fluids shall be of a type, material and construction approved by the chief as suitable for such use. Approval shall be based upon satisfactory evidence that the design, construction and test are in accordance with nationally recognized standards. See Article 90.

7501.5.2 Unidentified containers. Containers, equipment or devices which are not in compliance with recognized standards for design and construction may be approved by the chief upon presentation of satisfactory evidence that they are designed and constructed for safe operation.

The following data shall be submitted to the chief with reference to the deviation from the standard with the application for approval:

1. Type and use of container, equipment or device,
2. Material to be stored, handled or transported,
3. Description showing dimensions and materials used in construction,
4. Design pressure, maximum operating pressure and test pressure,
5. Type, size and setting of safety devices, and
6. Other data requested by the chief.

7501.6 Electrical Equipment.

7501.6.1 General. Electrical installations and equipment shall be in accordance with the Electrical Code.

7501.6.2 Lighting. When required by the chief, lighting, including emergency lighting, shall be provided for fire appliances and operating facilities such as walkways, control valves and gages.

1994

UNIFORM FIRE CODE™

CERTIFIED AS TRUE COPY
OF Ord No 95-070
12-14-95
DATE CERTIFIED
Valerie J. Burrowes
CITY CLERK, CITY OF SACRAMENTO

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Preface

Introduction: The *Uniform Fire Code* (U.F.C.) is the United States' premier model fire code. Since its initiation in 1971, the Code has become internationally recognized for its role in setting the pace of fire prevention, fire protection and public safety.

Fire codes represent one of today's most rapidly changing regulatory arenas. New challenges presented by hazardous materials, flammable and combustible liquids, explosives, high-piled combustible storage, aerosol product storage and building operations are among the many issues shaping the future of fire prevention, fire protection and public safety. In addition, fire codes have evolved far beyond their traditional roles as maintenance codes, now addressing many issues related to new construction and special hazards in buildings. As a model code developed through a consensus code development process, the *Uniform Fire Code* provides jurisdictions with an opportunity to adopt a fire code which is comprehensive, up-to-date and consistent with codes of other jurisdictions. Adoption of the *Uniform Fire Code* also relieves jurisdictions from the burdensome process of independently developing regulations.

History: The 1994 edition is the ninth edition of the *Uniform Fire Code*. Now published by the International Fire Code Institute, the Code was initially published as a model code document in 1971 through a cooperative effort of the Western Fire Chiefs Association and the International Conference of Building Officials. The Code was updated in 1973 and has since been published on a three-year schedule. Editions include 1971, 1973, 1976, 1979, 1982, 1985, 1988, 1991 and 1994.

New Format and Improved Correlation with Building Codes: The 1994 edition of the *Uniform Fire Code* has been partially reformatted and completely renumbered to improve usability, eliminate redundant requirements and provide for improved correlation with the common code format and occupancy classifications incorporated into the 1993 edition of the BOCA *National Building Code* and the 1994 editions of the *Uniform Building Code*™ and the *Standard Building Code*. Apart from the changes approved by the IFCI membership, the technical content of the Code is unchanged.

The 1994 edition of the *Uniform Fire Code* remains compatible with the *Uniform Building Code* and related publications published by the International Conference of Building Officials, providing a complete set of documents for regulatory use.

Two-Volume Set: Provisions of the *Uniform Fire Code* and the *Uniform Fire Code Standards* have been redesignated as a two-volume set of the *Uniform Fire Code*. Volume 1 contains the provisions previously contained in the *Uniform Fire Code* and Volume 2 contains provisions previously contained in the *Uniform Fire Code Standards*. This redesignation emphasized that both books are truly part of the *Uniform Fire Code* when the Code is adopted.

Metrication: The *Uniform Fire Code* has been metricated for the 1994 edition. Metric equivalents are provided in parentheses following English units. Formulas are also provided with metric equivalents. Metric equivalent formulas immediately follow English formulas and are denoted by "For **SI:**" preceding the metric equivalent. Some formulas do not use dimensions and, thus, are not provided with metric equivalents. Tables are provided with multiplying conversion factors in subheadings for each tabulated unit of measurement.

Metric equivalents included in the Code represent approximate conversions from English units. Where metric units are shown in parentheses adjacent to English units, the English units shall be the exact Code requirement, and the metric equivalent shall be considered as an approximation.

It is recognized that some of the selected units for metric conversions, such as the use of millimeters for most dimensions of length, may be nonstandard; however, unit selections were based on those used by the *Uniform Building Code* at the request of the General Services Administration, an agency of the United States Government.

How the Code is Revised: The *Uniform Fire Code* is updated on an annual basis. At the conclusion of each update cycle, an annual supplement to the current edition is published, except for every third year when all approved code changes are consolidated into a new edition of the Code. Updating is accomplished through a consensus code development process administered by the International Fire Code Institute that allows anyone to submit proposals to revise the Code and comment on the proposals of others

through regular public hearings. Participants in the Code development process represent a wide cross-section of fire officials, building officials, design professionals, manufacturers, developers, insurance organizations, researchers, industry associations and other interested parties.

For additional information about the process of revising the Code or to submit a Code change proposal, contact the International Fire Code Institute.

Marking of Revisions as Compared to the 1991 Edition: Solid vertical lines in the margins within the body of the Code indicate a technical or major editorial change from the 1991 edition. The revision may be a new Code provision, a revised provision or a provision that has been relocated from elsewhere in the Code.

The letter **B** repeating in line vertically in the margin indicates that the provision is maintained under the Code change procedures of the International Conference of Building Officials and that the provision is based on requirements of the *Uniform Building Code*.

The letter **M** repeating in line vertically in the margin indicates that the provision is maintained under the Code change procedures of the International Conference of Building Officials and that the provision is based on requirements of the *Uniform Mechanical Code*™.

Deletion indicators (➧) are provided in the margin where a paragraph or item listing has been deleted or relocated to another portion of the Code.

Minor revisions, such as rewording or resequencing changes, have not been marked in the margin.

For additional information describing revisions between the 1991 and 1994 editions, see the *Illustrated Guide to Revisions in the 1994 U.F.C.*, published by the International Fire Code Institute.

About the International Fire Code Institute

The International Fire Code Institute (IFCI) is a not-for-profit public service benefit corporation dedicated to public safety. The Institute is a membership association representing fire officials, building officials, design professionals, manufacturers, developers, insurance organizations, researchers, industry associations and other interested parties. Cosponsored by the International Association of Fire Chiefs (IAFC), the Western Fire Chiefs Association (WFCA) and the International Conference of Building Officials (ICBO), the institute was formed to act as an advocate for fire officials and to promote the continued international expansion of the *Uniform Fire Code*. The Institute began operations in October of 1991, and together with IFCI's sister organizations, ICBO and WFCA, IFCI has nearly 70 years experience developing and promulgating model codes, including more than 20 years developing and promulgating the *Uniform Fire Code*.

The Institute occupies a unique niche among fire-safety organizations as the first organization in the United States to focus on model fire codes, and it has quickly become a leading fire-safety organization. The most well-known function of IFCI is the organization's role in administration of the *Uniform Fire Code* and ancillary programs.

The Institute has four major organizational objectives:

1. To promote international uniformity of fire prevention, hazardous material and building construction regulations;
2. To provide a forum in which persons interested in the prevention, control and suppression of fires, explosions and hazardous materials incidents can exchange methods of improved safety and ideas;
3. To continue publishing, developing and promoting the *Uniform Fire Code;* and
4. To provide education and support services for the *Uniform Fire Code*.

The Institute has already had a dramatic impact on the fire prevention profession. New programs and projects offered by IFCI include publication of the *IFCI Fire Code Journal,* the nation's first magazine to focus on fire code related issues. The *IFCI Fire Code Journal* is also unique in that it covers activities of interest in all of the model code organizations, not just those in the Uniform Codes, so that IFCI's members can keep abreast of major fire- and life-safety issues affecting codes throughout the United States. The Institute also offers numerous professional development seminars for fire code enforcers and users, nationally recognized certification programs for fire inspectors and underground storage tank installers and inspectors, and computer-assisted tools for using the U.F.C. Several additional projects to support fire code users are also under development.

Membership is currently available to individuals and organizations with an interest in fire codes, and membership benefits include receiving copies of each new edition of the *Uniform Fire Code* and annual supplements; the *IFCI Fire Code Journal* magazine; all proposed revisions to the *Uniform Fire Code,* code application and enforcement assistance by a staff of engineers, and discounts on publications, educational offerings and video training programs.

For further information on the International Fire Code Institute, please call IFCI's office at (512) 345-2633, fax (512) 343-9116, or contact us on the ICHIEFS network at "IFCI."

SUMMARY OF REORGANIZATION: The following table summarizes the reorganization and contents of the articles and appendices of the 1994 edition of the *Uniform Fire Code*.

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10	**Fire-protection Systems and Equipment**[1]	14 and part of 10
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29	**Repair Garages**[1]	29 and part of 79, Division IX
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32	Tents, Canopies and Temporary Membrane Structures	32
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35	Covered Mall Buildings	35
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A-II-A	Suppression and Control of Hazardous Fire Areas	A-II-A
A-II-B	Protection of Flammable and Combustible Liquids Tanks in Locations Subject to Flooding	A-II-B
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A-II-E	Hazardous Materials Management Plans and Hazardous Materials Inventory Statements	A-II-E
A-II-F	**Protected Aboveground Tanks for Motor Vehicle Fuel-dispensing Stations Outside Buildings**[1]	A-II-F
A-II-G	**Secondary Containment for Underground Tank Systems Containing Flammable or Combustible Liquids**[1]	New
A-II-H	**Site Assessments for Determining Potential Fire and Explosion Risks from Underground Flammable or Combustible Liquid Tank Leaks**[1]	New
A-II-I	**Ozone Gas-generating Equipment**[1]	New

1994 U.F.C. Article	1991 U.F.C. Article
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[1]Bold titles denote an article or appendix which is new or contains substantially revised contents as compared to the 1991 edition. Note that other articles and appendices may also contain significant revisions to a smaller portion of the article or appendix.

CODES AND RELATED PUBLICATIONS

The International Fire Code Institute is publisher of the *Uniform Fire Code* and related publications. The *Uniform Fire Code* is part of a complete and coordinated set of model codes published in cooperation with the International Conference of Building Officials, which provides jurisdictions with regulations for building, fire and life safety. The model codes are developed through an open, public accessible consensus process, and they help to reduce jurisdictions' burden of developing local regulations while helping to coordinate regulations on a national and international level.

The following is a list of Uniform Codes and current available reference materials which support the Uniform Codes. Direct inquiries to IFCI at (512) 345-CODE.

UNIFORM CODES

Uniform Fire Code™, Volumes 1 and 2. The premier model fire code in the United States, the *Uniform Fire Code* sets forth provisions necessary for fire prevention and fire protection. Published by the International Fire Code Institute, the *Uniform Fire Code* is endorsed by the Western Fire Chiefs Association, the International Association of Fire Chiefs and the International Conference of Building Officials. Volume 1 contains code provisions compatible with the main text of the code, and Volume 2 contains standards referenced from the code provisions.

U.F.C. on Disk. Save time when searching for code provisions or typing code text into correspondence. The *U.F.C. on Disk* software package provides the complete text of the *Uniform Fire Code* on computer disk. The user-friendly functions allow you to easily search for subjects, merge code text directly into correspondence, print code text and leave electronic bookmarks, all using a few simple keystrokes. The *U.F.C. on Disk* is an invaluable tool for regular and infrequent users of the U.F.C. and runs on IBM-compatible personal computers with 640k of RAM and 7 megabytes of hard disk-drive space.

Uniform Building Code, Volumes 1, 2 and 3. The most widely adopted model building code in the United States, the performance-based *Uniform Building Code* is a proven document, meeting the needs of government units charged with the enforcement of building regulations. Volume 1 contains administrative, fire- and life-safety and field inspection provisions; Volume 2 contains structural engineering design provisions; and Volume 3 contains material, testing and installation standards.

Uniform Mechanical Code. Provides a complete set of requirements for the design, construction, installation and maintenance of heating, ventilating, cooling and refrigeration systems; incinerators and other heat-producing appliances.

Uniform Housing Code™. Provides complete requirements affecting conservation and rehabilitation of housing. Its regulations are compatible with the *Uniform Building Code*.

Uniform Code for the Abatement of Dangerous Buildings™. A code compatible with the *Uniform Building Code* and the *Uniform Housing Code* which provides equitable remedies consistent with other laws for the repair, vacation or demolition of dangerous buildings.

Uniform Sign Code™. Dedicated to the development of better sign regulation, its requirements pertain to all signs and sign construction attached to buildings.

Uniform Administrative Code™. This code covers administrative areas in connection with adoption of the *Uniform Building Code, Uniform Mechanical Code* and related codes. It contains provisions which relate to site preparation, construction, alteration, moving, repair and use and occupancies of buildings or structures and building service equipment, including plumbing, electrical and mechanical regulations. The code is compatible with the administrative provisions of all codes published by the Conference.

Uniform Building Security Code™. This code establishes minimum standards to make dwelling units resistant to unlawful entry. It regulates swinging doors, sliding doors, windows and hardware in connection with dwelling units of apartment houses or one- and two-family dwellings. The code gives consideration to the concerns of police, fire and building officials in establishing requirements for resistance to burglary which are compatible with fire and life safety.

Uniform Code for Building Conservation™. A building conservation guideline presented in code format which will provide a community with the means to preserve its existing buildings while achieving appropriate levels of safety. It is formatted in the same manner as the *Uniform Building Code*, is compatible with other Uniform Codes, and may be adopted as a code or used as a guideline.

Uniform Zoning Code™. This newest addition to the Uniform Codes family is dedicated to intelligent community development and to the benefit of the public welfare by providing a means of promoting uniformity in zoning laws and enforcement.

Supplements to the Uniform Codes. Published each of the two years between editions, the Supplements contain all changes approved during that year, plus an analysis of those changes.

Metricated Tables and Figures of the 1994 Uniform Codes. The tables presented in the 1994 Uniform Codes tabulate values in inch-pound units system and are provided with multiplying factors to convert values to the SI equivalent. This publication provides all the tables and figures of the Uniform Codes completely metricated. All tabulated values will be presented in SI units without reference to the inch-pound equivalent.

Uniform Building Code—1927 Edition. A special 60th anniversary printing of the first published *Uniform Building Code*.

CABO CODES

CABO One and Two Family Dwelling Code. Jointly sponsored by ICBO and the other model building code organizations, this code eliminates conflicts and duplications among the model codes to achieve national uniformity. Covers mechanical and plumbing requirements as well as construction and occupancy.

Application and Commentary on CABO One and Two Family Dwelling Code. An interpretative commentary on the *CABO One and Two Family Dwelling Code* intended to enhance uniformity of interpretation and application of the code nationwide. Developed by the three model code organizations, this document includes numerous illustrations of code requirements and the rationale for individual provisions.

CABO Model Energy Code. This code includes minimum requirements for effective use of energy in the design of new buildings and structures and additions to existing buildings. It is based on American Society of Heating, Refrigeration and Air-conditioning Engineers Standard 90A-1980 and was originally developed jointly by ICBO, BOCA, SBCCI and the National Conference of States on Building Codes and Standards under a contract funded by the United States Department of Energy. The code is now maintained by CABO and is adopted by reference in the *Uniform Building Code*.

TECHNICAL REFERENCES AND EDUCATIONAL MATERIALS

Illustrated Guide to Revisions in the 1994 U.F.C. The 1994 edition of the U.F.C. has a new look and feel. This detailed and illustrated guide quickly brings you up-to-speed on the 1994 edition of the Code by providing a comprehensive analysis of the changes between the 1991 and 1994 editions. The guide provides a commentary and numerous drawings and figures to clarify the rationale, application and intent of the new code provisions, which include 18 new or substantially revised articles, 7 new appendices and new occupancy classification designations correlating with the 1994 *Uniform Building Code*. The guide is a must for anyone updating to the 1994 U.F.C., and it's a must for every code-reference library.

Hazardous Materials Classification Guide. Bridge the gap between knowing a chemical name or identification number and applying code requirements, which are based on chemical categories. The *Hazardous Materials Classification Guide* provides the classifications of nearly 3,500 of the most commonly used chemicals . . . it's a tool that will save you countless hours of research the first time that you use it. Inspectors, engineers, architects, facility managers and plan reviewers can all benefit from the guide.

Unlike other resources which provide only chemical characteristics and require you to review numerous resources and then judge this information to classify chemicals, the guide provides end result chemical classifications which have been determined and reviewed by a team of certified industrial hygienists and chemists presented in an easy-to-read tabular format. The research has already been done! More than 7,500 chemical name cross-references are included with classifications of many mixtures and diluted chemicals. As an added benefit, the classification system used is compatible with the classification systems used by all U.S. model building and fire codes and OSHA, and designations for firefighter warning placard designations compatible with NFPA 704 are included.

HMEx Assistant Software. All of the information in the *Hazardous Materials Classification Guide* and more is at your fingertips with the *HMEx Assistant Software*. Complete chemical classifications can be accessed in seconds, saving countless hours of research and review time. Like the Hazardous Materials Classification Guide, the HMEx Assistant provides classifications of the nearly 3,500 chemicals plus additional chemical properties data such as LC_{50}, LD_{50}, etc., all in a user-friendly software package.

This software is an indispensable tool for classifying hazardous materials. It runs on IBM-compatible computers with 512k RAM and a hard disk drive, and it can be run on Apple computers using DOS operating software.

Analysis of Revisions to the Uniform Codes™. An analysis of changes between the previous and new editions of the Uniform Codes is provided. Changes between code editions are noted either at the beginning of chapters or in the margins of the code text.

1991/1994 Cross-Reference Directory to the U.B.C. and U.M.C. Both the U.B.C. and U.M.C. have been reformatted and reorganized for the 1994 editions. This publication provides two directories for both the U.B.C. and U.M.C. to cross-reference the provisions from the 1991 format to the 1994 format. The first cross-reference for each code lists the 1991 section numbers and indicates where provisions from the 1991 U.B.C. and U.M.C. are located in the 1994 editions. Other cross-reference tables list the 1994 U.B.C. and U.M.C. section numbers and refer to their origin in the 1991 codes.

Handbook to the Uniform Building Code. The handbook is a completely detailed and illustrated commentary on the *Uniform Building Code*, tracing historical background and rationale of the codes through the current edition. Also included are numerous drawings and figures clarifying the application and intent of the code provisions. Also available in electronic format.

Handbook to the Uniform Mechanical Code. An indispensable tool for understanding the provisions of the current U.M.C., the handbook traces the historical background and rationale behind the U.M.C. provisions, includes 160 figures which clarify the intent and application of the code, and provides a chapter-by-chapter analysis of the U.M.C.

Uniform Building Code Application/Interpretation Manual. This manual discusses sections of the *Uniform Building Code* with a question-and-answer format, providing a comprehensive analysis of the intent of the code sections. Most sections include illustrative examples. The manual is in loose-leaf format so that code interpretations published in *Building Standards* magazine may be inserted. Also available in electronic format.

Uniform Mechanical Code Application/Interpretation Manual. As a companion document to the *Uniform Mechanical Code*, this manual provides a comprehensive analysis of the intent of a number of code sections in an easy-to-use question-and-answer format. The manual is available in a loose-leaf format and includes illustrative examples for many code sections.

Dwelling Construction under the Uniform Building Code™. Designed primarily for use in home building and apprentice training, this book contains requirements applicable to the construction of one- and two-story dwellings based on the requirements of the *Uniform Building Code*. Available in English or Spanish.

Dwelling Construction under the Uniform Mechanical Code™. This publication is for the convenience of the homeowner or contractor interested in installing mechanical equipment in a one- or two-family dwelling in conformance with the *Uniform Mechanical Code*.

Quick-Reference Guide to the Occupancy Requirements of the 1994 U.B.C. Code requirements are compiled in this publication by occupancy groups for quick access. These tabulations assemble requirements for each occupancy classification in the code. Provisions, such as fire-resistive ratings for occupancy separations in Table 3-B, exterior wall and opening protection requirements in Table 5-A-1, and fire-resistive ratings for types of construction in Table 6-A, are tabulated for quick reference and comparison.

Plan Review Manual. A practical text that will assist and guide both the field inspector and plan reviewer in applying the code requirements. This manual covers the nonstructural and basic structural aspects of plan review.

Field Inspection Manual. An important fundamental text for courses of study at the community college and trade or technical school level. It is an effective text for those studying building construction or architecture and includes sample forms and checklists for use in the field.

Building Department Administration. An excellent guide for improvement of skills in departmental management and in the enforcement and application of the Building Code and other regulations administered by a building inspection department. This textbook will also be a valuable aid to instructors, students and those in related professional fields.

Building Department Guide to Disaster Mitigation. This new, expanded guide is designed to assist building departments in developing or updating disaster mitigation plans. Subjects covered include guidelines for damage mitigation, disaster-response management, immediate response, mutual aid and inspections, working with the media, repair and recovery policies, and public information bulletins. This publication is a must for those involved in preparing for and responding to disaster.

Building Official Management Manual. This manual addresses the unique nature of code administration and the managerial duties of the building official. A supplementary insert addresses the budgetary and financial aspects of a building department. It is also an ideal resource for those preparing for the management module of the CABO Building Official Certification Examination.

Legal Aspects of Code Administration. A manual developed by the three model code organizations to inform the building official on the legal aspects of the profession. The text is written in a logical sequence with explanation of legal terminology. It is designed to serve as a refresher for those preparing to take the legal module of the CABO Building Official Certification Examination.

U.M.C. Workbook. Designed for independent study or use with instructor-led programs based on the *Uniform Mechanical Code*, this comprehensive study guide consists of 16 learning sessions, with the first two sessions reviewing the purpose, scope, definitions and administrative provisions and the remaining 14 sessions progressively exploring the requirements for installing, inspecting and maintaining heating, ventilating, cooling and refrigeration systems.

Concrete Manual. A publication for individuals seeking an understanding of the fundamentals of concrete field technology and inspection practices. Of particular interest to concrete construction inspectors, it will also benefit employees of concrete producers, contractors, testing and inspection laboratories and material suppliers.

Reinforced Concrete Masonry Construction Inspector's Handbook. A comprehensive information source written especially for masonry inspection covering terminology, technology, materials, quality control, inspection and standards. Published jointly by ICBO and the Masonry Institute of America.

You Can Build It! Sponsored by ICBO in cooperation with CABO, this booklet contains information and advice to aid "do-it-yourselfers" with building projects. Provides guidance in necessary procedures such as permit requirements, codes, plans, cost estimation, etc.

Guidelines for Manufactured Housing Installations. A guideline in code form, implementing the *Uniform Building Code* and its companion code documents to regulate the permanent installation of a manufactured home on a privately owned, nonrental site. A commentary is included to explain specific provisions, and codes applying to each component part are defined.

Accessibility Reference Guide. This guide will be a valuable resource for architects, interior designers, plan reviewers and others who design and enforce accessibility provisions. Features include accessibility requirements, along with detailed commentary and graphics to clarify the provisions; cross-references to other applicable sections of the U.B.C. and the Americans with Disabilities Act Accessibility Guidelines; a checklist of U.B.C. provisions on access and usability requirements; and many other useful references.

U.B.C. Field Inspection Workbook. A comprehensive workbook for studying the provisions of the U.B.C. Divided into 12 sessions, this workbook focuses on the U.B.C. combustible construction requirements for the inspection of wood-framed construction.

Educational and Technical Reference Materials. The Conference has been a leader in the development of texts and course material to assist in the educational process. These materials include vital information necessary for the building official and subordinates in carrying out their responsibilities and have proven to be excellent references in connection with community college curricula and higher-level courses in the field of building construction technology and inspection and in the administration of building departments. A full line of videotapes and automated products are also available.

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An ordinance adopting the *Uniform Fire Code* prescribing regulations governing conditions hazardous to life and property from fire, hazardous materials or explosion; providing for the issuance of permits for hazardous uses or operations; and establishing a bureau of fire prevention and providing officers therefor and defining their powers and duties

Be it ordained by the _____ **[Jurisdiction Name].**

Sec. 1. ADOPTION OF UNIFORM FIRE CODE.

There is hereby adopted by the _____ **[Legislative Body and Jurisdiction Name]** for the purpose of prescribing regulations governing conditions hazardous to life and property from fire, hazardous materials or explosion, that certain Code known as the *Uniform Fire Code*, including Appendix Chapters _____ and Appendix Standards _____ [*insert appropriate appendices. See Uniform Fire Code Sections 101.8 and 9001.1.*], published by the International Fire Code Institute, being particularly the 1994 edition thereof and the whole thereof, save and except such portions as are hereinafter deleted, modified or amended by Section 8 of this ordinance, three (3) copies of which have been and are now filed in the office of the clerk of the _____ **[Jurisdiction's Clerk]** and the same are hereby adopted and incorporated as fully as if set out at length herein, and from the date on which this ordinance shall take effect, the provision thereof shall be controlling within the limits of the _____ **[Jurisdiction Name].**

Sec. 2. ESTABLISHMENT AND DUTIES OF BUREAU OF FIRE PREVENTION.

2.1 The *Uniform Fire Code* as adopted and amended herein shall be enforced by the bureau of fire prevention (or other designated agency) in the fire department of the _____ **[Jurisdiction Name]** which is hereby established and which shall be operated under the supervision of the chief of the fire department.

2.2 The chief (or fire marshal) in charge of the bureau of fire prevention (or other designated agency) shall be appointed by _____ **[Name of Appointing Authority]** on the basis of examination to determine his or her qualifications.

2.3 The chief of the fire department shall recommend to the _____ **[Name of the Proper Administrative Authority Should Be Inserted in the Blank Space]** the employment of technical inspectors, who, when such authorization is made, shall be selected through an examination to determine their fitness for the position. The examination shall be open to members and nonmembers of the fire department, and appointments made after examination shall be for an indefinite term with removal only for cause.

Sec. 3. DEFINITIONS.

3.1 Wherever the word "jurisdiction" is used in the *Uniform Fire Code*, it is _____ **[Name of the State, County, City or Town, or Fire District].**

3.2 Where the party responsible for the enforcement of the *Uniform Fire Code* is given the title of "fire marshal," add the following definition:

FIRE MARSHAL is the chief of the bureau of fire prevention.

Sec. 4. ESTABLISHMENT OF LIMITS OF DISTRICTS IN WHICH STORAGE OF FLAMMABLE OR COMBUSTIBLE LIQUIDS IN OUTSIDE ABOVEGROUND TANKS IS PROHIBITED.

The limits referred to in Sections 7902.2.2.1 and 7904.2.5.4.2 of the *Uniform Fire Code* in which the storage of flammable or combustible liquids is restricted are hereby established as follows: _____ **[These limits should include heavily populated and congested commercial areas. These limits should be detailed unless such limits are established by other regulations. It may be desirable in some jurisdictions to establish limitations based on quantities or classes of liquids or both.].**

Sec. 5. ESTABLISHMENTS OF LIMITS IN WHICH STORAGE OF LIQUEFIED PETROLEUM GASES IS PROHIBITED.

The limits referred to in Section 8204.2 of the *Uniform Fire Code*, in which storage of liquefied petroleum gas is restricted, are hereby established as follows: _____ _____ **[These limits should include the heavily populated and the congested commercial areas. These limits should be detailed unless such limits are established by other regulations.].**

Sec. 6. ESTABLISHMENTS OF LIMITS OF DISTRICTS IN WHICH STORAGE OF EXPLOSIVES AND BLASTING AGENTS IS TO BE PROHIBITED.

The limits referred to in Section 7701.7.2 of the *Uniform Fire Code*, in which storage of explosives and blasting agents is prohibited, are hereby established as follows: _____ _____ **[These limits should include the heavily populated and the congested commercial areas. These limits should be detailed unless such limits are established by other regulations.].**

Sec. 7. ESTABLISHMENT OF LIMITS OF DISTRICTS IN WHICH THE STORAGE OF COMPRESSED NATURAL GAS IS TO BE PROHIBITED.

The limits referred to in Section 5204.5.2 of the *Uniform Fire Code* in which the storage of compressed natural gas storage is prohibited, are hereby established as follows: _____ _____ **[These limits should include the heavily populated and the congested commercial areas. These limits should be detailed unless such limits are established by other regulations.].**

Sec. 8. AMENDMENTS TO THE *UNIFORM FIRE CODE*.

The *Uniform Fire Code* is amended and changed in the following respects: Section _____, paragraphs _____ and _____ are amended as follows:

NOTE: Amendments deemed necessary should be inserted. Sections in the code dealing with subjects covered adequately by existing local or state laws may be cited as deleted.

Sec. 9. APPEALS.

Whenever the chief disapproves an application or refuses to grant a permit applied for, or when it is claimed that the provisions of the code do not apply or that the true intent and meaning of the code have been misconstrued or wrongly interpreted, the applicant may appeal from the decision of the chief to _____ **[Fill in body to which appeal should be made. See *Uniform Fire Code* Section 103.1.4.]** within 30 days from the date of the decision appealed.

Sec. 10. NEW MATERIALS, PROCESSES OR OCCUPANCIES WHICH MAY REQUIRE PERMITS.

The _____ **[Administrator]**, the chief and the chief of the bureau of fire prevention shall act as a committee to determine and specify, after giving affected persons an opportunity to be heard, any new materials, processes or occupancies for which permits are required in addition to those now enumerated in the *Uniform Fire Code*. The chief of the bureau of fire prevention shall post such list in a conspicuous place at the bureau of fire prevention and distribute copies thereof to interested persons.

Sec. 11. PENALTIES.

11.1 Any person who violates any of the provisions of the *Uniform Fire Code* as adopted and amended herein or fails to comply therewith, or who violates or fails to comply with any order made thereunder, or who builds in violation of any detailed statement of specifications or plans submitted and approved thereunder, or any certificate or permit issued thereunder, and from which no appeal has been taken, or who fails to comply with such an order as affirmed or modified by the _____ **[Fill in body to which appeal should be made. See *Uniform Fire Code* Section 103.1.4.]** or by a court of competent jurisdiction, within the required time, shall severally for each and every such violation and noncompliance, respectively, be guilty of a misdemeanor, punishable by a fine of not less than $_____

nor more than $_____ or by imprisonment for not less than _____ days nor more than _____ days or by both such fine and imprisonment. The imposition of one penalty for any violation shall not excuse the violation or permit it to continue; and all such persons shall be required to correct or remedy such violations or defects within a reasonable time; and when not otherwise specified, each ten days that prohibited conditions are maintained shall constitute a separate offense.

11.2 The application of the above penalty shall not be held to prevent the enforced removal of prohibited conditions.

Sec. 12. REPEAL OF CONFLICTING ORDINANCES.

All former ordinances or parts thereof conflicting or inconsistent with the provisions of this ordinance or of the *Uniform Fire Code* as adopted and amended herein are hereby repealed.

NOTE: In some jurisdictions, reference to specific laws that are amended or repealed is preferred or may be required.

Sec. 13. VALIDITY.

The _____ **[Legislative Body]** hereby declares that should any section, paragraph, sentence or word of this ordinance or of the *Uniform Fire Code* as adopted and amended herein be declared for any reason to be invalid, it is the intent of _____ _____ that it would have passed all other portions of this ordinance independent of the elimination herefrom of any such portion as may be declared invalid.

Sec. 14. DATE OF EFFECT.

This ordinance shall take effect and be in force from and after its approval as required by law.

PART I

GENERAL

ARTICLE 1 — ADMINISTRATION

SECTION 101 — GENERAL

101.1 Title. This code shall be known as the UNIFORM FIRE CODE, may be cited as such, and will be referred to herein as "this code."

101.2 Scope. This code prescribes regulations consistent with nationally recognized good practice for the safeguarding to a reasonable degree of life and property from the hazards of fire and explosion arising from the storage, handling and use of hazardous substances, materials and devices, and from conditions hazardous to life or property in the use or occupancy of buildings or premises.

The provisions of this code shall supplement any and all laws relating to firesafety and shall apply to all persons without restriction, unless specifically exempted.

101.3 Subjects Not Specifically Regulated by this Code. Where no applicable standards or requirements are set forth in this code, or contained within other laws, codes, regulations, ordinances or bylaws adopted by the jurisdiction, compliance with applicable standards of the National Fire Protection Association or other nationally recognized fire-safety standards as are approved by the chief shall be deemed as prima facie evidence of compliance with the intent of this code. See also Section 9001.2.

Nothing herein shall derogate from the power of the chief to determine compliance with codes or standards for those activities or installations within the chief's jurisdiction or responsibility.

101.4 Supplemental Rules and Regulations. The chief, with the approval of the administrator, is authorized to make and enforce such rules and regulations for the prevention and control of fires and fire hazards as necessary to carry out the intent of this code.

A minimum of one certified copy or the number required by governing law of such rules and regulations shall be filed with the clerk of the jurisdiction and shall be in effect immediately thereafter and additional copies shall be kept in the office of the fire department for distribution to the public.

101.5 Liability. The chief and other individuals charged by the chief with the control or extinguishment of any fire, the enforcement of this code or any other official duties, acting in good faith and without malice in the discharge of their duties, shall not thereby be rendered personally liable for any damage that may accrue to persons or property as a result of any act or by reason of any act or omission in the discharge of their duties. Any suit brought against the chief or such individuals because of such act or omission performed in the enforcement of any provision of such codes or other pertinent laws or ordinances implemented through the enforcement of this code or enforced by the code enforcement agency shall be defended by this jurisdiction until final termination of such proceedings, and any judgment resulting therefrom shall be assumed by this jurisdiction.

This code shall not be construed to relieve from or lessen the responsibility of any person owning, operating or controlling any building or structure for any damages to persons or property caused by defects, nor shall the code enforcement agency or its parent jurisdiction be held as assuming any such liability by reason of the inspections authorized by this code or any permits or certificates issued under this code.

See also Section 103.3.2.1.

101.6 Conflicting Provisions. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall be applicable.

101.7 Severability. If any provision of this code or the application thereof to any person or circumstance is held invalid, the remainder of the code and the application of such provision to other persons or circumstances shall not be affected thereby.

101.8 References to Appendix. When this code references the appendix, the provisions in the appendix shall not apply unless specifically adopted.

101.9 Amendments. When reference is made to a portion of this code or other applicable laws or ordinances, the reference applies to all amendments and additions now or hereafter made.

SECTION 102 — RETROACTIVE APPLICATION TO EXISTING CONDITIONS

102.1 Existing Conditions. The provisions of this code shall apply to conditions arising after the adoption thereof, conditions not legally in existence at the adoption of this code, and to conditions which, in the opinion of the chief, constitute a distinct hazard to life or property. See also Appendices I-A and I-B.

SECTION 103 — INSPECTION AND ENFORCEMENT

103.1 General.

103.1.1 Technical assistance. To determine the acceptability of technologies, processes, products, facilities, materials and uses attending the design, operation or use of a building or premises subject to the inspection of the department, the chief is authorized to require the owner or the person in possession or control of the building or premises to provide, without charge to the jurisdiction, a technical opinion and report. The opinion and report shall be prepared by a qualified engineer, specialist, laboratory or fire-safety specialty organization acceptable to the chief and the owner and shall analyze the fire-safety properties of the design, operation or use of the building or premises and the facilities and appurtenances situated thereon, to recommend necessary changes.

103.1.2 Alternate materials and methods. The chief, on notice to the building official, is authorized to approve alternate materials or methods, provided that the chief finds that the proposed design, use or operation satisfactorily complies with the intent of this code and that the material, method of work performed or operation is, for the purpose intended, at least equivalent to that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Approvals under the authority herein contained shall be subject to the approval of the building official whenever the alternate material or method involves matters regulated by the Building Code.

The chief is authorized to require tests as proof of compliance with the intent of this code. Such tests shall be made by an approved agency at the expense of the person requesting approval of the alternate material or method of construction.

103.1.3 Practical difficulties. The chief is authorized to modify any of the provisions of this code upon application in writing by the owner, a lessee or a duly authorized representative where there are practical difficulties in the way of carrying out the provisions of the code, provided that the spirit of the code shall be complied with, public safety secured and substantial justice done. The particulars of such modification and the decision of the chief shall be entered upon the records of the department and a signed copy shall be furnished to the applicant.

103.1.4 Appeals. To determine the suitability of alternate materials and types of construction and to provide for reasonable interpretations of the provisions of this code, there shall be and hereby is created a board of appeals consisting of five members who are qualified by experience and training to pass judgment upon pertinent matters. The chief shall be an ex officio member and shall act as secretary of the board. The board of appeals shall be appointed by the executive body and shall hold office at their pleasure. The board shall adopt reasonable rules and regulations for conducting its investigations and shall render decisions and findings in writing to the fire chief, with a duplicate copy to the appellant.

103.1.5 Appendix. See Appendix VI-C for additional information related to inspection and enforcement.

103.2 Authority for Inspection and Enforcement.

103.2.1 Authority of the chief and the fire department.

103.2.1.1 General. The chief is authorized to administer and enforce this code. Under the chief's direction, the fire department is authorized to enforce all ordinances of the jurisdiction pertaining to:

1. The prevention of fires,
2. The suppression or extinguishment of dangerous or hazardous fires,
3. The storage, use and handling of hazardous materials,
4. The installation and maintenance of automatic, manual and other private fire alarm systems and fire-extinguishing equipment,
5. The maintenance and regulation of fire escapes,
6. The maintenance of fire protection and the elimination of fire hazards on land and in buildings, structures and other property, including those under construction,
7. The maintenance of exits, and
8. The investigation of the cause, origin and circumstances of fire and unauthorized releases of hazardous materials.

For authority related to control and investigation of emergency scenes, see Section 104.

103.2.1.2 Fire prevention bureau personnel and police. The chief and members of the fire prevention bureau shall have the powers of a police officer in performing their duties under this code.

When requested to do so by the chief, the chief of police is authorized to assign such available police officers as necessary to assist the fire department in enforcing the provisions of this code.

103.2.2 Organization of the fire prevention bureau.

103.2.2.1 General. A fire prevention bureau established within the fire department under the direction of the chief shall consist of fire department personnel assigned thereto by the chief. The function of this bureau shall be to assist the chief in the administration and enforcement of the provisions of this code.

103.2.2.2 Fire marshal. The chief is authorized to designate a member of the fire department to exercise the powers and perform the duties of fire prevention engineer as set forth in this code. The fire prevention engineer could also be known as fire marshal.

103.3 Inspection.

103.3.1 General.

103.3.1.1 Authority to inspect. The fire prevention bureau shall inspect, as often as necessary, buildings and premises, including such other hazards or appliances designated by the chief for the purpose of ascertaining and causing to be corrected any conditions which would reasonably tend to cause fire or contribute to its spread, or any violation of the purpose or provisions of this code and of any other law or standard affecting firesafety.

103.3.1.2 Right of entry. Whenever necessary to make an inspection to enforce any of the provisions of this code, or whenever the chief has reasonable cause to believe that there exists in any building or upon any premises any condition which makes such building or premises unsafe, the chief is authorized to enter such building or premises at all reasonable times to inspect the same or to perform any duty authorized by this code, provided that if such building or premises is occupied, the

chief shall first present proper credentials and demand entry; and if such building or premises is unoccupied, the chief shall first make a reasonable effort to locate the owner or other persons having charge or control of the building or premises and demand entry. If such entry is refused, the chief shall have recourse to every remedy provided by law to secure entry.

If the owner or occupant denies entry, the chief is authorized to obtain a proper inspection warrant or other remedy provided by law to secure entry. Owners, occupants or any other persons having charge, care or control of any building or premises shall, after proper request is made as herein provided, promptly permit entry therein by the chief for the purpose of inspection and examination pursuant to this code.

For the purpose of Section 103.3.1.2, the term "chief" shall include the chief officer of the fire department serving the jurisdiction and the officers named in Sections 103.2.1.2 and 103.2.2.2.

103.3.2 New construction and alterations.

103.3.2.1 General. Construction or work for which fire department approval is required shall be subject to inspection by the chief and such construction or work shall remain accessible and exposed for inspection purposes until approved by the chief.

Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or of other ordinances of the jurisdiction. Inspections presuming to give authority to violate or cancel the provisions of this code or of other ordinances of the jurisdiction shall not be valid.

It shall be the duty of the permit applicant or contractor or both to cause the work to remain accessible and exposed for inspection purposes. Neither the chief nor the jurisdiction shall be liable for expense entailed in the removal or replacement of any material required to allow inspection.

103.3.2.2 Inspection requests. It shall be the duty of the person doing the work authorized by a permit to notify the chief that such work is ready for inspection. The chief is authorized to require that every request for inspection be filed not less than one working day before such inspection is desired. Such requests may be in writing or by telephone at the option of the chief.

It shall be the duty of the person requesting any required inspections to provide access to and means for proper inspection of such work.

103.3.3 Firesafety during construction and alterations. Firesafety during construction, alteration or demolition of a building shall be in accordance with Article 87.

103.3.4 Records. The fire prevention bureau shall retain for not less than three years a record of each inspection made showing the findings and disposition of each inspection made.

103.4 Enforcement.

103.4.1 Authorization to issue corrective orders and notices.

103.4.1.1 General. When the chief finds in any building or on any premises combustible, hazardous or explosive materials or dangerous accumulations of rubbish; or finds unnecessary accumulations of wastepaper, boxes, shavings or any highly flammable materials which are so situated as to endanger life or property; or finds obstructions to or on fire escapes, stairs, passageways, doors or windows that reasonably tend to interfere with the operations of the fire department or the egress of the occupants of such building or premises; or finds that the effectiveness of any exit door, attic separation or any fire separation wall is reduced; or finds that this code is being violated, the chief is authorized to issue orders as necessary for the enforcement of the fire prevention laws and ordinances governing the same and for the safeguarding of life and property from fire.

See also Appendix VI-C.

103.4.1.2 Unsafe heating or electrical equipment and structural hazards. When the chief deems any chimney, smokestack, stove, oven, incinerator, furnace or other heating device, electric

fixture or any appurtenance thereto, or anything regulated under a nationally recognized standard in or upon any building, structure or premises not specifically mentioned in this code, to be defective or unsafe so as to create a hazard, the chief is authorized to serve upon the owner or the person having control of the property a written notice to repair or alter as necessary and shall notify any other authority enforcing codes regulating such equipment. The chief is authorized to affix a condemnation tag prohibiting the use thereof until such repairs or alterations are made. When affixed, such tag shall only be removed by the order of the chief when the hazard to which the order pertains has been eliminated in an approved manner. Until removed, that item or device which has caused the hazard shall not be used or be permitted to be used.

When an apparent structural hazard is caused by the faulty installation, operation or malfunction of any of the items or devices listed in this subsection, the chief shall immediately notify the building official to investigate such hazard and cause such hazard to be abated as required by the Building Code.

103.4.1.3 Stopping uses, evacuation. The chief is authorized to order an operation or use stopped or the evacuation of any premises, building or vehicle or portion thereof which has or is a fire hazard.

103.4.1.4 Time limit for corrective orders. Orders or notices shall set forth a time limit for compliance dependent upon the hazard and danger created by the violation.

103.4.2 Service of orders and notices. Orders and notices authorized or required by this code shall be given or served upon the owner, operator, occupant or other person responsible for the condition or violation either by verbal notification, personal service, or delivering the same to and leaving it with a person of suitable age and discretion upon the premises; or, if no such person is found on the premises, by affixing a copy thereof in a conspicuous place on the door to the entrance of said premises and by mailing a copy thereof to such person by registered or certified mail to the person's last known address.

Orders or notices which are given verbally shall be confirmed by service in writing as herein provided.

103.4.3 Compliance with orders, notices and tags.

103.4.3.1 Compliance with orders and notices. Orders and notices issued or served as provided by this code shall be complied with by the owner, operator, occupant or other person responsible for the condition or violation to which the order or notice pertains. In cases of extreme danger to persons or property, immediate compliance is required.

If the building or other premises is not owner occupied, under lease or otherwise, and the order or notice requires additions or changes in the building or premises which would immediately become real estate and be the property of the owner of the building or premises, such orders or notices shall be complied with by the owner.

> **EXCEPTION:** When the owner and the occupant have agreed otherwise between themselves, in which event the occupant shall comply.

103.4.3.2 Compliance with tags. A building, premises or thing shall not be used when in violation of this code as noted on a tag affixed in accordance with Section 103.4.1.

103.4.3.3 Removal and destruction of signs and tags. A sign or tag posted or affixed by the chief shall not be mutilated, destroyed or removed without authorization by the chief.

103.4.4 Citations. Persons operating or maintaining an occupancy, premises or vehicle subject to this code who allow a hazard to exist or fail to take immediate action to abate a hazard on such occupancy, premises or vehicle when ordered or notified to do so by the chief shall be guilty of a misdemeanor.

103.4.5 Unsafe buildings. Buildings or structures which are structurally unsafe or not provided with adequate egress, or which constitute a fire hazard or are otherwise dangerous to human life, or

which in relation to existing use constitute a hazard to safety or health or public welfare, by reason of inadequate maintenance, dilapidation, obsolescence, fire hazard, disaster damage or abandonment as specified in this code or any other ordinance, are, for the purpose of Section 103.4.5, unsafe buildings. Such unsafe buildings are hereby declared to be public nuisances and shall be abated by repair, rehabilitation, demolition or removal. See the procedure specified in Chapters 4 through 9 of the *Uniform Code for the Abatement of Dangerous Buildings.*

103.4.6 Appeals. For appeals, see Section 103.1.4.

SECTION 104 — CONTROL AND INVESTIGATION OF EMERGENCY SCENES

104.1 Authority at Fires and Other Emergencies.

104.1.1 General. The chief or officer of the fire department in charge at the scene of a fire or other emergency involving the protection of life or property or any part thereof, shall have the authority to direct such operation as necessary to extinguish or control any fire, perform any rescue operation, investigate the existence of suspected or reported fires, gas leaks or other hazardous conditions or situations or of taking any other action necessary in the reasonable performance of duty. In the exercise of such power, the chief is authorized to prohibit any person, vehicle, vessel or thing from approaching the scene and is authorized to remove or cause to be removed or kept away from the scene any vehicle, vessel or thing which could impede or interfere with the operations of the fire department and, in the judgment of the chief, any person not actually and usefully employed in the extinguishing of such fire or in the preservation of property in the vicinity thereof.

104.1.2 Interference. The operations of the fire department in connection with extinguishing any fire or other emergency shall not be obstructed. Lawful commands of the chief or officer of the fire department in charge at such a scene, or any part thereof, or any police officer assisting the fire department, shall not be disobeyed.

104.1.3 Barricades. The chief or officer of the fire department in charge at the scene of an emergency is authorized to place ropes, guards, barricades or other obstructions across any street, alley, place or private property in the vicinity of such operation so as to prevent accidents or interference with the lawful efforts of the fire department to manage and control the situation and to handle fire apparatus.

104.2 Investigations. The fire department is authorized to investigate promptly the cause, origin and circumstances of each and every fire occurring in the jurisdiction involving loss of life or injury to person or destruction or damage to property and, if it appears to the bureau of investigation that such fire is of suspicious origin, they are authorized to take immediate charge of all physical evidence relating to the cause of the fire and are authorized to pursue the investigation to its conclusion.

The chief is authorized to investigate the cause, origin and circumstances of unauthorized releases of hazardous materials.

The police department is authorized to assist the fire department in its investigations when requested to do so.

104.3 Records and Reports.

104.3.1 Fire occurrences. The fire department shall keep a record of fires occurring within its jurisdiction and of facts concerning the same, including statistics as to the extent of such fires and the damage caused thereby, together with other information as required by the chief.

104.3.2 Record retention. The fire department shall retain for not less than three years a record of each investigation made showing the cause, the findings and disposition of each investigation.

SECTION 105 — PERMITS

105.1 Scope. Permits shall be in accordance with Section 105.

105.2 Conditions of Permits.

105.2.1 General. A permit constitutes permission to maintain, store, use or handle materials, or to conduct processes which produce conditions hazardous to life or property, or to install equipment used in connection with such activities. Such permission shall not be construed as authority to violate, cancel or set aside any of the provisions of this code. Such permit shall not take the place of any license required by law.

105.2.2 Expiration. A permit shall continue until revoked or for such a period of time as designated therein at the time of issuance. Permits shall not be transferable and any change in use, occupancy, operation or ownership shall require a new permit.

105.2.3 Compliance. Permit applicants and the applicants' agents and employees shall carry out the proposed activity in compliance with this code and other laws or regulations applicable thereto, whether specified or not, and in complete accordance with approved plans and specifications. Permits which purport to sanction a violation of this code or any applicable law or regulation shall be void and approvals of plans and specifications in the issuance of such permits shall likewise be void.

105.3 Application for Permit. Applications for permits shall be made to the bureau of fire prevention in such form and detail as prescribed by the bureau. Applications for permits shall be accompanied by such plans as required by the bureau.

105.4 Inspection Required. Before a permit is issued, the chief shall inspect and approve the receptacles, vehicles, buildings, devices, premises, storage spaces or areas to be used. In instances where laws or regulations are enforceable by departments other than the fire department, joint approval shall be obtained from all departments concerned.

105.5 Retention of Permits. Permits shall be kept on the premises designated therein at all times and shall be posted in a conspicuous location on the premises or shall be kept on the premises in a location designated by the chief. Permits shall be subject to inspection at all times by an officer of the fire or police department or other persons authorized by the chief.

105.6 Permits for the Same Location. When more than one permit is required for the same location, such permits may be consolidated into a single permit.

105.7 Revocation of Permits. The chief is authorized to suspend or revoke a permit when it is determined after a hearing by the chief that:

1. The permit has been used by a person other than the person to whom the permit was issued,
2. The permit has been used for a location other than that for which it was issued,
3. Any of the conditions or limitations set forth in the permit have been violated,
4. The permittee failed, refused or neglected to comply with orders or notices duly served in accordance with the provisions of this code within the time provided therein, or
5. There has been a false statement or misrepresentation as to a material fact in the application or plans on which the permit or application was based.

105.8 Permit Required. A permit shall be obtained from the bureau of fire prevention prior to engaging in the following activities, operations, practices or functions:

a.1. **Aerosol products.** To store or handle an aggregate quantity of Level 2 or Level 3 aerosol products in excess of 500 pounds (226.8 kg) net weight. See Article 88.

a.2. **Aircraft refueling vehicles.** To operate aircraft refueling vehicles. See Article 24.

a.3. **Aircraft repair hangar.** To use any structure as an aircraft hangar for the purpose of servicing or repairing aircraft. See Article 24.

a.4. **Asbestos removal.** To conduct asbestos-removal operations regulated by Article 87.

Assembly. See "places of assembly."

a.5. **Automobile wrecking yard.** To operate an automobile wrecking yard. See Article 34.

b.1. **Bowling pin or alley refinishing.** To conduct a bowling pin refinishing or bowling alley resurfacing operation involving the use and application of flammable liquids or materials. See Article 26.

c.1. **Candles and open flames in assembly areas.** To use open flame or candles in connection with assembly areas, dining areas of restaurants or drinking establishments. For definition of ASSEMBLY, see Article 2. See Article 25 for open flame and candles.

c.2. **Carnivals and fairs.** To conduct a carnival or fair. See Article 25.

c.3. **Cellulose nitrate film.** To store, handle, use or display cellulose nitrate film. See Article 33.

c.4. **Cellulose nitrate storage.** To store or handle more than 25 pounds (11.3 kg) of cellulose nitrate plastic (pyroxylin) for the manufacturing or assembly of articles or parts of articles containing cellulose nitrate plastics (pyroxylin). See Article 27.

c.5. **Combustible fiber storage.** To store or handle combustible fibers in quantities in excess of 100 cubic feet (2.83 m^3). See Article 28.

c.6. **Combustible material storage.** To store more than 2,500 cubic feet (70.8 m^3) gross volume of combustible empty packing cases, boxes, barrels or similar containers, or rubber or cork, or other similarly combustible material. See Article 11.

c.7. **Compressed gases.** To store, use or handle at normal temperatures and pressures compressed gases in excess of the amounts listed in Table 105-A. When the compressed gases in use or storage exceed the amounts listed in Table 105-A, a permit is required to install, repair, abandon, remove, place temporarily out of service, close or substantially modify a compressed gas system.

EXCEPTIONS: 1. Routine maintenance.

2. For emergency repair work performed on an emergency basis, application for permit shall be made within two working days of commencement of work.

The permit applicant shall apply for approval to close storage, use or handling facilities at least 30 days prior to the termination of the storage, use or handling of compressed or liquefied gases. Such application shall include any change or alteration of the facility closure plan filed pursuant to Section 8001.11. This 30-day period may be waived by the chief if there are special circumstances requiring such waiver.

c.8. **Commercial rubbish-handling operation.** To operate a commercial rubbish-handling operation. See Article 11.

c.9. **Cryogens.** Except where federal or state regulations apply and except for fuel systems of the vehicle, to produce, store or handle cryogens in excess of the amounts listed in Table 105-B.

d.1. **Dry cleaning plants.** To engage in the business of dry cleaning or to change to a more hazardous cleaning solvent. Such permits shall prescribe the class of system to be used. See Article 36.

d.2. **Dust-producing operations.** To operate a grain elevator, flour starch mill, feed mill, or plant pulverizing aluminum, coal, cocoa, magnesium, spices, sugar or other material producing dusts as defined in Article 2. See Articles 30 and 76.

e.1. **Explosives or blasting agents.** For permits for explosives or blasting agents, see Article 77.

f.1. **Fire hydrants and water-control valves.** For a permit to use a fire hydrant or operate a water-control valve intended for fire-suppression purposes. See Article 9.

f.2. **Fireworks.** For permits for fireworks, see Article 78.

f.3. **Flammable or combustible liquids.** See Article 79.

1. To use or operate, repair or modify a pipeline for the transportation of flammable or combustible liquids.

2. To store, handle or use Class I liquids in excess of 5 gallons (18.9 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 chief, would cause an unsafe condition.

2.2 The storage or use of paints, oils, varnishes or similar flammable mixtures when such liquids are stored for maintenance, painting or similar purposes for a period of not more than 30 days.

3. To store, handle or use Class II or Class III-A liquids in excess of 25 gallons (94.6 L) in a building or in excess of 60 gallons (227.1 L) outside a building, except for fuel oil used in connection with oil-burning equipment.

4. To remove Class I or Class 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.

5. To install, construct, alter or 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.

6. To install, alter, remove, abandon, place temporarily out of service or otherwise dispose of a flammable or combustible liquid tank.

7. To change the type of contents stored in a flammable or combustible liquid tank to a material other than that for which the tank was designed and constructed.

f.4. **Fruit ripening.** To operate a fruit-ripening process regulated by Article 46.

f.5. **Fumigation or thermal insecticidal fogging.** To operate a business of fumigation or thermal insecticidal fogging and to maintain a room, vault or chamber in which a toxic or flammable fumigant is used. See Article 47.

h.1. **Hazardous materials.** To store, transport on site, dispense, use or handle hazardous materials in excess of the amounts listed in Table 105-C or to install, repair, abandon, remove, place temporarily out of service, close or substantially modify a storage facility or other area regulated by Article 80 when the hazardous materials in use or storage exceed the amounts listed in Table 105-C.

h.2. **Hazardous production materials.** To store, handle or use hazardous production material in a Group H, Division 6 Occupancy. See Article 51.

h.3. **High-piled combustible storage.** To use any building or portion thereof as a high-piled storage area exceeding 500 square feet (46.45 m^2) (see definition in Article 81). Plans shall be submitted with applications for such permits in accordance with Article 81.

l.1. **Liquefied petroleum gases.** See Article 82.

1. To store, use, handle or dispense LP-gas.

2. To install or maintain LP-gas containers.

l.2 **Liquid- or gas-fueled vehicles or equipment in assembly buildings.** To display, compete or demonstrate liquid- or gas-fueled vehicles or equipment in assembly buildings. See Article 25.

l.3. **Lumber yards.** To store lumber in excess of 100,000 board feet (9290.3 m^2 surface area of lumber 25.4 mm in thickness). See Article 30.

m.1. **Magnesium working.** To melt, cast, heat treat or grind more than 10 pounds (4.54 kg) of magnesium per working day. See Article 48.

m.2. **Mall, covered.** See Article 35. To use a covered mall in the following manner:

1. Placing or constructing temporary kiosks, display booths, concession equipment or the like in the mall.

2. To use a mall as a place of assembly.

3. To use open-flame or flame-producing devices.

4. To display any liquid- or gas-fueled powered equipment.

m.3. **Motor vehicle fuel-dispensing stations.** To dispense flammable or combustible liquids, liquefied petroleum gases or compressed natural gas at motor vehicle fuel-dispensing stations. See Article 52.

Nitrate film. See cellulose nitrate film.

o.1. **Open burning.** To conduct open burning. Where burning is conducted on public property or the property of someone other than the permit applicant, the permit applicant shall demonstrate that permission has been obtained by the appropriate government agency, the owner, or the owner's authorized agent. When limits for atmospheric conditions or hours restrict burning, such limits shall be designated in the permit restrictions. See Section 1102.3.

o.2. **Organic coatings.** To manufacture more than 1 gallon (3.79L) of organic coatings in a working day. See Article 50.

o.3. **Ovens, industrial baking or drying.** To operate an industrial baking or drying oven regulated by Article 62.

p.1. **Parade floats.** To use a parade float for public performance, presentation, spectacle, entertainment or parade. See Section 1104.

p.2. **Places of assembly.** To operate a place of assembly. See Article 25.

p.3. **Pyrotechnical special effects material.** For permits for pyrotechnical special effects material, see Article 78.

r.1. **Radioactive materials.** To store or handle at any installation more than 1 microcurie (37 000 becquerel) of radioactive material not contained in a sealed source or more than 1 millicurie (37 000 000 becquerel) of radioactive material in a sealed source or sources, or any amount of radioactive material for which a specific license from the Nuclear Regulatory Commission is required. See Article 80.

r.2. **Refrigeration equipment.** To install or operate a mechanical refrigeration unit or system regulated by Article 63.

r.3. **Repair garages.** To use a structure as a place of business for servicing or repairing motor vehicles. See Article 29.

s.1. **Spraying or dipping.** To conduct a spraying or dipping operation utilizing flammable or combustible liquids or the application of combustible powders regulated by Article 45.

t.1. **Tents, canopies and temporary membrane structures.** To erect or operate a tent or air-supported temporary membrane structure having an area in excess of 200 square feet (18.6 m^2), or a canopy in excess of 400 square feet (37.2 m^2), except for structures used exclusively for camping. See Article 32.

t.2. **Tire storage.** To use an open area or portion thereof to store tires in excess of 1,000 cubic feet (28.3 m^3). See Section 1103.3.6.

w.1. **Welding and cutting operations.** To conduct welding or cutting operations in an occupancy. See Article 49.

TABLE 105-A—PERMIT AMOUNTS FOR COMPRESSED GASES[1]

TYPE OF GAS	AMOUNT (cubic feet) × 0.0283 for m^3
Corrosive	200
Flammable (except cryogenic fluids and liquefied petroleum gases)	200
Highly toxic	Any amount
Inert and simple asphyxiant	6,000
Irritant	200
Other health hazards	650
Oxidizing (including oxygen)	504
Pyrophoric	Any amount
Radioactive	Any amount
Sensitizer	200
Toxic	Any amount
Unstable (reactive)	Any amount

[1]See Articles 74, 80 and 82 for additional requirements and exceptions.

TABLE 105-B—PERMIT AMOUNTS FOR CRYOGENS[1]

TYPE OF CRYOGEN	INSIDE BUILDING (gallons)	OUTSIDE BUILDING (gallons)
	× 3.785 for L	
Corrosive	Over 1	Over 1
Flammable	Over 1	60
Highly toxic	Over 1	Over 1
Nonflammable	60	500
Oxidizer (includes oxygen)	50	50

[1]See Article 75.

TABLE 105-C—PERMIT AMOUNTS FOR HAZARDOUS MATERIALS[1]

TYPE OF MATERIAL		AMOUNT × 0.4536 for lbs. to kg × 3.785 for gal. to L
Carcinogens		10 pounds
Cellulose nitrate		See No. c.4
Combustible fiber		See No. c.5
Combustible liquids		See No. f.3
Corrosive gases		See No. c.7
Corrosive liquids		55 gallons
Corrosive solids		500 pounds
Cryogens		See No. c.9
Explosives		See No. e.1
Flammable gases		See No. c.7
Flammable liquids		See No. f.3
Flammable solids		100 pounds
Highly toxic gases (including pesticides and fumigants)		See No. c.7
Highly toxic liquids and solids (including pesticides and fumigants)		Any amount
Irritant liquids		55 gallons
Irritant solids		500 pounds
Liquefied petroleum gases		See No. l.1
Magnesium		See No. m.1
Nitrate film		See No. c.3
Oxidizing gases		See No. c.7
Oxidizing liquids:	Class 4	Any amount
	Class 3	1 gallon
	Class 2	10 gallons
	Class 1	55 gallons
Oxidizing solids:	Class 4	Any amount
	Class 3	10 pounds
	Class 2	100 pounds
	Class 1	500 pounds
Organic peroxide liquids and solids:	Class I	Any amount
	Class II	Any amount
	Class III	10 pounds
	Class IV	20 pounds
Other health hazards:	Liquids	55 gallons
	Solids	500 pounds
Pyrophoric gases		See No. c.7
Pyrophoric liquids		Any amount
Pyrophoric solids		Any amount
Radioactive materials (including gases, liquids and solids)		See No. c.7 and r.1
Sensitizer liquids		55 gallons
Sensitizer solids		500 pounds
Toxic gases		See No. c.7
Toxic liquids		10 gallons
Toxic solids		100 pounds
Unstable (reactive) gases		See No. c.7
Unstable (reactive) liquids:	Class 4	Any amount
	Class 3	Any amount
	Class 2	5 gallons
	Class 1	10 gallons
Unstable (reactive) solids:	Class 4	Any amount
	Class 3	Any amount
	Class 2	50 pounds
	Class 1	100 pounds
Water-reactive liquids:	Class 3	Any amount
	Class 2	5 gallons
	Class 1	10 gallons
Water-reactive solids:	Class 3	Any amount
	Class 2	50 pounds
	Class 1	100 pounds

[1]See Article 80 for additional requirements and exceptions.

PART II

DEFINITIONS AND ABBREVIATIONS

ARTICLE 2 — DEFINITIONS AND ABBREVIATIONS

SECTION 201 — GENERAL

201.1 Definitions. For the purpose of this code, certain words and phrases are defined and certain provisions shall be construed as set forth herein, unless it is apparent from the context that a different meaning is intended.

When terms are not defined, they shall have their ordinary accepted meanings within the context with which they are used. *Webster's Third New International Dictionary of the English Language, Unabridged,* copyright 1986, shall be considered as providing ordinarily accepted meanings.

201.2 Tenses. Present tenses include past and future tenses and future tenses include the past.

201.3 Number. Singular numbers include plural and plural numbers include singular.

SECTION 202 — A

AAR is the Association of American Railroads.

ADMINISTRATOR is the executive officer of the jurisdictional area.

AERIAL SHELL is a pyrotechnic device that functions in the air.

AEROSOL is a product which is dispensed from an aerosol container by a propellant.

AEROSOL CONTAINER is a metal can, up to a maximum size of 33.8 fluid ounces (1000 mL), or a glass or plastic bottle, up to a maximum size of 4 fluid ounces (118 mL), that is designed to dispense an aerosol product.

AEROSOL WAREHOUSE is a building used for warehousing aerosol products.

AGA is the American Gas Association.

AIA is the American Insurance Association.

ALARM is the giving, signaling or transmitting to a public fire station or company or to an officer or employee thereof, whether by telephone, spoken word or otherwise, information to the effect that a fire or emergency condition exists at or near the place indicated by the person giving, signaling or transmitting such information.

ALARM CONTROL UNIT is a unit comprising the controls, relays, switches and associated circuits necessary to

1. Distribute power to a fire alarm system,

2. Receive signals from alarm-initiating devices and transmit them to alarm-signaling devices and accessory equipment, and

3. Electrically supervise the system circuitry.

ALARM-INITIATING DEVICE is manually or automatically operated equipment which, when activated, initiates an alarm through an alarm-signaling device.

ALARM SIGNAL is an audible or visual signal, or both, indicating the existence of an emergency fire condition. Audible devices may be bells, horns, chimes, speakers or similar devices. Voice alarms and their messages shall be approved by the chief.

ALARM-SIGNALING DEVICE is equipment that produces an approved alarm signal.

ALARM SYSTEM is a combination of approved compatible devices with the necessary electrical interconnection and energy to produce an alarm signal in the event of fire or system activation.

ALARM ZONE is a building or defined area of a building as approved by the chief for purposes of identifying alarm-initiating locations.

ALTER and ALTERATION are a change, addition or modification in construction or occupancy.

AMUSEMENT BUILDING is a building or portion thereof, temporary or permanent, used for entertainment or educational purposes and which contains a system which transports passengers or provides a walkway through a course so arranged that the required exits are not apparent due to theatrical distractions, are disguised, or are not readily available due to the method of transportation through the building or structure.

ANNUNCIATOR is equipment which indicates the zone or area of a building from which an alarm has been initiated or the location of an alarm-initiating device and the operational condition of the alarm circuits of the system.

ANSI is the American National Standards Institute.

APARTMENT HOUSE is any building, or portion thereof, which contains three or more dwelling units including residential condominiums.

API is the American Petroleum Institute.

APPLIANCE, PORTABLE, is a device operated by electricity which is capable of being hand-carried or is easily moved from one place to another in normal use.

APPLIANCE, STATIONARY, is a device operated by electricity which is not affixed to a structure and which is not easily moved from one place to another.

APPROVED refers to approval by the chief as the result of investigation and tests conducted by the chief or by reason of accepted principles or tests by national authorities, or technical or scientific organizations.

AREA is a particular extent of surface. (See also FLOOR AREA.)

ARRAY is a description of the configuration of storage. Characteristics considered in defining an array include the type of packaging, flue spaces, height of storage and compactness of storage.

ARRAY, CLOSED, is an array having a 6-inch (152.4 mm) or smaller width vertical flue space that restricts air movement through the stored commodity.

ASHRAE is the American Society of Heating, Refrigerating and Air-Conditioning Engineers.

ASME is the American Society of Mechanical Engineers.

ASPHALT KETTLE is a vessel or container used to process, heat, hold for heating, or dispense flammable or combustible roofing materials that are in liquid form or will take that form as a result of being exposed to such vessel or container.

ASSEMBLY is the gathering together of 50 or more persons for such purposes as deliberation, education, instruction, worship, entertainment, amusement, drinking, dining or awaiting transportation.

ASTM is the American Society for Testing and Materials.

ATMOSPHERIC TANK is a storage tank which has been designed to operate at pressures from atmospheric through 0.5 pound per square inch gage (psig) (3.4 kPa).

ATRIUM is an opening through two or more floor levels other than enclosed stairways, elevators, hoistways, escalators, plumbing, electrical, air-conditioning or other equipment, which is closed at the top and not defined as a mall. Floor levels as used in this definition do not include balconies within an assembly occupancy or mezzanines which comply with the Building Code requirements for mezzanines.

AUTOMATIC FIRE ALARM SYSTEM is a system which automatically detects a fire condition and actuates fire alarm-signaling devices.

AUTOMATIC FIRE CHECK is a device listed for installation in communicating piping carrying an explosive vapor/air mixture to prevent a flashback from reaching underground tanks or equipment in a piping system. These devices shall be equipped with special elements for arresting an explosion wave which may already be established in a pipe. These devices shall contain an automatically operated shutoff valve to stop flow of vapor/air mixture in event of a flashback and continued burning at the arrester element. The shutoff valve shall be capable of a manual reset.

AUTOMATIC FIRE-EXTINGUISHING SYSTEM is an approved system of devices and equipment which automatically detects a fire and discharges an approved fire-extinguishing agent onto or in the area of a fire. B

AUTOMOBILE WRECKING YARD is an area that stores salvage vehicles.

AWNING is a shelter supported entirely from the exterior wall of a building.

SECTION 203 — B

BALCONY, EXTERIOR EXIT, is a landing or porch projecting from the wall of a building and which serves as a required exit. The long side shall be at least 50 percent open, and the open area above the guardrail shall be so distributed as to prevent the accumulation of smoke or toxic gases. B

BANDING is a method of packaging consisting of stretch wrapping around not more than four sides of a pallet load.

BARREL is a volume of 42 U.S. gallons (159 L).

BARRICADE is a structure that consists of a combination of walls, floor and roof that is designed to withstand the rapid release of energy in an explosion. Barricades may be fully confined, partially vented or fully vented.

BASE PRODUCT is the contents of an aerosol container excluding the propellant. A base product is considered flammable if its closed-cup flash point is below 500°F. (260°C.).

BASEMENT is any floor level below the first story in a building, except that a floor level in a building having only one floor level shall be classified as a basement unless such floor level qualifies as a first story as defined in the Building Code. B

BATF is the Bureau of Alcohol, Tobacco and Firearms.

BELOWGROUND CONTAINER is a storage container in which the maximum liquid level is below the surrounding grade or below a backfill berm, which is at least 10 feet (3048 mm) wide at the top and then slopes away from the container at a natural angle of repose or is retained 10 feet (3048 mm) from the container by a retaining wall and constructed of earth, concrete, solid masonry or suitable material designed to prevent the escape of liquid.

BINARY EXPLOSIVE is an explosive material composed of separate components, each of which is safe for storage and transportation and would not in itself be considered as an explosive.

BINBOX is a five-sided container with the open side facing an aisle. Binboxes are self-supporting or supported by a structure designed so that little or no horizontal or vertical space exits around the boxes.

BLASTING AGENT is a material or mixture consisting of a fuel and oxidizer intended for blasting, not otherwise classified as an explosive, in which none of the ingredients is classified as explosives, provided that the finished product as mixed and packaged for use or shipment cannot be detonated by means of a No. 8 test blasting cap when unconfined. Materials or mixtures classified as nitrocarbonitrates by DOT regulations are included in this definition. See Appendix VI-E.

BLASTING CAP is a shell closed at one end and containing a charge of a detonating compound which is ignited by a safety fuse. It is used for detonating explosives.

BBB **BLEACHERS** are tiered or stepped seating facilities without backrests in which an area of 3 square feet (0.28 m^2) or less is assigned per person for computing the occupant load.

BOILING POINT is the boiling point of a liquid at a pressure of 14.7 psia (101.3 kPa). Where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, for purposes of this classification, the 10 percent point of a distillation performed in accordance with nationally recognized standards is allowed to be used as the boiling point of the liquid. See Article 90, Standard a.4.3.

BOILOVER is the expulsion of crude oil or certain other liquids from a burning tank in which the light fractions of the crude oil burn off, producing a heat wave in the residue which, on reaching a water strata, results in the expulsion of a portion of the contents of the tank in the form of a froth.

BONFIRE is the open burning of cut trees, vegetation or lumber.

BREAK (aerial shell) is an individual effect from an aerial shell, generally either color or noise. Aerial shells can be single break, having only one effect, or multiple break, having two or more effects.

Btu is a British thermal unit, the heat necessary to raise the temperature of 1 pound (0.454 kg) of water by 1°F. (0.556°C.).

BB **BUILDING** is any structure used or intended for supporting or sheltering any use or occupancy.

BUILDING CODE is the Building Code adopted by this jurisdiction. See the *Uniform Building Code*, promulgated by the International Conference of Building Officials.

BBB **BUILDING OFFICIAL** is the officer or other designated authority of the jurisdiction charged with the administration and enforcement of the Building Code, or the building official's duly authorized representative.

BULK OXYGEN SYSTEM is an assembly of equipment, such as oxygen storage containers, pressure regulators, safety devices, vaporizers, manifolds and interconnecting piping, which has a storage capacity at normal temperature and pressure of:

1. More than 12,000 cubic feet (340 m^3) of oxygen connected in service or ready for service, or

2. More than 25,000 cubic feet (708 m^3) of oxygen, including unconnected reserve on hand at the site.

A bulk oxygen system terminates at the point where oxygen at service pressure first enters the supply line. The oxygen is allowed to be stored as a liquid or gas in either stationary or portable containers.

BULK PLANT OR TERMINAL is that portion of a property where flammable or combustible liquids are received by tank vessel, pipelines, tank car or tank vehicle and are stored or blended in bulk for the purpose of distributing such liquids by tank vessel, pipeline, tank car, tank vehicle, portable tank or container.

BULLET RESISTANT is a material or method of construction which resists penetration of a bullet of 150 grain (9.75 g) M-2 ball ammunition having a nominal muzzle velocity of 2,700 feet per second (823 m/s) fired from a .30 caliber rifle at a distance of 100 feet (30.5 m). See Section 7702.3.4.

BUREAU OF FIRE PREVENTION is the fire prevention bureau of the jurisdiction.

SECTION 204 — C

CARCINOGEN is a substance that causes the development of cancerous growths in living tissue. A chemical is considered to be a carcinogen if:

1. It has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen, or

2. It is listed as a carcinogen or potential carcinogen in the latest edition of the Annual Report on Carcinogens published by the National Toxicology Program, or

3. It is regulated by OSHA as a carcinogen.

CARGO TANK is a container having a liquid capacity in excess of 110 gallons (416 L) used for carrying flammable or combustible liquids, LP-gas, or hazardous chemicals and mounted permanently or otherwise upon a tank vehicle. The term "cargo tank" does not apply to containers used solely for the purpose of supplying fuel for propulsion of the vehicle upon which it is mounted.

CARNIVAL is a mobile enterprise principally devoted to offering amusement or entertainment to the public in, upon or by means of portable amusement rides or devices or temporary structures in any number or combination, whether or not associated with other structures or forms of public attraction.

CEILING LIMIT is the maximum concentration of an airborne contaminant to which one may be exposed. The ceiling limits utilized are to be those published in 29 C.F.R. 1910.1000.

CELLULOSE NITRATE PLASTICS (Pyroxylin) is a plastic substance, material or compound, other than cellulose nitrate film, covered by Article 33, or guncotton or other explosive covered by Article 77, having cellulose nitrate as a base, or whatever name known, when in the form of blocks, slabs, sheets, tubes or fabricated shapes. For requirements, see Article 27.

CENTRAL SUPPLY is that portion of system which normally supplies piping systems.

CGA is the Compressed Gas Association.

C.F.R. is the Code of Federal Regulations of the United States Government.

CHEMICAL is any element, chemical compound or mixture of elements or compounds or both.

CHEMICAL NAME is the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry, the Chemical Abstracts Service rules of nomenclature, or a name which will clearly identify a chemical for the purpose of conducting an evaluation.

CHIEF is the chief officer of the fire department serving the jurisdiction or the chief officer's authorized representative.

CHIEF ENGINEER is the chief.

CHIEF OF POLICE or POLICE DEPARTMENT is the chief law enforcement officer of the jurisdiction or the chief law enforcement officer's authorized representative.

CHIEF OF THE BUREAU OF FIRE PREVENTION is the head of the fire prevention bureau.

CLASSIFIED refers to a product that has been evaluated with respect to

1. The properties of the product,
2. A limited spectrum of hazards to life or property,
3. Suitability of the product for certain uses and
4. Other conditions by a nationally recognized testing laboratory or approved organization.

CLOSED CONTAINER is a container sealed by means of a lid or other device such that liquid, vapor or dusts will not escape from it under ordinary conditions of use or handling.

CNG is compressed natural gas.

COMBUSTIBLE DECORATIVE MATERIALS are combustible materials used for decorative effects such as curtains; draperies; streamers; surface coverings applied over building interior finishes for decorative, acoustical or other effect; cloth; cotton batting; paper; plastics; vegetation; hay; split bamboo; straw; vines; leaves; trees; moss; and similar materials used for decorative effect. Combustible decorative materials do not include floor coverings, ordinary window shades,

interior finish materials used as surface coverings (for regulations of such materials, see U.B.C. Chapter 8, and materials $^1/_{28}$ inch (0.9 mm) or less in thickness applied directly to a noncombustible backing.

COMBUSTIBLE FIBER STORAGE BIN is a metal or metal-lined container with a capacity not exceeding 100 cubic feet (2.83 m^3) and equipped with a self-closing cover.

COMBUSTIBLE FIBER STORAGE ROOM is a room with a capacity not exceeding 500 cubic feet (14.2 m^3) separated from the remainder of a building by not less than a one-hour occupancy separation constructed in accordance with the Building Code.

COMBUSTIBLE FIBER STORAGE VAULT, PROTECTED, is a room with a capacity exceeding 1,000 cubic feet (28.3 m^3) separated from a remainder of a building by not less than a two-hour occupancy separation constructed in accordance with the Building Code and provided with an approved automatic sprinkler system.

COMBUSTIBLE FIBER STORAGE VAULT, UNPROTECTED, is a room with a capacity not exceeding 1,000 cubic feet (28.3 m^3) separated from the remainder of the building by a two-hour occupancy separation constructed in accordance with the Building Code and provided with approved safety vents to the outside.

COMBUSTIBLE FIBERS are readily ignitable and free-burning fibers, such as cotton, sisal, henequen, ixtle, jute, hemp, tow, cocoa fiber, oakum, baled waste, baled wastepaper, kapok, hay, straw, excelsior, Spanish moss or other like materials.

COMBUSTIBLE LIQUID is a liquid having a flash point at or above 100°F. (37.8°C.). Combustible liquids are subdivided as follows. The category of combustible liquids does not include compressed gases or cryogenic fluids.

Class II liquids are those having flash points at or above 100°F. (37.8°C.) and below 140°F. (60°C.).

Class III-A liquids are those having flash points at or above 140°F. (60°C.) and below 200°F. (93.3°C.).

Class III-B liquids are those liquids having flash points at or above 200°F. (93.3°C.).

COMBUSTIBLE WASTE MATTER includes magazines; books; trimmings from lawns, trees or flower gardens; pasteboard boxes; rags; paper; straw; sawdust; packing material; shavings; boxes; rubbish; and refuse that will ignite through contact with flames of ordinary temperatures.

COMMODITY is a combination of products, packing materials and containers.

COMPRESSED GAS is a material, or mixture of materials, which:

1. Is a gas at 68°F. (20°C.) or less at 14.7 psia (101.3 kPa) of pressure, and

2. Has a boiling point of 68°F. (20°C.) or less at 14.7 psia (101.3 kPa) which is either liquefied, nonliquefied or in solution, 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 (282.5 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 which 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 which 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.

COMPRESSED GAS CONTAINER is a pressure vessel designed to hold compressed gases at pressures greater than one atmosphere at 68°F. (20°C.) and includes cylinders, containers and tanks.

COMPRESSED GAS SYSTEM is an assembly of equipment designed to contain, distribute or transport compressed gases. It can consist of a compressed gas container or containers, reactors and appurtenances, including pumps, compressors, and connecting piping and tubing.

CONDENSATE TANK is a tank which is installed in the vapor-return piping of a vapor-recovery system to collect condensed gasoline and is capable of being emptied of liquids without opening.

CONGREGATE RESIDENCE is any building or portion thereof which contains facilities for living, sleeping and sanitation, as required by the Building Code, and may include facilities for eating and cooking, for occupancy by other than a family. A congregate resident may be a shelter, convent, monastery, dormitory, fraternity or sorority house but does not include jails, hospitals, nursing homes, hotels or lodging houses.

CONTAINER. See Sections 7901.2.2 and 8001.2.2.

CONTINUOUS GAS-DETECTION SYSTEM is a gas-detection system where the analytical instrument is maintained in continuous operation and sampling is performed without interruption. Analysis is allowed to be performed on a cyclical basis at intervals not to exceed 30 minutes.

CONTROL AREA is a building or portion of a building within which the exempted amounts of hazardous materials are allowed to be stored, dispensed, used or handled.

CONVERSION OIL BURNER is a burner for field installation in heating appliances such as boilers and furnaces. It is allowed to be furnished with or without a primary safety control. Under special circumstances, it is allowed to be installed for firing ovens, water heaters, ranges, special furnaces and the like. A burner of this type is allowed to be a pressure-atomizing gun type, a horizontal or vertical rotary type, or a mechanical or natural draft-vaporizing type.

CONVERSION RANGE OIL BURNER is an oil burner designed to burn kerosene, range oil or similar fuel. It is intended primarily for installation in a stove or range, a portion or all of which was originally designed to utilize solid fuel and to which a flue is connected.

CORROSIVE is a chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact. A chemical is considered to be corrosive if, when tested on the intact skin of albino rabbits by the method described in Appendix A to C.F.R. 49, Part 173, it destroys or changes irreversibly the structure of the tissue at the site of contact following an exposure period of four hours. This term does not refer to action on inanimate surfaces.

CORROSIVE LIQUID is a liquid which, when in contact with living tissue, will cause destruction or irreversible alteration of such tissue by chemical action. Examples include acidic, alkaline or caustic materials.

COVERED MALL BUILDING is a single building enclosing a number of tenants and occupancies such as retail stores, drinking and dining establishments, entertainment and amusement facilities, offices, and other similar uses wherein two or more tenants have a main entrance into the mall.

CRUDE PETROLEUM is a hydrocarbon mixture that has a flash point below 150°F. (65.6°C.) and which has not been processed in a refinery.

CRYOGENIC FLUID is a fluid that has a normal boiling point below –150°F. (–101.1°C.).

CRYOGENIC IN-GROUND CONTAINER is a container in which the maximum liquid level is below the normal surrounding grade and is constructed essentially of natural materials such as earth and rock and dependent upon the freezing of water-saturated earth materials for its tightness or impervious nature.

CRYOGENIC VESSEL is a pressure vessel, low-pressure tank or atmospheric tank designed to contain a cryogenic fluid on which venting, insulation, refrigeration or a combination of these is

used in order to maintain the operating pressure within the design pressure and the contents in a liquid phase.

CURTAIN BOARD is a structure arranged to limit the spread of smoke and heat along the ceiling. Curtain boards are sometimes referred to as draft curtains.

CUT-OFF STORAGE is indoor storage which is separated from other building areas by not less than a two-hour fire-resistive occupancy separation.

CYLINDER is a pressure vessel designed for pressures higher than 40 psia (275.6 kPa) and having a circular cross section. It does not include a portable tank, multiunit tank car tank, cargo tank or tank car.

SECTION 205 — D

DEA is the Drug Enforcement Administration of the United States Department of Justice.

DEFLAGRATION is an exothermic reaction, such as the extremely rapid oxidation of a flammable dust or vapor in air, 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.

DESIGNATED LANDING AREA is the area over which aerial shells are fired and into which debris and malfunctioning aerial shells can fall.

DETACHED STORAGE is storage in a separate building or in an outside area located away from all structures.

DETONATING CORD is a flexible cord containing a center core of high explosives and used to initiate other explosives. Examples of brand names of detonating cord include "A" Cord, Detacord, E-Cord, Primacord, Primaline, Primex and Scotch-Cord.

DETONATION is an exothermic reaction characterized by the presence of a shock wave in a material which establishes and maintains the reaction. The reaction zone progresses through the material at a rate greater than the velocity of sound. The principal heating mechanism is one of shock compression. Detonations have an explosive effect.

DETONATOR is a component, such as a blasting cap or an electric blasting cap, in an explosive train which is capable of initiating detonation in a subsequent high explosive component.

DIP TANK is a tank, vat or container of flammable or combustible liquid in which articles or materials are immersed for the purpose of coating, finishing, treating or similar processes.

DISPENSING is the pouring or transferring of a material from a container, tank or similar vessel whereby vapors, dusts, fumes, mists or gases could be liberated to the atmosphere.

DISPERSAL AREA, SAFE, is an area which will accommodate a number of persons equal to the total capacity of the stand and building which it serves such that a person within the area will not be closer than 50 feet (15 240 mm) from the stand or building. Dispersal area capacity shall be determined by allowing 3 square feet (0.28 m^2) of net clear area per person.

DISTILLERY is a plant or a portion of a plant where liquids produced by fermentation are concentrated and where the concentrated products are also allowed to be mixed, stored or packaged.

DOT is the United States Department of Transportation.

DRY CLEANING is the process of removing dirt, grease, paints and other stains from wearing apparel, textiles, fabrics, rugs or other material by the use of nonaqueous liquid solvents. It includes the process of dyeing clothes or other fabrics or textiles in a solution of dye colors and nonaqueous liquid solvents.

DUST is pulverized particles which, if mixed with air in the proper proportions, become explosive and could be ignited by a flame or a spark or other source of ignition.

DWELLING is any building or portion thereof which contains not more than two dwelling units.

DWELLING UNIT is any building or portion thereof which contains living facilities, including provisions for sleeping, eating, cooking and sanitation as required by the Building Code, for not more than one family, or a congregate residence of 10 or less persons.

SECTION 206 — E

EARLY SUPPRESSION FAST-RESPONSE (ESFR) SPRINKLER is a sprinkler listed for early suppression fast-response performance.

ELECTRIC BLASTING CAP is a shell containing a charge of detonating compound designed to be fired by an electric current.

ELECTRICAL CODE is the Electrical Code adopted by this jurisdiction. See the *National Electrical Code*, promulgated by the National Fire Protection Association.

ELECTRICAL FIRING UNIT is the source of electrical current used to ignite electric matches. Generally, the firing unit will have switches to control the routing of the current to various firework items and will have a test circuit and warning indicators.

ELECTROSTATIC FLUIDIZED BED is a container holding powder coating material which is aerated from below so as to form an air-supported expanded cloud of such material which is electrically charged with a charge opposite to the charge of the object to be coated. Such object is transported through the container immediately above the charged and aerated materials in order to be coated.

ENCAPSULATED is a method of packaging consisting of a plastic sheet completely enclosing the sides and top of a pallet load. The term encapsulated does not apply to banding or individual plastic-enclosed items inside a large nonplastic-enclosed container.

EXCESS FLOW CONTROL is a fail-safe system designed to shut off flow due to a rupture in pressurized piping systems.

EXCESS FLOW VALVE is a valve inserted into a compressed gas cylinder, portable tank or stationary tank that is designed to positively shut off the flow of gas in the event that its predetermined flow is exceeded.

EXECUTIVE BODY is the governing body of the jurisdiction adopting this code.

EXHAUSTED ENCLOSURE is a noncombustible enclosure which consists of a top, a back and two sides. The enclosure provides a means of local exhaust, but lacks the isolated environment provided by gas cabinets or gas rooms. Such enclosures include laboratory hoods, exhaust fume hoods and similar appliances and equipment used to locally retain and exhaust the gases, fumes, vapors and mists that could be released. Rooms or areas provided with general ventilation, in themselves, do not constitute exhausted enclosures. See the definition of GAS ROOM.

EXIT is a continuous and unobstructed means of egress to a public way and shall include intervening aisles, doors, doorways, gates, corridors, exterior exit balconies, ramps, stairways, pressurized enclosures, horizontal exits, exit passageways, exit courts and yards.

EXIT COURT is a yard or court providing access to a public way for one or more required exits.

EXIT PASSAGEWAY is an enclosed exit connecting a required exit or exit court with a public way.

EXPANDED PLASTIC is a foamed or cellular plastic material having a reduced density based on the presence of numerous small cavities or cells dispersed throughout the material.

EXPLOSION is an effect produced by the sudden violent expansion of gases, which may be accompanied by a shock wave or disruption, or both, of enclosing materials or structures. An explosion could result from

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; or

3. Atomic changes (nuclear fission or fusion).

EXPLOSIVE is

1. A chemical that causes a sudden, almost instantaneous release of pressure, gas and heat when subjected to sudden shock, pressure, or high temperatures, or

2. A material or chemical, other than a blasting agent, that is commonly used or intended to be used for the purpose of producing an explosive effect and is regulated by Article 77.

EXPLOSIVE MATERIALS are explosives, blasting agents and detonators including, but not limited to, dynamite and other high explosives; slurries, emulsions and water gels; black powder and pellet powder; initiating explosives; detonators or blasting caps; safety fuses; squibs; detonating cord; igniter cord; igniters and Class B (Explosives, Division 1.3 and some Division 1.2—see Appendix VI-E) special fireworks.

EXTENSION CORD is a portable flexible cord of any length which has one male connector on one end and one or more female connectors on the other, and no built-in overcurrent protection.

EXTRAHIGH-RACK COMBUSTIBLE STORAGE is storage on racks of Class I, II, III or IV commodities which exceed 40 feet (121 920 mm) in height and storage on racks of high-hazard commodities which exceed 30 feet (9144 mm) in height.

SECTION 207 — F

FABRICATION AREA (Fab Area) is an area within a Group H, Division 6 Occupancy in which there are processes involving hazardous production materials and is allowed to include ancillary rooms or areas such as dressing rooms and offices that are directly related to the fab area processes.

FACILITY (as applied to access and water supply) is a building or use in a fixed location including exterior storage areas for flammable and combustible substances and hazardous materials, piers, wharves, tank farms and similar uses.

FAIR is an enterprise principally devoted to the exhibition of products of agriculture or industry in connection with the operation of amusement rides or devices, or concession booths.

FALSE ALARM is the deliberate reporting of an alarm for which no such fire or emergency actually exists.

FIRE is the combustion of material other than deliberate combustion for cooking, heating, recreation, incineration or purposes incidental to normal operation of a property.

FIRE APPARATUS is a vehicle such as a fire pumper, aerial ladder truck, elevated platform, rescue squad or similar firefighting or rescue equipment.

FIRE APPLIANCE is apparatus or equipment provided or installed for use in the event of an emergency.

FIRE ASSEMBLY is the assembly of a fire door, fire window or fire damper, including all required hardware, anchorage, frames and sills.

FIRE BARRIER is a line or barricade designed to keep unauthorized persons out of the area of a fire.

FIRE DEPARTMENT is a regularly organized fire department, fire protection district or fire company regularly charged with the responsibility of providing fire protection to the jurisdiction.

FIRE DEPARTMENT INLET CONNECTION is a connection through which the fire department can pump water into a standpipe system, or sprinkler system.

FIRE DOOR is a fire-resistive door approved for openings in fire separations.

FIRE HAZARD is any thing or act which increases or could cause an increase of the hazard or menace of fire to a greater degree than that customarily recognized as normal by persons in the public service regularly engaged in preventing, suppressing or extinguishing fire or any thing or act which could obstruct, delay, hinder or interfere with the operations of the fire department or the egress of occupants in the event of fire.

FIRE NUISANCE is any thing or act which is annoying, unpleasant, offensive or obnoxious because of fire.

FIRE POINT is the lowest temperature of a liquid in an open container at which vapors are evolved fast enough to support continuous combustion as determined by U.F.C. Standard 2-6.

FIRE-RESISTIVE or FIRE-RESISTIVE CONSTRUCTION is construction to resist the spread of fire, details of which are specified in the Building Code.

FIRE-RESISTIVE RATING is the time that the material or construction will withstand the standard fire exposure as determined by a fire test made in conformity with the standard methods of fire tests of buildings, construction and materials in the Building Code.

FIRE SEPARATION is construction of rated fire resistance or the maintenance of clear areas to resist the spread of fire.

FIREWORKS is a combustible or explosive composition, or any substance, combination of substances, or device prepared for the purpose of producing a visible or audible effect by combustion, explosion, deflagration or detonation. Fireworks include blank cartridges, toy pistols, toy cannons, toy canes or toy guns in which explosives are used; firecrackers, torpedoes, sky-rockets, Roman candles, sparklers or other devices of like construction; any devices containing an explosive or flammable compound; and any tablet or other device containing an explosive substance. Fireworks do not include auto flares; paper caps containing an average of 0.25 grain of explosive content per cap or less; and toy pistols, toy canes, toy guns or other devices for use of such caps. See also Appendix VI-E.

FIREWORKS, CLASS C, COMMON, (Explosives, Division 1.4—see Appendix VI-E) are small firework devices designed primarily to produce visible or audible effects by combustion and which comply with the construction, chemical composition and DOT labeling requirements for Class C, common fireworks.

FIREWORKS, SPECIAL, are large fireworks designed primarily to produce visible or audible effects by combustion, deflagration or detonation. Special fireworks include, but are not limited to, firecrackers containing more than 2 grains (130 milligrams) of explosive composition, aerial shells containing more than 40 grams of pyrotechnic composition, and other display pieces which exceed the limits for classification as common fireworks. Special fireworks are classified as Class B explosives (Explosives, Division 1.3 and some Division 1.2—see Appendix VI-E) by DOT.

FISSILE MATERIAL is a radioisotope which could undergo a nuclear fission reaction and is usually found at reactor sites or as part of a nuclear weapon.

FIXED GROUND PIECE is a ground display piece having no movable parts, such as a revolving wheel.

FLAME ARRESTER is a device approved for installation in piping which carries a flammable vapor/air mixture to prevent a flashback beyond the point of installation and installed in a location specifically approved by a listing agency.

FLAME-RESISTANT MATERIAL is material that has been modified in its chemical composition by impregnation, coating or has inherent composition that makes the material resistant to ignition and combustion when exposed to a small ignition source.

FLAME RETARDANT is an approved chemical, chemical compound or mixture which, when applied in an approved manner to any fabric or other material, will render such fabric or material incapable of supporting combustion.

FLAMMABLE CRYOGENIC FLUID is a cryogenic fluid which is flammable in its vapor state.

FLAMMABLE GAS is any material which is a gas at 68°F. (20°C.) or less at 14.7 psia (101.3 kPa) of pressure [a material has a boiling point of 68°F. (20°C.) or less at 14.7 psia (101.3 kPa)] which:

1. Is ignitable at 14.7 psia (101.3 kPa) when in a mixture of 13 percent or less by volume with air, or
2. Has a flammable range at 14.7 psia (101.3 kPa) with air of at least 12 percent, regardless of the lower limit.

The limits specified shall be determined at 14.7 psi (101.3 kPa) of pressure and a temperature of 68°F. (20°C.) in accordance with nationally recognized standards. See Article 90, Standard a.4.9.

FLAMMABLE LIQUEFIED GAS is a liquefied compressed gas which under the charged pressure is partially liquid at a temperature of 68°F. (20°C.) and which is flammable.

FLAMMABLE LIQUID is a liquid having a flash point below 100°F. (37.8°C.) and having a vapor pressure not exceeding 40 psia (276 kPa) at 100°F. (37.8°C.). The category of flammable liquids does not include compressed gases or cryogenic fluids. Class I liquids include those having flash points below 100°F. (37.8°C.) and are subdivided as follows:

Class I-A liquids include those having a flash point below 73°F. (22.8°C.) and having a boiling point below 100°F. (37.8°C.).

Class I-B liquids include those having a flash point below 73°F. (22.8°C.) and having a boiling point at or above 100°F. (37.8°C.).

Class I-C liquids include those having a flash point at or above 73°F. (22.8°C.) and below 100°F. (37.8°C.).

FLAMMABLE MATERIAL is

1. A material that will readily ignite from common sources of heat, and
2. A material that will ignite at a temperature of 600°F. (315.6°C.) or less.

FLAMMABLE SOLID is a solid substance, other than one which is defined as a blasting agent or explosive, that is liable to cause fire through friction or as a result of retained heat from manufacture, which has an ignition temperature below 212°F. (100°C.), or which burns so vigorously or persistently when ignited that it creates a serious hazard. Flammable solids include finely divided solid materials which when dispersed in air as a cloud could be ignited and cause an explosion.

FLASH POINT is the minimum temperature at which a liquid gives off vapors in sufficient concentrations to form an ignitable mixture with air near the surface of the liquid within the vessel as specified by appropriate test procedures and apparatus as follows:

The flash point of a liquid having a viscosity less than 5.82 centistokes at 100°F. (37.8°C.) and a flash point below 200°F. (93.3°C.) is determined in accordance with U.F.C. Standard 2-1.

The flash point of a liquid having a viscosity of 5.82 centistokes or more at 100°F. (37.8°C.) or a flash point of 200°F. (93.3°C.) or higher is determined in accordance with U.F.C. Standard 2-2.

As an alternate, U.F.C. Standard 2-3 is allowed to be used for testing aviation turbine fuels within the scope of this procedure.

As an alternate, U.F.C. Standard 2-4 is allowed to be used for paints, enamels, lacquers, varnishes and related products and their components having flash points between 32°F. (0°C.) and 230°F. (110°C.) and having a viscosity less than 1.5 centistokes at 77°F. (25°C.).

FLEXIBLE CORD is multiconductor flexible sheathed cable which is used for extension cords, as the connection means for appliances, and for permanent use by connecting pieces of equipment or devices to each other or to the premises wiring system where flexibility or portability is required.

FLEXIBLE JOINT is either a swing joint or a flexible connector for use on underground piping to prevent breakage of pipe or loosening of pipe fittings due to movement, thermal expansion or other stress.

FLOOR AREA is the area included within the surrounding exterior walls of a building or portion thereof, exclusive of vent shafts and courts. The floor area of a building, or portion thereof, not provided with surrounding exterior walls shall be the usable area under the horizontal projection of the roof or floor above.

FLUIDIZED BED is a container holding powder coating material which is aerated from below so as to form an air-supported expanded cloud of such material through which the preheated object to be coated is immersed and transported.

FOLDING AND TELESCOPING SEATING is a structure that is used for tiered seating of persons, and which overall shape and size may be reduced without being dismantled, for purposes of moving or storing.

FOOTBOARDS are that part of a raised seating facility other than an aisle or cross aisle upon which the occupant walks to reach a seat.

FUEL BREAK is a strip or block of land on which the vegetation has been permanently modified so that fires burning into it will not propagate across it.

FUEL OIL is kerosene or any hydrocarbon oil conforming to nationally recognized standards and having a flash point not less than 100°F. (37.8°C.).

FUMIGANT is a substance which, by itself or in combination with other substances, emits or liberates a gas, fume or vapor used for the destruction or control of insects, fungi, vermin, germs, rodents or other pests. Fumigants are distinguished from insecticides and disinfectants.

FUMIGATION is a process using a fumigant.

SECTION 208 — G

GARAGE is a building or portion thereof in which a motor vehicle containing flammable or combustible liquids or gas in its tank is stored, repaired or kept.

GARAGE, PRIVATE, is a building or a portion of a building, not more than 1,000 square feet (92.9 m^2) in area, in which only motor vehicles used by the tenants of the building or buildings on the premises are stored or kept.

GARAGE, PUBLIC, is any garage other than a private garage.

GAS CABINET is a fully enclosed, noncombustible enclosure used to provide an isolated environment for compressed gas cylinders in storage or use. Doors and access ports for exchanging cylinders and accessing pressure-regulating controls are allowed to be included.

GAS ROOM is a separately ventilated, fully enclosed room isolated from the remainder of the building by not less than a one-hour fire-resistive occupancy separation in which only compressed gases and associated equipment and supplies are stored or used.

GENERAL-PURPOSE WAREHOUSE is a detached building or a separate portion of a building used for storage or warehousing operations involving mixed commodities.

GRANDSTANDS are tiered or stepped seating facilities wherein an area of more than 3 square feet (0.28 m^2) is provided for each person.

GROUND PIECE is a pyrotechnic device that functions on the ground. Ground pieces include fountains, roman candles, wheels and set pieces.

GUEST is any person hiring or occupying a room for living or sleeping purposes.

GUNPOWDER is any of various powders used in firearms and small arms ammunition as propelling charges.

SECTION 209 — H

HANDLING is the deliberate transport of material by any means to a point of storage or use.

HAZARDOUS CHEMICAL REACTION is a reaction which generates pressure or byproducts which could cause injury, illness or harm to humans, domestic animals, livestock or wildlife.

HAZARDOUS FIRE AREA is land which is covered with grass, grain brush or forest, whether privately or publicly owned, which is so situated or is of such inaccessible location that a fire originating upon such land would present an abnormally difficult job of suppression or would result in great and unusual damage through fire or resulting erosion. Such areas are designated by the chief on a map maintained in the office of the chief.

HAZARDOUS MATERIALS are those chemicals or substances which are physical hazards or health hazards as defined and classified in Article 80 whether the materials are in usable or waste condition.

HAZARDOUS PRODUCTION MATERIAL (HPM) is a solid, liquid or gas associated with semiconductor manufacturing that has a degree-of-hazard rating in health, flammability or reactivity of Class 3 or 4 as ranked by U.F.C. Standard 79-3 and which is used directly in research, laboratory or production processes which have as their end product materials which are not hazardous.

HAZARDOUS WATERSHED FIRE AREA is a location within 500 feet (152.4 m) of a forest or brush-, grass- or grain-covered land, exclusive of small individual lots or parcels of land located outside of a brush-, forest- or grass-covered area.

HEALTH HAZARD is a classification of a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects could occur in exposed persons. Health hazards include chemicals which are carcinogens, toxic or highly toxic materials, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes or mucous membranes.

HEATING AND COOKING APPLIANCE is an electric, gas or oil-fired appliance not intended for central heating.

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

HIGHLY TOXIC MATERIAL is a material which produces a lethal dose or lethal concentration which falls within any of the following categories:

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 one 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 which is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons.

HIGHLY VOLATILE LIQUID is a liquid with a boiling point of less than 68°F. (20°C.).

HIGH-PILED COMBUSTIBLE STORAGE is 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. When required by the chief, 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.

HIGHWAY is a public street or public road.

HORIZONTAL EXIT is an exit from one building into another building on approximately the same level, or through or around a wall constructed as required in the Building Code for a two-hour occupancy separation and which completely divides a floor into two or more separate areas so as to establish an area of refuge affording safety from fire or smoke coming from the area from which escape is made.

HOTEL is any building containing six or more guest rooms intended or designed to be used, or which are used, rented or hired out to be occupied, or which are occupied for sleeping purposes by guests.

HPM FLAMMABLE LIQUID is an HPM liquid that is defined as being either a flammable or combustible liquid.

HPM STORAGE ROOM is a room used for the storage or dispensing of HPM and which is classified as a Group H, Division 2, 3 or 7 Occupancy.

HYPERGOLIC MATERIAL is a material which is capable of igniting spontaneously upon contact with another substance.

SECTION 210 — I

IDLH (Immediately Dangerous to Life and Health) is a concentration of airborne contaminants, normally expressed in parts per million (ppm) or milligrams per cubic meter, which represents the maximum level from which one could escape within 30 minutes without any escape-impairing symptoms or irreversible health effects. This level is established by the National Institute of Occupational Safety and Health (NIOSH). If adequate data do not exist for precise establishment of IDLH data, an independent certified industrial hygienist, industrial toxicologist or appropriate regulatory agency shall make such determination.

IME is the Institute of Makers of Explosives.

INCINERATOR is a structure, or portion thereof, container, device or other appliance designed, used or intended to be used for the disposal of combustible rubbish by burning.

INCOMPATIBLE MATERIALS are materials which, when in contact with each other, have the potential to react in a manner that generates heat, fumes, gases or byproducts which are hazardous to life or property.

INERT GASES are argon, helium, krypton, neon, nitrogen and xenon.

INHABITED BUILDING is a building regularly occupied in whole or in part as a habitation for human beings. Inhabited buildings include churches, schools, railway passenger stations, stores, airport terminals for passengers, and other buildings or structures where people are accustomed to congregate or assemble. Inhabited buildings do not include buildings or structures occupied in connection with the manufacture, transportation, storage or use of explosives and blasting agents.

INSIDE HPM STORAGE ROOM is an HPM storage room totally enclosed within a building and having no exterior walls.

INTRAPLANT DISTANCE is the minimum distance permitted between two buildings on an explosives manufacturing site, when at least one of the buildings contains or is designed to contain explosives.

IRRITANT is a chemical which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 C.F.R. 1500.41 for four hours' exposure or by other appropriate techniques, it results in an empirical score of 5 or more. A chemical is an eye irritant if so determined under the procedure listed in 16 C.F.R. 1500.42 or other approved techniques.

SECTION 211 — J

JURISDICTION is any state, county, city or town, or district or other political subdivision adopting this code for use in its jurisdictional area.

JURISDICTIONAL AREA is the territory of the state, county, city or district adopting this code.

SECTION 212 — K

No definitions.

SECTION 213 — L

LABELED is equipment or material to which has been attached a label, symbol or other identifying mark of a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling is indicated compliance with nationally recognized standards or tests to determine suitable usage in a specified manner.

LIQUEFIED PETROLEUM GAS (LP-gas) is a material which is composed predominantly of the following hydrocarbons or mixtures of them: propane, propylene, butane (normal butane or isobutane) and butylenes.

LIQUEFIED PETROLEUM GAS EQUIPMENT is containers, apparatus, piping other than utility distribution piping systems, and equipment pertinent to the storage or handling of liquefied petroleum gas. Liquefied petroleum gas equipment does not include gas-consuming appliances.

LIQUID is a material which has a fluidity greater than that of 300 penetration asphalt when tested in accordance with approved standards. See Article 90, Standard a.4.2. When not otherwise identified, the term "liquid" includes both flammable and combustible liquids.

LIQUID STORAGE ROOM is a room classified as a Group H, Division 3 Occupancy used for the storage of flammable or combustible liquids in a closed condition. See Section 7902.5.11 for requirements.

LIQUID STORAGE WAREHOUSE is a Group H, Division 3 Occupancy used for the storage of flammable or combustible liquids in an unopened condition. The quantities of flammable or combustible liquids stored are not limited. See Section 7902.5.12 for requirements.

LISTED is equipment or materials included on a list published by a nationally recognized testing laboratory, inspection agency or other organization concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials, and whose listing states that equipment or materials meet nationally recognized standards and have been tested and found suitable for use in a specified manner.

LODGING HOUSE is any building or portion thereof containing not more than five guest rooms where rent is paid in money, goods, labor or otherwise.

LONGITUDINAL FLUE SPACE is the flue space between rows of storage perpendicular to the direction of loading.

LOW EXPLOSIVE is explosive material which 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 are black powder, safety fuse, igniters, igniter cord, fuse lighters, Class B special fireworks, Class B composite solid propellants (Class B explosives are either Explosives, Division 1.2 or 1.3—see Appendix VI-E, and common fireworks defined as Class C (Explosives, Division 1.4—see Appendix VI-E) explosives.

LOWER FLAMMABILITY LIMIT (LFL) is the minimum concentration of vapor in air at which propagation of flame will occur in the presence of an ignition source. LFL is sometimes referred to as LEL or lower explosive limit.

LOW-PRESSURE TANK is a storage tank designed to withstand an internal pressure greater than 0.5 psig (3.4 kPa) but not greater than 15 psig (103.4 kPa).

SECTION 214 — M

MAGAZINE is a building or structure used for the storage of explosives.

MAGNESIUM is the pure metal and alloys of which the major part is magnesium.

MALL is a roofed or covered common pedestrian area within a covered mall building which serves as access for two or more tenants and may have three levels that are open to each other. B B B

MANUAL STOCKING METHODS are those methods utilizing ladders or other nonmechanical equipment to move stock.

MANUFACTURER'S INSTALLATION INSTRUCTIONS are printed instructions included with equipment as part of the conditions of a listing.

MASS-DETONATING EXPLOSIVES are high explosives, black powder, certain propellants, certain pyrotechnics and other similar 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. 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 (Q/D) purposes.

MATERIAL SAFETY DATA SHEET (MSDS) is written or printed material concerning a hazardous material which is prepared in accordance with the provisions of 29 C.F.R. 1910.1200.

MCA is the Manufacturing Chemists Association.

MECHANICAL CODE is the Mechanical Code adopted by this jurisdiction. See the *Uniform Mechanical Code*, promulgated by the International Conference of Building Officials.

MECHANICAL STOCKING METHODS are the stocking methods utilizing motorized vehicles or hydraulic jacks to move stock.

MORTAR is a tube from which aerial shells are fired.

MOTOR VEHICLE FUEL-DISPENSING STATION, AIRCRAFT, is that portion of an airport or heliport where flammable or combustible liquids used as aircraft fuel are stored and dispensed from fixed automotive-type dispensing equipment into fuel tanks of an aircraft and shall include all facilities essential thereto.

MOTOR VEHICLE FUEL-DISPENSING STATION, AUTOMOTIVE, is that portion of property where flammable or combustible liquids or gases used as motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles.

MOTOR VEHICLE FUEL-DISPENSING STATION, MARINE, is that portion of property where flammable or combustible liquids or gases used as fuel for watercraft are stored and

dispensed from fixed equipment on shore, piers, wharves, floats or barges into the fuel tanks of watercraft and shall include all other facilities used in connection therewith.

MULTIPLUG ADAPTER is a device that plugs into a receptacle and allows that receptacle to supply power to more appliances or fixtures than that for which it was originally designed, such as cube adapters, strip plugs and multiplug extension cords.

MULTITHEATER COMPLEX is a building or portion thereof containing two or more motion picture auditoriums which are served by a common lobby.

SECTION 215 — N

NESTING is a method of securing cylinders upright in a tight mass using a contiguous three-point contact system whereby all cylinders within a group have a minimum of three points of contact with other cylinders, walls or bracing.

NFPA is the National Fire Protection Association.

NONCOMBUSTIBLE as applied to building construction material means a material which, in the form in which it is used, is either one of the following:

1. Material of which no part will ignite and burn when subjected to fire. Any material conforming to U.B.C. Standard 2-1 shall be considered noncombustible.

2. Material having a structural base of noncombustible material as defined in Item 1 above, with a surfacing material not over $^1/_8$ inch (3.2 mm) thick which has a flame-spread rating of 50 or less.

"Noncombustible" does not apply to surface finish materials. Material required to be noncombustible for reduced clearances to flues, heating appliances or other sources of high temperature shall refer to material conforming to Item 1. No material shall be classed as noncombustible which is subject to increase in combustibility or flame-spread rating, beyond the limits herein established, through the effects of age, moisture or other atmospheric condition.

Flame-spread rating as used herein refers to rating obtained according to tests conducted as specified in U.B.C. Standard 8-1.

NORMAL TEMPERATURE PRESSURE (NTP) is a temperature of 70°F. (21.1°C.) and a pressure of 1 atmosphere [14.7 psia (101.3 kPa)].

SECTION 216 — O

OCCUPANCY is the purpose for which a building or part thereof is used or intended to be used.

OCCUPANCY CLASSIFICATION. For the purpose of this code, certain occupancies are defined as follows:

Group A Occupancies:

Group A Occupancies include the use of a building or structure, or a portion thereof, for the gathering together of 50 or more persons for purposes such as civic, social or religious functions; recreation, education or instruction; food or drink consumption; or awaiting transportation. A room or space used for assembly purposes by less than 50 persons and accessory to another occupancy shall be included as a part of that major occupancy. Assembly occupancies shall include the following:

Division 1. A building or portion of a building having an assembly room with an occupant load of 1,000 or more and a legitimate stage.

Division 2. A building or portion of a building having an assembly room with an occupant load of less than 1,000 and a legitimate stage.

Division 2.1. A building or portion of a building having an assembly room with an occupant load of 300 or more without a legitimate stage, including such buildings used for educational purposes and not classed as Group B or E Occupancies.

Division 3. A building or portion of a building having an assembly room with an occupant load of less than 300 without a legitimate stage, including such buildings used for educational purposes and not classed as Group B or E Occupancies.

Division 4. Stadiums, reviewing stands and amusement park structures not included within other Group A Occupancies.

Group B Occupancies:

Group B Occupancies shall include buildings, structures, or portions thereof, for office, professional or service-type transactions, which are not classified as Group H Occupancies. Such occupancies include occupancies for the storage of records and accounts, and eating and drinking establishments with an occupant load of less than 50. Business occupancies shall include, but not be limited to, the following:

1. Animal hospitals, kennels, pounds.
2. Automobile and other motor vehicle showrooms.
3. Banks.
4. Barber shops.
5. Beauty shops.
6. Car washes.
7. Civic administration.
8. Outpatient clinic and medical offices (where five or less patients in a tenant space are incapable of unassisted self-preservation).
9. Dry cleaning pick-up and delivery stations and self-service.
10. Educational occupancies above the 12th grade.
11. Electronic data processing.
12. Fire stations.
13. Florists and nurseries.
14. Laboratories—testing and research.
15. Laundry pick-up and delivery stations and self-service.
16. Police stations.
17. Post offices.
18. Print shops.
19. Professional services such as attorney, dentist, physician, engineer.
20. Radio and television stations.
21. Telephone exchanges.

Group E Occupancies:

Group E Occupancies shall be:

Division 1. Any building used for educational purposes through the 12th grade by 50 or more persons for more than 12 hours per week or four hours in any one day.

Division 2. Any building used for educational purposes through the 12th grade by less than 50 persons for more than 12 hours per week or four hours in any one day.

Division 3. Any building or portion thereof used for day-care purposes for more than six persons.

Group F Occupancies:

Group F Occupancies shall include the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not classified as Group H Occupancies. Factory and industrial occupancies shall include the following:

Division 1. Moderate-hazard factory and industrial occupancies shall include factory and industrial uses which are not classified as Group F, Division 2 Occupancies, but are not limited to facilities producing the following:

1. Aircraft.
2. Appliances.
3. Athletic equipment.
4. Automobiles and other motor vehicles.
5. Bakeries.
6. Alcoholic beverages.
7. Bicycles.
8. Boats.
9. Brooms and brushes.
10. Business machines.
11. Canvas or similar fabric.
12. Cameras and photo equipment.
13. Carpets and rugs, including cleaning.
14. Clothing.
15. Construction and agricultural machinery.
16. Dry cleaning and dyeing.
17. Electronics assembly.
18. Engines, including rebuilding.
19. Photographic film.
20. Food processing.
21. Furniture.
22. Hemp products.
23. Jute products.
24. Laundries.
25. Leather products.
26. Machinery.
27. Metal.
28. Motion pictures and television filming and videotaping.
29. Musical instruments.
30. Optical goods.
31. Paper mills or products.
32. Plastic products.

33. Printing or publishing.
34. Recreational vehicles.
35. Refuse incineration.
36. Shoes.
37. Soaps and detergents.
38. Tobacco.
39. Trailers.
40. Wood, distillation.
41. Millwork (sash and door).
42. Woodworking, cabinet.

Division 2. Low-hazard factory and industrial occupancies shall include facilities producing noncombustible or nonexplosive materials which, during finishing, packing or processing, do not involve a significant fire hazard, including, but not limited to, the following:

1. Nonalcoholic beverages.
2. Brick and masonry.
3. Ceramic products.
4. Foundries.
5. Glass products.
6. Gypsum.
7. Ice.
8. Steel products—fabrication and assembly.

Group H Occupancies:

Group H Occupancies shall include buildings or structures, or portions thereof, that involve the manufacturing, processing, generation or storage of materials that constitute a high fire, explosion or health hazard. Group H Occupancies shall be:

Division 1. Occupancies with a quantity of material in the building in excess of those listed in Table 8001.13-A which present a high explosion hazard, including, but not limited to:

1. Explosives, blasting agents, fireworks and black powder.

   EXCEPTION: Storage and the use of pyrotechnic special effect materials in motion picture, television, theatrical and group entertainment production when under permit as required by Section 7801.3.2. The time period for storage shall not exceed 90 days.

2. Unclassified detonatable organic peroxides.
3. Class 4 oxidizers.
4. Class 4 or Class 3 detonatable unstable (reactive) materials.

Division 2. Occupancies where combustible dust is manufactured, used or generated in such a manner that concentrations and conditions create a fire or explosion potential; occupancies with a quantity of material in the building in excess of those listed in Table 8001.13-A, which present a moderate explosion hazard or a hazard from accelerated burning, including, but not limited to:

1. Class I organic peroxides.
2. Class 3 nondetonatable unstable (reactive) materials.
3. Pyrophoric gases.
4. Flammable or oxidizing gases.

5. Class I, II or III-A flammable or combustible liquids which are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15-pounds-per-square-inch (103.4 kPa) gage.

EXCEPTION: Aerosols.

6. Class 3 oxidizers.

7. Class 3 water-reactive materials.

Division 3. Occupancies where flammable solids, other than combustible dust, are manufactured, used or generated.

Division 3 Occupancies also include uses in which the quantity of material in the building in excess of those listed in Table 8001.13-A presents a high physical hazard, including, but not limited to:

1. Class II, III or IV organic peroxides.

2. Class 1 or 2 oxidizers.

3. Class I, II or III-A flammable or combustible liquids which are used or stored in normally closed containers or systems and containers or systems pressurized at 15-pounds-per-square-inch (103.4 kPa) gage or less, and aerosols.

4. Class III-B combustible liquids.

5. Pyrophoric liquids or solids.

6. Class 1 or 2 water-reactive materials.

7. Flammable solids in storage.

8. Flammable or oxidizing cryogenic fluids (other than inert).

9. Class 1 unstable (reactive) gas or Class 2 unstable (reactive) materials.

Division 4. Repair garages not classified as Group S, Division 3 Occupancies.

Division 5. Aircraft repair hangars not classified as Group S, Division 5 Occupancies and heliports.

Division 6. Semiconductor fabrication facilities and comparable research and development areas in which hazardous production materials (HPM) are used and the aggregate quantity of materials are in excess of those listed in Table 8001.13-A or 8001.13-B.

Division 7. Occupancies having quantities of materials in excess of those listed in Table 8001.13-B that are health hazards, including:

1. Corrosives.

2. Toxic and highly toxic materials.

3. Irritants.

4. Sensitizers.

5. Other health hazards.

Group I Occupancies:

Group I Occupancies shall be:

Division 1.1. Nurseries for the full-time care of children under the age of six (each accommodating more than five children).

Hospitals, sanitariums, nursing homes with nonambulatory patients and similar buildings (each accommodating more than five patients).

Division 1.2. Health-care centers for ambulatory patients receiving outpatient medical care which may render the patient incapable of unassisted self-preservation (each tenant space accommodating more than five such patients).

Division 2. Nursing homes for ambulatory patients, homes for children six years of age or over (each accommodating more than five patients or children).

Division 3. Mental hospitals, mental sanitariums, jails, prisons, reformatories and buildings where personal liberties of inmates are similarly restrained.

EXCEPTION: Group I Occupancies shall not include buildings used only for private residential purposes for a family group.

Group M Occupancies:

Group M Occupancies shall include buildings, structures, or portions thereof, used for the display and sale of merchandise, and involving stocks of goods, wares or merchandise incidental to such purposes and accessible to the public. Mercantile occupancies shall include, but are not limited to, the following:

1. Department stores.
2. Drug stores.
3. Markets.
4. Paint stores without bulk handling.
5. Shopping centers.
6. Sales rooms.
7. Wholesale and retail stores.

Group R Occupancies:

Group R Occupancies shall be:

Division 1. Hotels and apartment houses.

Congregate residences (each accommodating more than 10 persons).

Division 2. Not used.

Division 3. Dwellings and lodging houses.

Congregate residences (each accommodating 10 persons or less).

Group S Occupancies:

Group S Occupancies shall include the use of a building or structure, or a portion thereof, for storage not classified as a hazardous occupancy. Storage occupancies shall include the following:

Division 1. Moderate hazard storage occupancies shall include buildings or portions of buildings used for storage of combustible materials that are not classified as a Group S, Division 2 or as a Group H Occupancy.

Division 2. Low-hazard storage occupancies shall include buildings, structures, or portions thereof, used for storage of noncombustible materials, such as products on wood pallets or in paper cartons with or without single-thickness divisions, or in paper wrappings and shall include ice plants, power plants and pumping plants. Such products may have a negligible amount of plastic trim such as knobs, handles or film wrapping. Low-hazard storage occupancies shall include, but are not limited to, storage of the following items:

1. Beer or wine (in metal, glass or ceramic containers).
2. Cement in bags.
3. Cold storage and creameries.
4. Dairy products in nonwax-coated paper containers.
5. Dry-cell batteries.
6. Dryers.

7. Dry pesticides in a building not classified as a Group H Occupancy.
8. Electrical coils.
9. Electrical insulators.
10. Electrical motors.
11. Empty cans.
12. Foods in noncombustible containers.
13. Fresh fruits in nonplastic trays or containers.
14. Frozen foods.
15. Glass bottles (empty or filled with nonflammable liquids).
16. Gypsum board.
17. Inert pigments.
18. Meats.
19. Metal cabinets.
20. Metal furniture.
21. Oil-filled distribution transformers.
22. Stoves.
23. Washers.

Division 3. Division 3 Occupancies shall include repair garages where work is limited to exchange of parts and maintenance requiring no open flame or welding, motor vehicle fuel-dispensing stations, and parking garages not classified as Group S, Division 4 open parking garages or Group U private garages.

Division 4. Open parking garages as set forth in the Building Code. (See U.B.C. Section 311.)

Division 5. Aircraft hangars where work is limited to exchange of parts and maintenance requiring no open flame or welding and helistops.

Group U Occupancies:

Group U Occupancies shall include buildings or structures, or portions thereof, and shall be:

Division 1. Private garages, carports, sheds and agricultural buildings.

EXCEPTION: Where applicable in accordance with the Building Code (see U.B.C. Section 101.3 for agricultural buildings. See also U.B.C. Appendix Chapter 3).

Division 2. Fences over 6 feet (1829 mm) high, tanks and towers.

OIL-BURNING EQUIPMENT is an oil burner of any type together with its tank, piping, wiring, controls and related devices. Oil-burning equipment includes oil burners, oil-fired units and heating and cooking appliances but does not include equipment exempted by Section 6101.

OIL-FIRED UNIT is a heating appliance equipped with one or more oil burners and the necessary safety controls, electrical equipment and related equipment manufactured for assembly as a complete unit. Oil-fired unit does not include kerosene stoves or oil stoves.

OPEN BURNING is the burning of a bonfire, rubbish fire or other fire in an outdoor location where fuel being burned is not contained in an incinerator, outdoor fireplace, barbecue grill or barbecue pit.

OPEN-AIR GRANDSTANDS and BLEACHERS are seating facilities which are located so that the side toward which the audience faces is unroofed and without an enclosing wall. See also Section 203 for BLEACHERS.

OPERATING LINE is a group of separated operating buildings of specific arrangement used in the assembly, modification, reconditioning, renovation, maintenance, inspection, surveillance, testing or manufacturing of explosives.

ORGANIC COATING is a liquid mixture of binders, such as alkyd, nitrocellulose, acrylic or oil and flammable and combustible solvents such as hydrocarbon, ester, ketone or alcohol, which when spread in a thin film converts to a durable protective and decorative finish.

ORGANIC PEROXIDE is an organic compound that contains the bivalent -0-0- 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.

OSHA is the Occupational Safety and Health Administration.

OTHER HEALTH HAZARD MATERIAL is a hazardous material which affects target organs of the body, including, but not limited to, those materials which produce liver damage, kidney damage, damage to the nervous system, act on the blood to decrease hemoglobin function, deprive the body tissue of oxygen, or affect reproductive capabilities, including mutations (chromosomal damage) or teratogens (effects on fetuses).

OWNER includes persons having vested or contingent interest in the property in question and their duly authorized agents or attorneys, purchasers, devisees and fiduciaries.

OXIDIZER is a chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

SECTION 217 — P

PACKAGING is a receptacle and other components or materials necessary for the receptacle to perform its containment function. Packaging includes, but is not limited to, containers, cylinders, and portable and stationary tanks.

PANELBOARD, ELECTRICAL, is a single panel, or group of panel units designed for assembly in the form of a single panel, with automatic overcurrent devices and with or without switches for the control of light, heat or power circuits, and designed to be placed in a cabinet or cutout box placed in or against a wall or partition and accessible only from the front. See SWITCHBOARD, ELECTRICAL.

PANIC HARDWARE is a door-latching assembly incorporating an unlatching device, the activation portion of which extends across at least one half the width of the door leaf on which it is installed.

PARADE FLOAT is a unit especially designed or constructed for use in conjunction with a parade or public gathering.

PERCUSSION CAP is a device used to ignite the powder charge of small arms ammunition.

PERMANENT STANDS are those seating facilities which remain at a location for more than 90 days.

PERMANENT WIRING is wiring affixed to a structure in accordance with the Electrical Code.

PERMISSIBLE EXPOSURE LIMIT (PEL) is the maximum permitted eight-hour time-weighted average concentration of an airborne contaminant. The maximum permitted time-weighted average exposures to be utilized are those published in 29 C.F.R. 1910.1000.

PEROXIDE-FORMING CHEMICAL is a chemical which, when exposed to air, will form explosive peroxides which are shock, pressure or heat sensitive.

PERSON is a natural person, heirs, executors, administrators or assigns, and also includes a firm, partnership or corporation, its or their successors or assigns, or the agent of any of the aforesaid.

PERSON, AMBULATORY, is one who is capable of leaving a fire area within a reasonable length of time without assistance of any kind in event of an emergency.

PERSON, NONAMBULATORY, is one who is incapable of leaving a fire area within a reasonable length of time without assistance in event of an emergency.

PESTICIDE is a substance or mixture of substances, including fungicides, intended for preventing, destroying, repelling or mitigating pests and substances or a mixture of substances intended for use as a plant regulator, defoliant or desiccant. Products defined as drugs in the Federal Food, Drug and Cosmetic Act are not pesticides.

PHYSICAL HAZARD is a classification of a chemical for which there is scientifically valid evidence that it is a combustible liquid, compressed gas, cryogenic, explosive, flammable gas, flammable liquid, flammable solid, organic peroxide, oxidizer, pyrophoric, unstable (reactive), or water-reactive material.

PLUMBING CODE is the Plumbing Code adopted by this jurisdiction.

PORTABLE TANK is any packaging over 60 U.S. gallons (227.1 L) capacity and designed primarily to be loaded into or on or temporarily attached to a transport vehicle or ship and equipped with skids, mounting or accessories to facilitate handling of the tank by mechanical means. It does not include any cylinder having less than a 1,000-pound (453.5 kg) water capacity, cargo tank, tank car tank or trailers carrying cylinders of over 1,000-pound (453.5 kg) water capacity.

POWER TAP is a device with a flexible cord not longer than 6 feet (1829 mm) that has a male connector on one end of the cord and a housing containing built-in overcurrent protection and one or more receptacles on the other.

POWERED INDUSTRIAL TRUCK is a forklift, tractor, platform lift truck or motorized hand truck powered by an electrical motor or internal combustion engine. Powered industrial trucks do not include farm vehicles or automotive vehicles for highway use.

PRESSURE DELIVERY SYSTEM and REMOTE PUMPING SYSTEM are methods of transferring flammable or combustible liquids from underground storage tanks to the fuel tanks of motor vehicles when the pump is located elsewhere than in the dispenser.

PRESSURE VESSEL is a closed vessel designed to operate at pressures above 15 psig (103.4 kPa).

PRIMARY CONTAINMENT is the first level of containment, consisting of the inside portion of that container which comes into immediate contact on its inner surface with the material being contained.

PRIVATE STAIRWAY is a stairway serving one tenant only.

PROCESSING PLANT is that portion of a property in which flammable or combustible liquids or materials are mixed, heated, separated or otherwise processed as principal business. Processing plants do not include refineries.

PROPELLANT is the liquefied or compressed gas in an aerosol container that expels the contents from an aerosol container when the valve is actuated. A propellant is considered flammable if it forms a flammable mixture with air, or if a flame is self-propagating in a mixture with air.

PROPRIETARY INFORMATION is information regarding compounds or ingredients used in a process or production which does not qualify as trade secrets but which provides an industry or business with a competitive advantage.

PSIA is pounds per square inch, absolute.

PUBLIC CONVEYANCE is any railroad car, street car, cab, bus, airplane or other vehicle which is carrying passengers for hire.

PUBLIC NUISANCE is the existence of dry and drying weeds, rubbish and waste material on property, lands or premises which is dangerous or injurious to that or neighboring property, lands or premises and which is detrimental to the welfare of the occupants or residents of the vicinity.

PUBLIC WAY is any street, alley or similar parcel of land essentially unobstructed from the ground to the sky which is deeded, dedicated or otherwise permanently appropriated to the public for public use and having a clear width of not less than 10 feet (3048 mm).

PYROPHORIC is a chemical that will spontaneously ignite in air at or below a temperature of 130°F. (54.5°C.).

PYROTECHNIC OPERATOR is an individual approved by the chief to be responsible for pyrotechnics, pyrotechnic special effects materials or both.

PYROTECHNIC SPECIAL EFFECTS MATERIAL (special effects) is a low explosive material, other than detonating cord, commonly used in motion picture, television, theatrical or group entertainment production for which a permit from the chief is required for use or storage.

SECTION 218 — Q

No definitions.

SECTION 219 — R

RACK STORAGE is a combination of vertical, horizontal and diagonal members that support stored materials. Racks are allowed to be fixed or portable. See Article 81.

RADIATION SOURCE MATERIALS, COMMON, are radioisotopes, other than fissile materials, commonly used in various medical and industrial testing and measuring situations.

RADIOACTIVE MATERIAL is a material or combination of materials that spontaneously emits ionizing radiation.

RAILWAY is a steam, electric or other railroad which carries passengers for hire.

REACTIVE MATERIAL is a material which can enter into a hazardous chemical reaction with other stable or unstable materials.

READY BOX is a storage container for aerial shells at the site of a fireworks display.

RECEPTACLE is an electrical outlet designed for use with a plug or connector for the purpose of supplying electrical power to an appliance.

RECREATIONAL FIRE is the burning of materials other than rubbish where fuel being burned is not contained in an incinerator, outdoor fireplace, barbecue grill or barbecue pit and with a total fuel area of 3 feet (914 mm) or less in diameter and 2 feet (610 mm) or less in height for pleasure, religious, ceremonial, cooking or similar purposes.

REDUCED FLOW VALVE is a valve equipped with a restricted flow orifice and inserted into a compressed gas cylinder, portable tank or stationary tank that is designed to reduce the maximum flow from the valve under full flow conditions. The maximum flow rate from the valve is determined with the valve allowed to flow to atmosphere with no other piping or fittings attached.

REFINERY is a plant in which flammable or combustible liquids are produced on a commercial scale from crude petroleum, natural gasoline or other hydrocarbon sources.

REFRIGERANT is the fluid used for heat transfer in a refrigerating system; the refrigerant absorbs heat and transfers it at a higher temperature and a higher pressure, usually with a change of state.

REMOTE PUMPING SYSTEM. See PRESSURE DELIVERY SYSTEM.

REMOTE SOLVENT RESERVOIR is a liquid solvent container which is completely enclosed against evaporative losses to the atmosphere during nonuse periods, except for a solvent

return opening not larger than 16 square inches (10 323 mm^2). Such return allows pump-cycled used solvent to drain back into the reservoir from a separate solvent sink or work area.

The reservoir is allowed to be integral to the parts-cleaning machine it services or separate and connected by hoses, tubing, piping or similar devices.

REPAIR is the reconstruction or renewal of any part of an existing building for the purpose of its maintenance.

RETAIL DISPLAY AREA is the area of a Group M Occupancy open for the purpose of viewing or purchasing merchandise offered for sale. Individuals in such establishments are free to circulate among the items offered for sale which are typically displayed on shelves, racks or the floor.

RETAIL SALES OCCUPANCY is the occupancy or use of a building or structure or any portion thereof for displaying, selling or buying of goods, wares or merchandise.

REVIEWING STANDS are elevated platforms accommodating not more than 50 persons. Seating facilities, if provided, are normally in the nature of loose chairs. Reviewing stands accommodating more than 50 persons shall be regulated as grandstands.

ROOM. See LIQUID STORAGE ROOM and see Section 7903.2.3 for construction requirements for rooms where flammable or combustible liquids are used, dispensed or mixed in quantities exceeding exempt amounts.

RUBBISH is waste material including, but not limited to, garbage, waste paper and debris from construction or demolition.

SECTION 220 — S

SAFE DISPERSAL AREA. See DISPERSAL AREA, SAFE.

SAFETY CAN is an approved container of not over 5-gallon (18.9 L) capacity having a spring-closing lid and spout cover.

SAFETY CAP is a paper tube, closed at one end, that is placed over the end of the fuse of an aerial shell to protect it from accidental ignition.

SAFETY FACTOR is a ratio of the design burst pressure to the maximum working pressure which is not less than four.

SALVAGE VEHICLE is a vehicle which is dismantled for parts or awaiting destruction.

SCAVENGED GAS is residual process gas that is collected for treatment or release at a location remote from the site of use.

SECONDARY CONTAINMENT is that level of containment that is external to and separate from primary containment.

SECURE is safe from intrusion or contained separately to prevent mixing with other materials.

SEGREGATED is storage in the same room or inside area, but physically separated by distance from incompatible materials.

SEMICONDUCTOR FABRICATION FACILITIES. See definition for Group H, Division 6 Occupancy under OCCUPANCY CLASSIFICATION.

SENSITIZER is a chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

SERVICE CORRIDOR. See Section 5101.2.2.

SHELF STORAGE is storage on shelves less than 30 inches (762 mm) deep with the distance between shelves not exceeding 3 feet (914 mm) vertically. For other shelving arrangements, see the requirements for rack storage.

SIMPLE ASPHYXIANT GAS is a gas which does not provide sufficient oxygen to support life and has none of the other physical or health hazard specified in Section 8002.2.1.

SMALL ARMS AMMUNITION is shotgun, rifle, pistol or revolver cartridges.

SMOKE DETECTOR is an approved listed device which senses visible or invisible particles of combustion.

SMOKE-PROTECTED ASSEMBLY SEATING is seating served by a means of egress which is not subject to blockage by smoke accumulation within or under a structure.

SMOKING is the carrying or use of lighted pipe, cigar, cigarette or tobacco in any form.

SMOKING MATERIAL is a material or combination of materials intended for use by generating products of combustion. Smoking materials include cigars, cigarettes, materials used in pipes, and smoke bombs.

SOLID SHELVING is shelving that is solid, slatted or of other construction located in racks and which obstructs sprinkler discharge down into the racks.

SPECIAL INDUSTRIAL EXPLOSIVE DEVICE is an explosive power-pack containing an explosive charge in the form of a cartridge or construction device. The term includes, but is not limited to, explosive rivets, explosive bolts, explosive charges for driving pins or studs, cartridges for explosive-actuated power tools and charges of explosives used in jet tapping of open-hearth furnaces and jet perforation of oil well casings.

SPECIAL INDUSTRIAL HIGH-EXPLOSIVE MATERIALS are sheets, extrusions, pellets and packages of high explosives containing dynamite, trinitrotoluol, penaerythritoltetranitrate, cyclotrimethylenetrinitramine or other similar compounds used for high-energy-rate forming, expanding and shaping in metal fabrication and for dismemberment and quick reduction of scrap metal.

SPRAY BOOTH is a power-ventilated structure of varying dimensions and construction provided to enclose or accommodate a spraying operation and to confine and limit the escape of spray vapor and residue and to exhaust it safely.

SPRAYING AREA is an area in which dangerous quantities of flammable vapors or combustible residues, dusts or deposits are present due to the operation of spraying processes. The chief is authorized to define the limits of the spraying area in any specific case.

SPRAYING ROOM is a room designed to accommodate spraying operations complying with the Building Code requirements for a Group H, Division 2 Occupancy.

SQUIB, ELECTRIC, is a device similar in appearance to an electric blasting cap which, upon activation by an electric current, produces a deflagration instead of a detonation.

STANDPIPE SYSTEM is an arrangement of piping, valves, hose connections and allied equipment installed in a building or structure with the hose connections located in such a manner that water can be discharged in streams or spray patterns through attached hoses and nozzles, for the purpose of extinguishing a fire and so protecting a building or structure and its contents in addition to protecting the occupants. This is accomplished by connections to water supply systems or by pumps, tanks and other equipment necessary to provide an adequate supply of water to the hose connections.

STANDPIPE SYSTEM, CLASS I, is a standpipe system equipped with $2^1/_2$-inch (63.5 mm) outlets.

STANDPIPE SYSTEM, CLASS II, is a standpipe system directly connected to a water supply and equipped with $1^1/_2$-inch (38.1 mm) outlets and hoses.

STANDPIPE SYSTEM, CLASS III, is a standpipe system directly connected to a water supply and equipped with $2^1/_2$-inch (63.5 mm) outlets or $2^1/_2$-inch (63.5 mm) and $1^1/_2$-inch (38.1 mm) outlets when a $1^1/_2$-inch (38.1 mm) hose is required. Hose connections are allowed to be through

$2^1/_2$-inch (63.5 mm) hose valves with easily removable $2^1/_2$-inch by $1^1/_2$-inch (63.5 mm by 38.1 mm) reducers.

STATIONARY TANK is packaging designed primarily for stationary installations not intended for loading, unloading or attachment to a transport vehicle as part of its normal operation in the process of use. It does not include cylinders having less than 1,000-pound (453.5 kg) water capacity.

STORAGE FACILITY is a building, portion of a building or exterior area used for the storage of hazardous materials in excess of exempt amounts specified in Section 8001.13.

STREET is any thoroughfare or public way not less than 16 feet (4877 mm) in width which has been dedicated or deeded to the public for public use.

STRUCTURE is that which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

SWITCHBOARD, ELECTRICAL, is a large floor-mounted single panel, frame or assembly of panels on which are mounted, on the face or back or both, switches, overcurrent and other protective devices, buses and usually instruments. Most modern switchboards, even though totally enclosed, are generally accessible from the rear as well as from the front, and are not intended to be installed in cabinets. See PANELBOARD, ELECTRICAL.

SYSTEM is an assembly of equipment consisting of a container or containers, appurtenances, pumps, compressors and connecting piping.

SECTION 221 — T

TANK is a vessel containing more than 60 gallons (227 L).

TANK VEHICLE is a vehicle other than a railroad tank car or boat, with a cargo tank mounted thereon or built as an integral part thereof used for the transportation of flammable or combustible liquids, LP-gas, or hazardous chemicals. Tank vehicles include self-propelled vehicles and full trailers and semitrailers, with or without motive power, and carrying part or all of the load.

TEMPORARY MEMBRANE STRUCTURE is an air-inflated, air-supported, cable, or frame-covered structure as defined by the Building Code, which is erected for less than 180 days and not otherwise defined as a tent, canopy or awning. See *Uniform Building Code* Appendix Chapter 31.

TEMPORARY SEATING FACILITIES are those which are intended for use at a location for not more than 90 days.

TEMPORARY WIRING is wiring installed in an approved manner for a specific period when approved by the authority enforcing the Electrical Code.

TENT is a temporary structure, enclosure or shelter constructed of fabric or pliable material supported by any manner except by air or the contents it protects.

TEST BLASTING CAP NO. 8 is a blasting cap containing 2 grams of a mixture of 80 percent mercury fulminate and 20 percent potassium chlorate or a cap of equivalent strength.

THERMAL INSECTICIDAL FOGGING is the use of insecticidal liquids which are passed through thermal-fog-generating units where they are, by means of heat, pressure and turbulence, transformed and discharged in the form of fog or mist that is blown into the area to be treated.

TOXIC MATERIAL is a material which produces a lethal dose or a lethal concentration within any of the following categories:

1. A chemical or substance 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 or substance 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 or substance that has a median lethal concentration (LC_{50}) in air more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for one hour, or less if death occurs within one hour, to albino rats weighing between 200 and 300 grams each.

TRANSVERSE FLUE SPACE is the space between rows of storage parallel to the direction of loading.

SECTION 222 — U

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UL is Underwriters Laboratories Inc.

UNAUTHORIZED DISCHARGE is a release or emission of materials in a manner which does not conform to the provisions of this code or applicable public health and safety regulations.

UNSTABLE (Reactive) LIQUID is a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shock, pressure or temperature.

UNSTABLE MATERIAL is 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 noncompatible materials.

USBM is the United States Bureau of Mines.

USE (Material) is:

1. Placing a material into action, including solids, liquids and gases, or

2. Making a material available for service by opening or connecting anything utilized for confinement of material including solids, liquids and gases.

USE, CLOSED SYSTEM, is use of a solid or liquid hazardous material in a closed vessel or system that remains closed during normal operations where vapors emitted by the product are not liberated outside of the vessel or system and the product is not exposed to the atmosphere during normal operations, and all uses of compressed gases. Examples of closed systems for solids and liquids include reaction process operations and product conveyed through a piping system into a closed vessel, system or piece of equipment.

USE, OPEN SYSTEM, is use of a solid or liquid hazardous material in a vessel or system that is continuously open to the atmosphere during normal operations and where vapors are liberated, or the product is exposed to the atmosphere during normal operations. Examples of open systems for solids and liquids include dispensing from or into open beakers or containers, and dip tank and plating tank operations.

SECTION 223 — V

VAPOR AREA is an area containing flammable vapors. The chief is authorized to determine the extent of the vapor area, taking into consideration the characteristics of the liquid, the degree of sustained ventilation and the nature of operations.

VAPOR BALANCE SYSTEM is a system designed to capture and retain, without processing, vapors displaced during the filling of tanks and containers or during the fueling of vehicles.

VAPOR PRESSURE is the pressure exerted by a volatile fluid as determined by U.F.C. Standard 2-5.

VAPOR-PROCESSING SYSTEM is a system designed to capture and process vapors displaced during filling operations at motor vehicle fuel-dispensing stations, bulk plants or terminals by use of mechanical or chemical means. Examples include systems using blower-assist for capturing vapors and refrigeration absorption and combustion systems for processing vapors.

VAPOR-PROCESSING UNIT is the actual vapor-processing equipment in one contiguous unit in an isolated or separated area. Vapor-processing units do not include in-line flame arresters, in-line fire checks, pressure vacuum valves, in-line check valves or flow regulators at the dispenser.

VAPOR-RECOVERY SYSTEM is a system designed to capture and retain, without processing, vapors displaced during filling operations at motor vehicle fuel-dispensing stations, bulk plants or terminals. Examples include balanced-pressure vapor displacement systems and vacuum-assist systems without vapor processing.

VAPOR-TRANSFER EQUIPMENT is the components of a vapor-processing system, a vapor balance system, or other approved system which is designed to capture, transfer and prevent emissions of vapors or liquids displaced during filling of tanks or containers or during the fueling of vehicles. Examples include the vapor/liquid-dispensing nozzle, vapor-transfer lines and tank vents.

VENT-RELEASE CONTAINER is an aerosol container which is designed to provide a controlled venting of the base product and propellant at a nominal hydrostatic pressure of less than 210 psig (1447 kPa).

SECTION 224 — W

WAREHOUSE. See definitions of LIQUID STORAGE WAREHOUSE and AEROSOL WAREHOUSE.

WATER-REACTIVE MATERIAL is material which explodes; violently reacts; produces flammable, toxic or other hazardous gases; or evolves enough heat to cause self-ignition or ignition of nearby combustibles upon exposure to water or moisture.

SECTION 225 — X

No definitions.

SECTION 226 — Y

No definitions.

SECTION 227 — Z

No definitions.

PART III

GENERAL PROVISIONS FOR SAFETY

ARTICLE 9 — FIRE DEPARTMENT ACCESS AND WATER SUPPLY

SECTION 901 — GENERAL

901.1 Scope. Fire department access and water supply shall be in accordance with Article 9.

For firesafety during construction, alteration or demolition of a building, see Article 87.

901.2 Permits and Plans.

901.2.1 Permits. A permit is required to use or operate fire hydrants or valves intended for fire-suppression purposes which are installed on water systems and accessible to public highways, alleys or private ways open to or generally used by the public. See Section 105, Permit f.1.

EXCEPTION: A permit is not required for persons employed and authorized by the water company which supplies the system to use or operate fire hydrants or valves.

901.2.2 Plans.

901.2.2.1 Fire apparatus access. Plans for fire apparatus access roads shall be submitted to the fire department for review and approval prior to construction.

901.2.2.2 Fire hydrant systems. Plans and specifications for fire hydrant systems shall be submitted to the fire department for review and approval prior to construction.

901.3 Timing of Installation. When fire protection, including fire apparatus access roads and water supplies for fire protection, is required to be installed, such protection shall be installed and made serviceable prior to and during the time of construction.

EXCEPTION: When alternate methods of protection, as approved by the chief, are provided, the requirements of Section 901.3 may be modified or waived.

901.4 Required Marking of Fire Apparatus Access Roads, Addresses and Fire Protection Equipment.

901.4.1 General. Marking of fire apparatus access roads, addresses and fire protection equipment shall be in accordance with Section 901.4.

901.4.2 Fire apparatus access roads. When required by the chief, approved signs or other approved notices shall be provided and maintained for fire apparatus access roads to identify such roads and prohibit the obstruction thereof or both.

901.4.3 Fire protection equipment and fire hydrants. Fire-protection equipment and fire hydrants shall be clearly identified in a manner approved by the chief to prevent obstruction by parking and other obstructions.

When required by the chief, hydrant locations shall be identified by the installation of reflective markers.

See also Section 1001.7.

901.4.4 Premises identification. Approved numbers or addresses shall be placed on all new and existing buildings in such a position as to be plainly visible and legible from the street or road fronting the property. Numbers shall contrast with their background.

901.4.5 Street or Road Signs. When required by the chief, streets and roads shall be identified with approved signs.

901.5 Obstruction and Control of Fire Apparatus Access Roads and Fire Protection Equipment. See Sections 902.2.4 and 1001.7.

901.6 Fire Protection in Recreational Vehicle, Mobile Home and Manufactured Housing Parks, Sales Lots and Storage Lots. Recreational vehicle, mobile home and manufactured housing parks, sales lots and storage lots shall provide and maintain fire hydrants and access roads in accordance with Sections 902 and 903.

EXCEPTION: Recreational vehicle parks located in remote areas shall be provided with protection and access roadways as required by the chief.

SECTION 902 — FIRE DEPARTMENT ACCESS

902.1 General. Fire department access roads shall be provided and maintained in accordance with Sections 901 and 902.

902.2 Fire Apparatus Access Roads.

902.2.1 Required access. Fire apparatus access roads shall be provided in accordance with Sections 901 and 902.2 for every facility, building or portion of a building hereafter constructed or moved into or within the jurisdiction when any portion of the facility or any portion of an exterior wall of the first story of the building is located more than 150 feet (45 720 mm) from fire apparatus access as measured by an approved route around the exterior of the building or facility. See also Section 902.3 for personnel access to buildings.

EXCEPTIONS: 1. When buildings are completely protected with an approved automatic fire sprinkler system, the provisions of Sections 902.2.1 and 902.2.2 may be modified by the chief.

2. When access roads cannot be installed due to location on property, topography, waterways, nonnegotiable grades or other similar conditions, the chief is authorized to require additional fire protection as specified in Section 1001.9.

3. When there are not more than two Group R, Division 3, or Group U Occupancies, the requirements of Sections 902.2.1 and 902.2.2 may be modified by the chief.

More than one fire apparatus road shall be provided when it is determined by the chief that access by a single road might be impaired by vehicle congestion, condition of terrain, climatic conditions or other factors that could limit access.

For high-piled combustible storage, see Section 8102.5.1.

For required access during construction, alteration or demolition of a building, see Section 8704.2.

902.2.2 Specifications.

902.2.2.1 Dimensions. Fire apparatus access roads shall have an unobstructed width of not less than 20 feet (6096 mm) and an unobstructed vertical clearance of not less than 13 feet 6 inches (4115 mm).

EXCEPTION: Vertical clearance may be reduced, provided such reduction does not impair access by fire apparatus and approved signs are installed and maintained indicating the established vertical clearance when approved by the chief.

Vertical clearances or widths shall be increased when, in the opinion of the chief, vertical clearances or widths are not adequate to provide fire apparatus access.

902.2.2.2 Surface. Fire apparatus access roads shall be designed and maintained to support the imposed loads of fire apparatus and shall be provided with a surface so as to provide all-weather driving capabilities.

902.2.2.3 Turning radius. The turning radius of a fire apparatus access road shall be as approved by the chief.

902.2.2.4 Dead ends. Dead-end fire apparatus access roads in excess of 150 feet (45 720 mm) in length shall be provided with approved provisions for the turning around of fire apparatus.

902.2.2.5 Bridges. When a bridge is required to be used as part of a fire apparatus access road, it shall be constructed and maintained in accordance with nationally recognized standards. See Article 90, Standard a.1.1. The bridge shall be designed for a live load sufficient to carry the imposed loads of fire apparatus.

Vehicle load limits shall be posted at both entrances to bridges when required by the chief.

902.2.2.6 Grade. The gradient for a fire apparatus access road shall not exceed the maximum approved by the chief.

902.2.3 Marking. See Section 901.4.

902.2.4 Obstruction and control of fire apparatus access.

902.2.4.1 General. The required width of a fire apparatus access road shall not be obstructed in any manner, including parking of vehicles. Minimum required widths and clearances established under Section 902.2.2.1 shall be maintained at all times.

Entrances to roads, trails or other accessways which have been closed with gates and barriers in accordance with Section 902.2.4.2 shall not be obstructed by parked vehicles.

902.2.4.2 Closure of accessways. The chief is authorized to require the installation and maintenance of gates or other approved barricades across roads, trails or other accessways, not including public streets, alleys or highways.

When required, gates and barricades shall be secured in an approved manner. Roads, trails and other accessways which have been closed and obstructed in the manner prescribed by Section 902.2.4.2 shall not be trespassed upon or used unless authorized by the owner and the chief.

EXCEPTION: Public officers acting within their scope of duty.

Locks, gates, doors, barricades, chains, enclosures, signs, tags or seals which have been installed by the fire department or by its order or under its control shall not be removed, unlocked, destroyed, tampered with or otherwise molested in any manner.

EXCEPTION: When authorized by the chief or performed by public officers acting within their scope of duty.

902.3 Access to Building Openings.

902.3.1 Required access. Exterior doors and openings required by this code or the Building Code shall be maintained readily accessible for emergency access by the fire department.

An approved access walkway leading from fire apparatus access roads to exterior openings required by this code or the Building Code shall be provided when required by the chief.

902.3.2 Maintenance of exterior doors and openings. Exterior doors or their function shall not be eliminated without prior approval by the chief. Exterior doors which have been rendered nonfunctional and which retain a functional door exterior appearance shall have a sign affixed to the exterior side of such door stating THIS DOOR BLOCKED. The sign shall consist of letters having principal stroke of not less than $^3/_4$ inch (19.1 mm) wide and at least 6 inches (152.4 mm) high on a contrasting background. Required fire department access doors shall not be obstructed or eliminated. See Section 1207 for exit doors.

For access doors for high-piled combustible storage, see Section 8102.5.2.

902.3.3 Shaftway marking. Exterior windows in buildings used for manufacturing or for storage purposes which open directly on shaftways or other vertical means of communication between two or more floors shall be plainly marked with the word SHAFTWAY in red letters at least 6 inches (152.4 mm) high on a white background. Warning signs shall be easily discernible from the outside of the building. Door and window openings on such shaftways from the interior of the building shall be similarly marked with the word SHAFTWAY in a manner which is easily visible to anyone approaching the shaftway from the interior of the building, unless the construction of the partition surrounding the shaftway is of such distinctive nature as to make its purpose evident at a glance.

902.4 Key boxes. When access to or within a structure or an area is unduly difficult because of secured openings or where immediate access is necessary for life-saving or firefighting purposes, the chief is authorized to require a key box to be installed in an accessible location. The key box shall be of a type approved by the chief and shall contain keys to gain necessary access as required by the chief.

SECTION 903 — WATER SUPPLIES AND FIRE HYDRANTS

903.1 General. Water supplies and fire hydrants shall be in accordance with Sections 901 and 903.

903.2 Required Water Supply for Fire Protection. An approved water supply capable of supplying the required fire flow for fire protection shall be provided to all premises upon which facilities, buildings or portions of buildings are hereafter constructed or moved into or within the jurisdiction. When any portion of the facility or building protected is in excess of 150 feet (45 720 mm) from a water supply on a public street, as measured by an approved route around the exterior of the facility or building, on-site fire hydrants and mains capable of supplying the required fire flow shall be provided when required by the chief. See Section 903.4.

903.3 Type of Water Supply. Water supply is allowed to consist of reservoirs, pressure tanks, elevated tanks, water mains or other fixed systems capable of providing the required fire flow. In setting the requirements for fire flow, the chief may be guided by Appendix III-A.

903.4 Fire Hydrant Systems.

903.4.1 General.

903.4.1.1 Applicability. Fire hydrant systems and fire hydrants shall be in accordance with Section 903.4.

903.4.1.2 Testing and maintenance. Fire hydrant systems shall be subject to such periodic tests as required by the chief. Fire hydrant systems shall be maintained in an operative condition at all times and shall be repaired where defective. Additions, repairs, alterations and servicing shall be in accordance with approved standards.

903.4.1.3 Tampering and obstruction. See Sections 1001.6 and 1001.7.

903.4.2 Required installations. The location, number and type of fire hydrants connected to a water supply capable of delivering the required fire flow shall be provided on the public street or on the site of the premises or both to be protected as required and approved by the chief. See Appendix III-B.

Fire hydrants shall be accessible to the fire department apparatus by roads meeting the requirements of Section 902.2.

903.4.3 Protection, marking and obstruction of hydrants. When exposed to vehicular damage, fire hydrants shall be suitably protected. For marking, see Section 901.4.3. For obstruction, see Section 1001.7.

903.4.4 Maintenance and use of hydrants. See Sections 1001.5 and 1001.6.2.

ARTICLE 10 — FIRE-PROTECTION SYSTEMS AND EQUIPMENT

SECTION 1001 — GENERAL

1001.1 Scope. Fire-protection systems and equipment shall be in accordance with Article 10. See also Appendix II-C.

Fire-protection equipment and systems shall be installed and maintained in buildings under construction in accordance with Article 87.

1001.2 Definitions. For definitions of ALARM CONTROL UNIT, ALARM-INITIATING DEVICE, ALARM SIGNAL, ALARM-SIGNALING DEVICE, ALARM SYSTEM, ALARM ZONE, ANNUNCIATOR, AUTOMATIC FIRE-EXTINGUISHING SYSTEM, FACILITY, FIRE DEPARTMENT INLET CONNECTION, SMOKE DETECTOR and STANDPIPE SYSTEM, see Article 2.

1001.3 Plans for Fire Alarm Systems. Complete plans and specifications for fire alarm systems shall be submitted for review and approval prior to system installation. Plans and specifications shall include, but not be limited to, a floor plan; location of all alarm-initiating and alarm-signaling devices; alarm control- and trouble-signaling equipment; annunciation; power connection; battery calculations; conductor type and sizes; voltage drop calculations; and manufacturer, model numbers and listing information for all equipment, devices and materials.

1001.4 Approval and Testing. Fire alarm systems; fire hydrant systems; fire-extinguishing systems, including automatic sprinklers and wet and dry standpipes; halon systems and other special types of automatic fire-extinguishing systems; basement pipe inlets; and other fire-protection systems and appurtenances thereto shall meet the approval of the fire department as to installation and location and shall be subject to such periodic tests as required by the chief. See Appendix III-C.

Condition of approval of halon systems shall be satisfactory passage of a test conducted in accordance with nationally recognized standards prior to final acceptance of the system.

Fire alarm and detection systems shall be tested in accordance with U.F.C. Standard 10-4 and nationally recognized standards.

1001.5 Maintenance.

1001.5.1 General. Sprinkler systems, fire hydrant systems, standpipe systems, fire alarm systems, portable fire extinguishers, smoke and heat ventilators, smoke-removal systems and other fire-protective or extinguishing systems or appliances shall be maintained in an operative condition at all times and shall be replaced or repaired where defective. Fire-protection or extinguishing systems coverage, spacing and specifications and fire alarm systems shall be maintained in accordance with Article 10 and recognized standards at all times. Such systems shall be extended, altered or augmented as necessary to maintain and continue protection whenever any building so equipped is altered, remodeled or added to. Additions, repairs, alterations and servicing shall be in accordance with approved standards.

1001.5.2 Fire department notification for fire alarm servicing. The chief shall be notified when any required fire alarm system is placed temporarily out of service and upon restoration of service.

1001.5.3 Systems in high-rise buildings. The owner of a high-rise building shall be responsible for assuring that the fire- and life-safety systems required by the Building Code are maintained in an operable condition at all times. Unless otherwise required by the chief, quarterly tests of such systems shall be conducted by approved persons. A written record shall be maintained and shall be made available to the inspection authority. (See U.B.C. Section 403.)

1001.5.4 Smoke-control systems. Mechanical smoke-control systems, such as those in high-rise buildings, buildings containing atria, covered mall buildings and mechanical ventilation systems

utilized in smokeproof enclosures and for smoke-removal systems utilized in high-piled combustible storage occupancies, shall be maintained in an operable condition at all times. Unless otherwise required by the chief, quarterly tests of such systems shall be conducted by approved persons. A written record shall be maintained and shall be made available to the inspection authority.

1001.6 Tampering with Fire-protection Equipment, Barriers, Security Devices, Signs and Seals.

1001.6.1 Fire department property. Apparatus, equipment and appurtenances belonging to or under the supervision and control of the fire department shall not be molested, tampered with, damaged or otherwise disturbed unless authorized by the chief.

1001.6.2 Fire hydrants and fire appliances. Fire hydrants and fire appliances required by this code to be installed or maintained shall not be removed, tampered with or otherwise disturbed except for the purpose of extinguishing fire, training, recharging or making necessary repairs, or when allowed by the fire department. When a fire appliance is removed as herein allowed, it shall be replaced or reinstalled as soon as the purpose for which it was removed has been accomplished.

1001.6.3 Barriers, security devices, signs and seals. Locks, gates, doors, barricades, chains, enclosures, signs, tags or seals which have been installed by the fire department or by its order or under its control shall not be removed, unlocked, destroyed, tampered with or otherwise molested in any manner. See also Sections 103.4.3.3 and 902.2.4.2.

EXCEPTION: When authorized by the chief or performed by public officers acting within their scope of duty.

1001.6.4 Fire alarms. See Sections 1007.1.4 and 1302.

1001.7 Obstruction and Impairment of Fire Hydrants and Fire-protection Equipment.

1001.7.1 General. Posts, fences, vehicles, growth, trash, storage and other materials or things shall not be placed or kept near fire hydrants, fire department inlet connections or fire-protection system control valves in a manner that would prevent such equipment or fire hydrants from being immediately discernible. The fire department shall not be deterred or hindered from gaining immediate access to fire-protection equipment or hydrants.

1001.7.2 Clear space around hydrants. A 3-foot (914.4 mm) clear space shall be maintained around the circumference of fire hydrants except as otherwise required or approved by the chief.

1001.7.3 Fire-extinguishing equipment. Class II standpipe hose stations, Class I and Class III standpipe outlets, and portable fire extinguishers shall not be concealed, obstructed or impaired.

1001.7.4 Fire alarm equipment. Alarm-initiating devices, alarm-signaling devices and annunciators shall not be concealed, obstructed or impaired.

1001.8 Marking of Fire-protection Equipment and Fire Hydrants. Fire-protection equipment and fire hydrants shall be clearly identified in a manner approved by the chief to prevent obstruction by parking and other obstructions. See also Section 901.4.3.

1001.9 Special Hazards. For occupancies of an especially hazardous nature or where special hazards exist in addition to the normal hazard of the occupancy, or where access for fire apparatus is unduly difficult, the chief is authorized to require additional safeguards consisting of additional fire appliance units, more than one type of appliance, or special systems suitable for the protection of the hazard involved. Such devices or appliances can consist of automatic fire alarm systems, automatic sprinkler or water spray systems, standpipe and hose, fixed or portable fire extinguishers, suitable fire blankets, breathing apparatus, manual or automatic covers, carbon dioxide, foam, halogenated or dry chemical or other special fire-extinguishing systems. Where such systems are provided, they shall be designed and installed in accordance with the applicable *Uniform Fire Code Standards*. See Article 90 and Section 101.3.

1001.10 Fire Appliances. The chief is authorized to designate the type and number of fire appliances to be installed and maintained in and upon all buildings and premises in the jurisdiction other than private dwellings. This designation shall be based on the relative severity of probable fire, including the rapidity with which it could spread. Such appliances shall be of a type suitable for the probable class of fire associated with such building or premises and shall have approval of the chief.

SECTION 1002 — PORTABLE FIRE EXTINGUISHERS

1002.1 General. Portable fire extinguishers shall be installed in occupancies and locations as set forth in this code and as required by the chief.

Portable fire extinguishers shall be in accordance with U.F.C. Standard 10-1.

1002.2 Prohibited Types. Vaporizing liquid extinguishers containing carbon tetrachloride or chlorobromomethane shall not be installed or used in any location for fire-protection use.

Soda-acid, foam, loaded stream, antifreeze and water fire extinguishers of the inverting types shall not be recharged or placed in service for fire-protection use.

1002.3 Sale of Defective Fire Extinguishers. Forms, types or kinds of fire extinguishers which are not approved or which are not in proper working order, or the contents of which do not meet the requirements of this code, shall not be sold or traded.

EXCEPTION: The sale or trade of fire extinguishers to a person engaged in the business of selling or handling such extinguishers, and the sale or exchange of obsolete or damaged equipment for junk.

SECTION 1003 — FIRE-EXTINGUISHING SYSTEMS

1003.1 Installation Requirements.

1003.1.1 General. Fire-extinguishing systems shall be installed in accordance with the Building Code and Section 1003.

Fire hose threads used in connection with fire-extinguishing systems shall be national standard hose thread or as approved by the chief.

The location of fire department hose connections shall be approved by the chief.

In buildings used for high-piled combustible storage, fire protection shall be in accordance with Article 81.

1003.1.2 Standards. Fire-extinguishing systems shall comply with the Building Code. (See U.B.C. Standard 9-1.)

EXCEPTIONS: 1. Automatic fire-extinguishing systems not covered by the Building Code shall be approved and installed in accordance with approved standards.

2. Automatic sprinkler systems may be connected to the domestic water-supply main when approved by the building official, provided the domestic water supply is of adequate pressure, capacity and sizing for the combined domestic and sprinkler requirements. In such case, the sprinkler system connection shall be made between the public water main or meter and the building shutoff valve, and there shall not be intervening valves or connections. The fire department connection may be omitted when approved by the chief.

3. Automatic sprinkler systems in Group R Occupancies four stories or less may be in accordance with the Building Code requirements for residential sprinkler systems. (See U.B.C. Standard 9-3.)

1003.1.3 Modifications. When residential sprinkler systems as set forth in the Building Code (see U.B.C. Standard 9-3) are provided, exceptions to, or reductions in, Building Code requirements based on the installation of an automatic fire-extinguishing system are not allowed.

1003.2 Required Installations.

1003.2.1 General. An automatic fire-extinguishing system shall be installed in the occupancies and locations as set forth in Section 1003.2.

For provisions on special hazards and hazardous materials, see Section 1001.9 and Articles 79, 80 and 81.

1003.2.2 All occupancies except Group R, Division 3 and Group U Occupancies. Except for Group R, Division 3 and Group U Occupancies, an automatic sprinkler system shall be installed:

1. In every story or basement of all buildings when the floor area exceeds 1,500 square feet (139.4 m^2) and there is not provided at least 20 square feet (1.86 m^2) of opening entirely above the adjoining ground level in each 50 lineal feet (15 240 mm) or fraction thereof of exterior wall in the story or basement on at least one side of the building. Openings shall have a minimum dimension of not less than 30 inches (762 mm). Such openings shall be accessible to the fire department from the exterior and shall not be obstructed in a manner that firefighting or rescue cannot be accomplished from the exterior.

When openings in a story are provided on only one side and the opposite wall of such story is more than 75 feet (22 860 mm) from such openings, the story shall be provided with an approved automatic sprinkler system, or openings as specified above shall be provided on at least two sides of an exterior wall of the story.

If any portion of a basement is located more than 75 feet (22 860 mm) from openings required in Section 1003.2.2, the basement shall be provided with an approved automatic sprinkler system.

2. At the top of rubbish and linen chutes and in their terminal rooms. Chutes extending through three or more floors shall have additional sprinkler heads installed within such chutes at alternate floors. Sprinkler heads shall be accessible for servicing.

3. In rooms where nitrate film is stored or handled. See also Article 33.

4. In protected combustible fiber storage vaults as defined in Article 2. See also Article 28.

5. Throughout all buildings with a floor level with an occupant load of 30 or more that is located 55 feet (16 764 mm) or more above the lowest level of fire department vehicle access.

EXCEPTION: 1. Airport control towers.
2. Open parking structures.
3. Group F, Division 2 Occupancies.

1003.2.3 Group A Occupancies.

1003.2.3.1 Drinking establishments. An automatic sprinkler system shall be installed in rooms used by the occupants for the consumption of alcoholic beverages and unseparated accessory uses where the total area of such unseparated rooms and assembly uses exceeds 5,000 square feet (465 m^2). For uses to be considered as separated, the separation shall not be less than as required for a one-hour occupancy separation. The area of other uses shall be included unless separated by at least a one-hour occupancy separation.

1003.2.3.2 Basements. An automatic sprinkler system shall be installed in basements classified as a Group A Occupancy when the basement is larger than 1,500 square feet (139 m^2) in floor area.

1003.2.3.3 Exhibition and display rooms. An automatic sprinkler system shall be installed in Group A Occupancies which have more than 12,000 square feet (112 m^2) of floor area which can be used for exhibition or display purposes.

1003.2.3.4 Stairs. An automatic sprinkler system shall be installed in enclosed usable space below or over a stairway in Group A, Divisions 2, 2.1, 3 and 4 Occupancies.

1003.2.3.5 Multitheater complexes. An automatic sprinkler system shall be installed in every building containing a multitheater complex.

1003.2.3.6 Amusement buildings. An automatic sprinkler system shall be installed in all amusement buildings. The main water-flow switch shall be electrically supervised. The sprinkler main cutoff valve shall be supervised. When the amusement building is temporary, the sprinkler water-supply system may be of an approved temporary type.

EXCEPTION: An automatic sprinkler system need not be provided when the floor area of a temporary amusement building is less than 1,000 square feet (92.9 m^2) and the exit travel distance from any point is less than 50 feet (15 240 mm).

1003.2.3.7 Stages. All stages shall be sprinklered. Such sprinklers shall be provided throughout the stage and in dressing rooms, workshops, storerooms and other accessory spaces contiguous to such stages.

EXCEPTIONS: 1. Sprinklers are not required for stages 1,000 square feet (92.9 m^2) or less in area and 50 feet (1542 mm) or less in height where curtains, scenery or other combustible hangings are not retractable vertically. Combustible hangings shall be limited to a single main curtain, borders, legs and a single backdrop.

2. Under stage areas less than 4 feet (1219 mm) in clear height used exclusively for chair or table storage and lined on the inside with $^5/_8$-inch (16 mm) Type X gypsum wallboard or an approved equal.

1003.2.4 Group E Occupancies.

1003.2.4.1 General. An automatic fire sprinkler system shall be installed throughout all buildings containing a Group E, Division 1 Occupancy.

EXCEPTIONS: 1. When each room used for instruction has at least one exit door directly to the exterior at ground level and when rooms used for assembly purposes have at least one half of the required exits directly to the exterior ground level, a sprinkler system need not be provided.

2. When area separation walls, or occupancy separations having a fire-resistive rating of not less than two hours subdivide the building into separate compartments such that each compartment contains an aggregate floor area not greater than 20,000 square feet (1858 m^2), an automatic sprinkler system need not be provided.

1003.2.4.2 Basements. An automatic sprinkler system shall be installed in basements classified as Group E, Division 1 Occupancies.

1003.2.4.3 Stairs. An automatic fire sprinkler system shall be installed in enclosed usable space below or over a stairway in Group E, Division 1 Occupancies.

1003.2.5 Group H Occupancies.

1003.2.5.1 General. An automatic fire-extinguishing system shall be installed in Group H, Divisions 1, 2, 3 and 7 Occupancies.

1003.2.5.2 Group H, Division 4 Occupancies. An automatic fire-extinguishing system shall be installed in Group H, Division 4 Occupancies having a floor area of more than 3,000 square feet (279 m^2).

1003.2.5.3 Group H, Division 6 Occupancies. An automatic fire-extinguishing system shall be installed throughout buildings containing Group H, Division 6 Occupancies. The design of the sprinkler system shall not be less than that required under the Building Code (see U.B.C. Standard 9-1) for the occupancy hazard classifications as follows:

LOCATION	OCCUPANCY HAZARD CLASSIFICATION
Fabrication areas	Ordinary Hazard Group 2
Service corridors	Ordinary Hazard Group 2
Storage rooms without dispensing	Ordinary Hazard Group 2
Storage rooms with dispensing	Extra Hazard Group 2
Exit corridors	Ordinary Hazard Group 2[1]

[1]When the design area of the sprinkler system consists of a corridor protected by one row of sprinklers, the maximum number of sprinklers that needs to be calculated is 13.

1003.2.6 Group I Occupancies. An automatic sprinkler system shall be installed in Group I Occupancies.

EXCEPTION: In jails, prisons and reformatories, the piping system may be dry, provided a manually operated valve is installed at a continuously monitored location. Opening of the valve will cause the piping sys-

tem to be charged. Sprinkler heads in such systems shall be equipped with fusible elements or the system shall be designed as required for deluge systems in the Building Code (see U.B.C. Standard 9-1).

1003.2.7 Group M Occupancies. An automatic sprinkler system shall be installed in retail sales rooms classified as Group M Occupancies where the floor area exceeds 12,000 square feet (1114.8 m^2) on any floor or 24,000 square feet (2229.7 m^2) on all floors or in Group M retail sales occupancies more than three stories in height. The area of mezzanines shall be included in determining the areas where sprinklers are required.

1003.2.8 Group R, Division 1 Occupancies. An automatic sprinkler system shall be installed throughout every apartment house three or more stories in height or containing 16 or more dwelling units, every congregate residence three or more stories in height or having an occupant load of 20 or more, and every hotel three or more stories in height or containing 20 or more guest rooms. Residential or quick-response standard sprinklers shall be used in the dwelling units and guest room portions of the building.

1003.3 Sprinkler System Monitoring and Alarms.

1003.3.1 Where required. All valves controlling the water supply for automatic sprinkler systems and water-flow switches on all sprinkler systems shall be electrically monitored where the number of sprinklers are:

1. Twenty or more in Group I, Divisions 1.1 and 1.2 Occupancies.
2. One hundred or more in all other occupancies.

Valve monitoring and water-flow alarm and trouble signals shall be distinctly different and shall be automatically transmitted to an approved central station, remote station or proprietary monitoring station as defined by U.F.C. Standard 10-2 or, when approved by the building official with the concurrence of the chief, shall sound an audible signal at a constantly attended location.

EXCEPTION: Underground key or hub valves in roadway boxes provided by the municipality or public utility need not be monitored.

1003.3.2 Alarms. An approved audible sprinkler flow alarm shall be provided on the exterior of the building in an approved location. An approved audible sprinkler flow alarm to alert the occupants shall be provided in the interior of the building in a normally occupied location. Actuation of the alarm shall be as set forth in the Building Code. (See U.B.C. Standard 9-1.)

1003.4 Permissible Sprinkler Omissions. Subject to the approval of the building official and with the concurrence of the chief, sprinklers may be omitted in rooms or areas as follows:

1. When sprinklers are considered undesirable because of the nature of the contents or in rooms or areas which are of noncombustible construction with wholly noncombustible contents and which are not exposed by other areas. Sprinklers shall not be omitted from any room merely because it is damp, of fire-resistive construction or contains electrical equipment.

2. Sprinklers shall not be installed when the application of water or flame and water to the contents may constitute a serious life or fire hazard, as in the manufacture or storage of quantities of aluminum powder, calcium carbide, calcium phosphide, metallic sodium and potassium, quicklime, magnesium powder and sodium peroxide.

3. Safe deposit or other vaults of fire-resistive construction, when used for the storage of records, files and other documents, when stored in metal cabinets.

4. Communication equipment areas under the exclusive control of a public communication utility agency, provided:

4.1 The equipment areas are separated from the remainder of the building by one-hour fire-resistive occupancy separation; and

4.2 Such areas are used exclusively for such equipment; and

4.3 An approved automatic smoke-detection system is installed in such areas and is supervised by an approved central, proprietary or remote station service or a local alarm which will give an audible signal at a constantly attended location; and

4.4 Other approved fire-protection equipment such as portable fire extinguishers or Class II standpipes are installed in such areas.

5. Other approved automatic fire-extinguishing systems may be installed to protect special hazards or occupancies in lieu of automatic sprinklers.

SECTION 1004 — STANDPIPES

1004.1 Installation Requirements.

1004.1.1 General. Standpipe systems shall be installed in accordance with the Building Code and Section 1004.

Fire hose threads used in connection with fire-extinguishing systems shall be national standard hose thread or as approved by the chief.

The location of fire department hose connections shall be approved by the chief.

In buildings used for high-piled combustible storage, fire protection shall be in accordance with Article 81.

1004.1.2 Standards. Standpipe systems shall comply with the Building Code. (See U.B.C. Standard 9-1.)

1004.2 Required Installations. Standpipe systems shall be provided as set forth in Table 1004-A.

1004.3 Location of Class I Standpipe Hose Connections. There shall be a Class I standpipe outlet connection at every floor-level landing of every required stairway above or below grade and on each side of the wall adjacent to the exit opening of a horizontal exit. Outlets at stairways shall be located within the exit enclosure or, in the case of pressurized enclosures, within the vestibule or exterior balcony, giving access to the stairway.

Risers and laterals of Class I standpipe systems not located within an enclosed stairway or pressurized enclosure shall be protected by a degree of fire resistance equal to that required for vertical enclosures in the building in which they are located.

EXCEPTION: In buildings equipped with an approved automatic sprinkler system, risers and laterals which are not located within an enclosed stairway or pressurized enclosure need not be enclosed within fire-resistive construction.

There shall be at least one outlet above the roof line when the roof has a slope of less than 4 units vertical in 12 units horizontal (33.3% slope).

In buildings where more than one standpipe is provided, the standpipes shall be interconnected at the bottom.

1004.4 Location of Class II Standpipe Hose Connections. Class II standpipe outlets shall be accessible and 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.

In Group A, Divisions 1 and 2.1 Occupancies with occupant loads of more than 1,000, outlets shall be located on each side of any stage, on each side of the rear of the auditorium and on each side of the balcony.

Fire-resistant protection of risers and laterals of Class II standpipe systems is not required.

1004.5 Location of Class III Standpipe Hose Connections. Class III standpipe systems shall have outlets located as required for Class I standpipes in Section 1004.3 and shall have Class II outlets as required in Section 1004.4.

Risers and laterals of Class III standpipe systems shall be protected as required for Class I systems.

EXCEPTIONS: 1. In buildings equipped with an approved automatic sprinkler system, risers and laterals which are not located within an enclosed stairway or pressurized enclosure need not be enclosed within fire-resistive construction.

2. Laterals for Class II outlets on Class III systems need not be protected.

In buildings where more than one Class III standpipe is provided, the standpipes shall be interconnected at the bottom.

SECTION 1005 — BASEMENT PIPE INLETS

Basement pipe inlets shall be installed in the first floor of every store, warehouse or factory having a basement when required by the Building Code. See Appendix III-D.

SECTION 1006 — PROTECTION OF COMMERCIAL COOKING OPERATIONS

1006.1 Ventilating Hood and Duct Systems. A ventilating hood and duct system shall be provided in accordance with the Mechanical Code for commercial-type food heat-processing equipment that produces grease-laden vapors.

1006.2 Fire-extinguishing System.

1006.2.1 Where required. Approved automatic fire-extinguishing systems shall be provided for the protection of commercial-type cooking equipment.

EXCEPTION: The requirement for protection does not include steam kettles and steam tables or equipment which as used does not create grease-laden vapors.

1006.2.2 Type of system. The system used for the protection of commercial-type cooking equipment shall be either a system listed for application with such equipment or an automatic fire-extinguishing system that is specifically designed for such application.

Systems shall be installed in accordance with the Mechanical Code, their listing and the manufacturer's instruction. Other systems shall be of an approved design and shall be of one of the following types:

1. Automatic sprinkler system.
2. Dry-chemical extinguishing system.
3. Carbon dioxide extinguishing system.
4. Wet-chemical extinguishing system.

1006.2.3 Extent of protection.

1006.2.3.1 General. The automatic fire-extinguishing system used to protect ventilating hoods and ducts and cooking appliances shall be installed to include cooking surfaces, deep fat fryers, griddles, upright broilers, charbroilers, range tops and grills. Protection shall also be provided for the enclosed plenum space within the hood above filters and exhaust ducts serving the hood.

1006.2.3.2 Carbon dioxide systems. When carbon dioxide systems are used, there shall be a nozzle at the top of the ventilating duct. Additional nozzles that are symmetrically arranged to give uniform distribution shall be installed within vertical ducts exceeding 20 feet (6096 mm) and horizontal ducts exceeding 50 feet (15 240 mm). Dampers shall be installed at either the top or the bottom of the duct and shall be arranged to operate automatically upon activation of the fire-extinguishing system. When the damper is installed at the top of the duct, the top nozzle shall be immediately below the damper. Carbon dioxide automatic fire-extinguishing systems shall be sufficiently sized to protect all hazards venting through a common duct simultaneously.

1006.2.4 Automatic power, fuel and ventilation shutoff.

1006.2.4.1 General. Automatic fire-extinguishing systems shall be interconnected to the fuel or current supply for the cooking operation and arranged to automatically shut off all equipment under the hood when the system is actuated.

Shutoff valves or switches shall be of a type that require manual operation to reset.

1006.2.4.2 Carbon dioxide systems. Commercial-type cooking equipment protected by an automatic carbon dioxide extinguishing system shall be arranged to shut off the ventilation system upon activation.

1006.2.5 Special provisions for automatic sprinkler systems. Commercial-type cooking equipment protected by automatic sprinkler systems shall be supplied from a separate, readily accessible indicating-type control valve that is identified.

Extinguishing systems shall be serviced at least every six months or after activation of the system. Inspection shall be by qualified individuals, and a Certificate of Inspection shall be forwarded to the chief upon completion.

Fusible links and automatic sprinkler heads shall be replaced at least annually, and other protection devices shall be serviced or replaced in accordance with the manufacturer's instructions.

EXCEPTION: Frangible bulbs need not be replaced annually.

1006.2.6 Manual system operation. A readily accessible manual activation device installed at an approved location shall be provided for dry chemical, wet chemical and carbon dioxide systems. The activation device is allowed to be mechanically or electrically operated. If electrical power is used, the system shall be connected to a standby power system and a visual means shall be provided to show that the extinguishing system is energized. Instructions for operating the fire-extinguishing system shall be posted adjacent to manual activation devices.

1006.2.7 Portable fire extinguishers. A sodium bicarbonate or potassium bicarbonate dry-chemical-type portable fire extinguisher having a minimum rating of 40-B shall be installed within 30 feet (9144 mm) of commercial food heat-processing equipment, as measured along an unobstructed path of travel, in accordance with U.F.C. Standard 10-1.

1006.2.8 Operations and maintenance. The ventilation system in connection with hoods shall be operated at the required rate of air movement, and classified grease filters shall be in place when equipment under a kitchen grease hood is used.

If grease extractors are installed, they shall be operated when the commercial-type cooking equipment is used.

Hoods, grease-removal devices, fans, ducts and other appurtenances shall be cleaned at intervals necessary to prevent the accumulation of grease. Cleanings shall be recorded, and records shall state the extent, time and date of cleaning. Such records shall be maintained on the premises. Sprinklers used for the protection of fryers shall be listed for that application and installed in accordance with their listing.

SECTION 1007 — FIRE ALARM SYSTEMS

1007.1 General.

1007.1.1 Applicability. Installation and maintenance of fire alarm systems shall be in accordance with Section 1007.

1007.1.2 Testing. See Section 1001.4.

1007.1.3 Maintenance. See Section 1001.5.1.

1007.1.4 Problematic systems and systems out of service. In the event of temporary failure of the alarm system or an excessive number of accidental alarm activations, the chief is authorized to

require the building owner or occupant to provide standby personnel as set forth in Section 2501.19 until the system is restored.

1007.2 Required Installations.

1007.2.1 General.

1007.2.1.1 When required. An approved manual, automatic or manual and automatic fire alarm system shall be provided in accordance with Section 1007.2.

1007.2.1.2 Use of area separation walls to define separate buildings. For the purposes of Section 1007, area separation walls shall not define separate buildings.

1007.2.2 Group A Occupancies.

1007.2.2.1 General. Group A, Divisions 1, 2 and 2.1 Occupancies shall be provided with a manual fire alarm system in accordance with Section 1007.2.2.

EXCEPTIONS: 1. Manual fire alarm boxes are not required when an approved automatic fire-extinguishing system is installed which will immediately activate the prerecorded announcement upon water flow.

2. Group A Occupancy portions of Group E Occupancies are allowed to have alarms as required for the Group E Occupancy.

See also Section 1007.2.12.

1007.2.2.2 System initiation. Activation of the fire alarm shall immediately initiate an approved prerecorded message announcement using an approved electrically supervised voice communication or public address system which is audible above the ambient noise level of the occupancy.

EXCEPTION: When approved by the chief, the prerecorded announcement is allowed to be manually deactivated for a period of time not to exceed 3 minutes for the sole purpose of allowing a live voice announcement from an approved, constantly attended station.

1007.2.2.3 Emergency power. Voice communication and public address systems shall be provided with an approved emergency power source.

1007.2.3 Group B Occupancies. See Section 1007.2.12.

1007.2.4 Group E Occupancies.

1007.2.4.1 General. Group E Occupancies shall be provided with fire alarm systems in accordance with Section 1007.2.4. Group E, Division 1 Occupancies and Group E, Division 3 Occupancies having an occupant load of 50 or more shall be provided with an approved manual fire alarm system. When automatic sprinkler systems or smoke detectors provided in accordance with Section 1007.2.4.2 are installed, such systems or detectors shall be connected to the building fire alarm system, and the building fire alarm system shall be both automatic and manual. See also Section 1007.2.12.

1007.2.4.2 Smoke detectors.

1007.2.4.2.1 Increased travel distance. Smoke detectors shall be installed when required by the Building Code for increases in travel distance to exits. (See U.B.C. Section 1017.3.)

1007.2.4.2.2 Exits through adjoining rooms. Smoke detectors shall be installed when required by the Building Code to allow the only means of egress from a room to be through adjoining or intervening rooms. (See U.B.C. Section 1017.4.)

1007.2.4.3 Exterior alarm-signaling device. A alarm-signaling device shall be mounted on the exterior of the building.

1007.2.5 Group F Occupancies. See Section 1007.2.12.

1007.2.6 Group H Occupancies.

1007.2.6.1 General. Group H Occupancies shall be provided with fire alarm systems in accordance with Section 1007.2.6. See also Section 1007.2.12.

1007.2.6.2 Organic coatings. Organic coating manufacturing uses shall be provided with a manual fire alarm system. See Article 50.

1007.2.6.3 Group H, Division 6 Occupancies. Group H, Division 6 Occupancies shall be provided with a manual fire alarm system. See Article 51.

1007.2.6.4 Rooms used for storage, dispensing, use and handling of hazardous materials. When required by Article 80, rooms or areas used for storage, dispensing, use or handling of highly toxic compressed gases, liquid and solid oxidizers, and Class I, II, III or IV organic peroxides shall be provided with an automatic smoke-detection system.

1007.2.7 Group I Occupancies.

1007.2.7.1 Divisions 1.1, 1.2 and 2 Occupancies.

1007.2.7.1.1 System requirements. Group I, Divisions 1.1, 1.2 and 2 Occupancies shall be provided with an approved manual and automatic fire alarm system in accordance with Section 1007.2.7.1. See also Section 1007.2.12. Smoke detectors shall be provided in accordance with the Building Code as follows:

1. At automatic-closing doors in smoke barriers and one-hour fire-resistive occupancy separations (see U.B.C. Sections 308.2.2.1 and 308.8),

2. In waiting areas which are open to corridors (see U.B.C. Section 1019.3).

When actuated, alarm-initiating devices shall activate an alarm signal which is audible throughout the building.

EXCEPTION: Visual alarm-signaling devices are allowed to substitute for audible devices in patient use areas.

1007.2.7.1.2 Patient room smoke detectors. Smoke detectors which receive their primary power from the building wiring shall be installed in patient sleeping rooms of hospital and nursing homes. Actuation of such detectors shall cause a visual display on the corridor side of the room in which the detector is located and shall cause an audible and visual alarm at the respective nurses' station. When single-station detectors and related devices are combined with a nursing call system, the nursing call system shall be listed for the intended combined use.

EXCEPTION: In rooms equipped with automatic door closers having integral smoke detectors on the room side, the integral detector may substitute for the room smoke detector, provided it performs the required alerting functions.

1007.2.7.2 Division 3 Occupancies.

1007.2.7.2.1 General. Group I, Division 3 Occupancies shall be provided with a manual and automatic fire alarm system installed for alerting staff in accordance with Section 1007.2.7.2. See also Section 1007.2.12.

1007.2.7.2.2 System initiation. Actuation of an automatic fire-extinguishing system, a manual fire alarm box or a fire detector shall initiate an approved fire alarm signal which automatically notifies staff. Presignal systems shall not be used.

1007.2.7.2.3 Manual fire alarm boxes.

1. **General.** Manual fire alarm boxes need not be located in accordance with Section 1007.3.3.1 when they are provided at staff-attended locations having direct supervision over areas where manual fire alarm boxes have been omitted.

2. **Locking of manual fire alarm boxes.** Manual fire alarm boxes are allowed to be locked in areas occupied by detainees, provided that staff members are present within the subject area and have keys readily available to operate the manual fire alarm boxes.

1007.2.7.2.4 Smoke detection. An approved automatic smoke-detection system shall be installed throughout resident housing areas, including sleeping areas and contiguous day rooms, group activity spaces and other common spaces normally accessible to residents.

EXCEPTION: Other approved smoke-detection arrangements providing equivalent protection, such as placing detectors in exhaust ducts from cells or behind protective grilles, are allowed when necessary to prevent damage or tampering.

1007.2.7.2.5 Zoning and annunciation. Alarm and trouble signals shall be annunciated at an approved constantly attended location. Such signals shall indicate the zone of origin.

Separate zones shall be provided for individual fire-protection systems, buildings, floors, cell complexes and sections of floors compartmented by smoke-stop partitions.

1007.2.7.2.6 Monitoring. The fire alarm system shall be monitored by an approved central, proprietary or remote station service or by transmission of a local alarm which will give audible and visual signals at an approved constantly attended location.

1007.2.8 Group M Occupancies. See Section 1007.2.12.

1007.2.9 Group R, Division 1 Occupancies.

1007.2.9.1 System requirements.

1007.2.9.1.1 General. Group R Occupancies shall be provided with fire alarm systems in accordance with Section 1007.2.9. Group R, Division 1 Occupancies shall be provided with a manual and automatic fire alarm system in apartment houses three or more stories in height or containing 16 or more dwelling units, in hotels three or more stories in height or containing 20 or more guest rooms, and in congregate residences three or more stories in height or having an occupant load of 20 or more. See also Section 1007.2.12.

EXCEPTIONS: 1. A manual fire alarm system need not be provided in buildings not over two stories in height when all individual dwelling units and contiguous attic and crawl spaces are separated from each other and public or common areas by at least one-hour fire-resistive occupancy separations and each individual dwelling unit or guest room has an exit directly to a public way, exit court or yard.

2. A separate fire alarm system need not be provided in buildings which are protected throughout by an approved supervised fire sprinkler system conforming with the Building Code and having a local alarm to notify all occupants.

1007.2.9.1.2 Manual fire alarm boxes. Manual fire alarm boxes are not required for interior corridors having smoke detectors as specified in Section 1007.2.9.1.3.

1007.2.9.1.3 Smoke detectors. Smoke detectors shall be provided in all common areas and interior corridors serving as a required exit for an occupant load of 10 or more.

1007.2.9.1.4 Heat detectors. Heat detectors shall be provided in common areas such as recreational rooms, laundry rooms, furnace rooms, and similar areas in accordance with U.F.C. Standard 10-3.

1007.2.9.1.5 Visual signaling devices. Guest rooms for persons with hearing impairments shall be provided with visible and audible alarm-indicating appliances, activated by both the in-room smoke detector and the building fire alarm system.

1007.2.9.2 Single-station smoke detectors. Approved single-station smoke detectors shall be installed in dwelling units, congregate residences and hotel or lodging house guest rooms in accordance with the Building Code.

Single-station smoke detectors shall not be connected to a fire alarm system. See also Section 1007.2.9.1.5.

EXCEPTION: Connection of such detectors for annunciation only.

1007.2.10 Group S Occupancies. See Section 1007.2.12.

1007.2.11 Group U Occupancies. No requirements.

1007.2.12 Special uses and conditions.

1007.2.12.1 Amusement buildings.

1007.2.12.1.1 General. An approved smoke-detection system shall be provided in amusement buildings in accordance with Section 1007.2.12.1.

EXCEPTION: In areas where ambient conditions will cause a smoke-detection system to alarm, an approved alternate type of automatic detector shall be installed.

1007.2.12.1.2 Alarm system. Activation of any single smoke detector, the automatic sprinkler system or other automatic fire-detection device shall immediately sound an alarm in the building at a constantly supervised location from which the manual operation of systems noted in Section 1007.2.12.1.3 can be initiated.

1007.2.12.1.3 System response. The activation of two or more smoke detectors, a single smoke detector monitored by an alarm verification zone, the automatic sprinkler system or other approved fire-detection device shall automatically:

1. Stop confusing sounds and other visual effects,
2. Activate approved directional exit marking, and
3. Cause illumination of the exit path with light of not less than one footcandle at the walking surface.

1007.2.12.1.4 Public address system. The public address system is also allowed to serve as an alarm.

1007.2.12.2 High-rise buildings.

1007.2.12.2.1 General. Group B office buildings and Group R, Division 1 Occupancies, each having floors used for human occupancy located more than 75 feet (22 860 mm) above the lowest level of fire department vehicle access, shall be provided with an automatic fire alarm system and a communication system in accordance with Section 1007.2.12.2.

1007.2.12.2.2 Automatic fire alarm system. Smoke detectors shall be provided in accordance with Section 1007.2.12.2.2. Smoke detectors shall be connected to an automatic fire alarm system. The actuation of any detector required by Section 1007.2.12.2.2 shall operate the emergency voice alarm-signaling system and shall place into operation all equipment necessary to prevent the recirculation of smoke. Smoke detectors shall be located as follows:

1. In every mechanical equipment, electrical, transformer, telephone equipment, elevator machine or similar room, and in elevator lobbies. Elevator lobby detectors shall be connected to an alarm verification zone or be listed as a releasing device;
2. In the main return-air and exhaust-air plenum of each air-conditioning system. Such detectors shall be located in a serviceable area downstream of the last duct inlet;
3. At each connection to a vertical duct or riser serving two or more stories from a return-air duct or plenum of an air-conditioning system. In Group R, Division 1 Occupancies, an approved smoke detector is allowed to be used in each return-air riser carrying not more than 5,000 cubic feet per minute (2360 L/s) and serving not more than 10 air-inlet openings; and
4. For Group R, Division 1 Occupancies, in all interior corridors serving as a required exit for an occupant load of 10 or more.

1007.2.12.2.3 Emergency voice alarm-signaling system. The operation of any automatic fire detector, sprinkler or water-flow device shall automatically sound an alert tone followed by voice instructions giving appropriate information and directions on a general or selective basis to the following terminal areas:

1. Elevators,
2. Elevator lobbies,
3. Corridors,
4. Exit stairways,
5. Rooms and tenant spaces exceeding 1,000 square feet (93 m^2) in area,
6. Dwelling units in apartment houses, and
7. Hotel guest rooms or suites.

A manual override for emergency voice communication shall be provided for all paging zones.

The emergency voice alarm-signaling system shall be designed and installed in accordance with the Building Code and U.F.C. Standard 10-2.

1007.2.12.2.4 Fire department communication system. A two-way, approved fire department communication system shall be provided for fire department use. It shall operate between the central control station and elevators, elevator lobbies, emergency and standby power rooms and at entries into enclosed stairways.

1007.2.12.3 Buildings with atriums. Actuation of an atrium smoke-control system required by the Building Code shall initiate an audible fire alarm signal in designated portions of the building.

1007.2.12.4 High-piled combustible storage uses. When required by Article 81, high-piled combustible storage uses shall be provided with an automatic smoke-detection system throughout.

1007.2.12.5 Special egress-control devices. When special egress-control devices are installed on exit doors, an automatic smoke-detection system shall be installed throughout the building. (See U.B.C. Section 1004.5.)

1007.2.12.6 Corridors in office uses. When required by the Building Code for corridors in lieu of one-hour corridor construction, smoke detectors shall be installed within office corridors in accordance with their listing. The actuation of any detector shall activate alarms audible in all areas served by the corridor. (See U.B.C. Section 1005.7, Exception 5.)

1007.2.12.7 Aerosol storage uses. When required by Article 88, aerosol storage rooms and general purpose warehouses containing aerosols shall be provided with an approved manual alarm system.

1007.2.12.8 Smoke-control systems. An approved automatic smoke-detection system shall be provided when required by the Building Code for automatic control of a smoke-control system. (See U.B.C. Section 905.9.)

1007.3 General System Design and Installation Requirements.

1007.3.1 Design standards. Fire alarm systems, automatic fire detectors, emergency voice alarm communication systems and notification devices shall be designed, installed and maintained in accordance with U.F.C. Standards 10-2 and 10-3 and other nationally recognized standards.

1007.3.2 Equipment. Systems and components shall be listed and approved for the purpose for which they are installed.

1007.3.3 System layout and operation.

1007.3.3.1 Manual fire alarm boxes. When a manual fire alarm system is required, manual fire alarm boxes shall be distributed throughout so that they are readily accessible, unobstructed, and are located in the normal path of exit travel from the area and as follows:

1. At every exit from every level.

2. Additional fire alarm boxes shall be located so that travel distance to the nearest box does not exceed 200 feet (60 960 mm).

1007.3.3.2 Control units, annunciator panels and access keys. The alarm control unit, remote annunciator panel and access keys to locked fire alarm equipment shall be installed and maintained in a location approved by the chief.

1007.3.3.3 Alarm initiation and signal.

1007.3.3.3.1 General. When actuated, fire alarm-initiating devices shall activate an alarm signal which is audible throughout the building or in designated portions of the building when approved by the chief.

EXCEPTION: Single-station detectors in dwelling units, rooms used for sleeping purposes in hotel and lodging houses, and patient sleeping rooms in hospitals and nursing homes.

1007.3.3.3.2 Alarm signal. The alarm signal shall be keyed to one half to one second "on" and one second "off" for three cycles, immediately after which, when a voice alarm is required by Section 1007.2, a voice announcement shall be broadcast. The alarm signal shall be repeated for the duration that the fire alarm system is activated.

EXCEPTION: This alarm signal is not required for:

1. Group A Occupancies having a fire alarm signal in accordance with Section 1007.2.2.
2. Patient and inmate areas of Group I Occupancies.

1007.3.3.3.3 Audibility. The alarm signal shall be a distinctive sound which is not used for any other purpose other than the fire alarm. Alarm-signaling devices shall produce a sound that exceeds the prevailing equivalent sound level in the room or space by 15 decibels minimum, or exceeds any maximum sound level with a duration of 30 seconds minimum by 5 decibels minimum, whichever is louder. Sound levels for alarm signals shall be 120 decibels maximum.

1007.3.3.3.4 Visual alarms. Alarm systems shall include both audible and visual alarms. Alarm devices shall be located in hotel guest rooms as required by the Building Code (see U.B.C. Section 1105.4.6); accessible public- and common-use areas, including toilet rooms and bathing facilities; hallways; and lobbies. (See Council of American Building Officials/American National Standards Institute Standard A117.1-1992, Section 4-26.2, for additional information about visual signals.)

1007.3.3.4 Connections to other systems. A fire alarm system shall not be used for any purpose other than fire warning unless approved by the chief.

1007.3.3.5 Supervision. Means of interconnecting equipment, devices and appliances shall be supervised for the integrity of the interconnecting conductors or equivalent, as set forth in U.F.C. Standard 10-2.

1007.3.3.6 Monitoring.

1007.3.3.6.1 General. When required by the chief, fire alarm systems shall be monitored by an approved central, proprietary or remote station service or a local alarm which gives audible and visual signals at a constantly attended location.

1007.3.3.6.2 Automatic telephone dialing devices. Automatic telephone dialing devices used to transmit an emergency alarm shall not be connected to any fire department telephone number unless approved by the chief.

1007.3.3.7 Annunciation. Fire alarm systems shall be divided into alarm zones when required by the chief. When two or more alarm zones are required, visible annunciation shall be provided in a location approved by the chief.

1007.3.4 Acceptance test and certification.

1007.3.4.1 Acceptance test. Upon completion of the installation, a satisfactory test of the entire system shall be made in the presence of the chief. All functions of the system or alteration shall be tested.

1007.3.4.2 Certification. The permittee shall provide written certification to the chief that the system has been installed in accordance with the approved plans and specifications.

1007.3.4.3 Instructions. When required by the chief, operating, testing and maintenance instructions and "as-built" drawings and equipment specifications shall be provided at an approved location.

TABLE 1004-A—STANDPIPE REQUIRED SYSTEMS

OCCUPANCY	NONSPRINKLERED BUILDING[1]		SPRINKLERED BUILDING[2,3]	
× 304.8 for mm × 0.0929 for m^2	Standpipe Class	Hose Requirement	Standpipe Class	Hose Requirement
1. Occupancies exceeding 150 ft. in height and more than one story	III	Yes	I	No
2. Occupancies 4 stories or more but less than 150 ft. in height, except Group R, Division 3[7]	[I and II[4]] (or III)	[5] Yes	I	No
3. Group A Occupancies with occupant load exceeding 1,000[6]	II	Yes	No requirement	No
4. Group A, Division 2.1 Occupancies over 5,000 square feet in area used for exhibition	II	Yes	II	Yes
5. Groups I; H; B; S; M; F, Division 1 Occupancies less than 4 stories in height but greater than 20,000 square feet per floor[7]	II[4]	Yes	No requirement	No
6. Stages more than 1,000 square feet in area	II	No	III	No

[1]Except as otherwise specified in Item 4 of this table, Class II standpipes need not be provided in basements having an automatic fire-extinguishing system throughout.

[2]The standpipe system may be combined with the automatic sprinkler system.

[3]Portions of otherwise sprinklered buildings which are not protected by automatic sprinklers shall have Class II standpipes installed as required for the unsprinklered portions.

[4] In open structures where Class II standpipes may be damaged by freezing, the building official may authorize the use of Class I standpipes which are located as required for Class II standpipes.

[5]Hose is required for Class II standpipes only.

[6]Class II standpipes need not be provided in assembly areas used solely for worship.

[7]For the purposes of this table, occupied roofs of parking structures shall be considered an additional story. In parking structures, a tier is a story.

ARTICLE 11 — GENERAL SAFETY PRECAUTIONS

SECTION 1101 — GENERAL

1101.1 Scope. General safety precautions shall be in accordance with Article 11. See also Appendices II-A, II-C, II-D, IV-A and IV-B.

1101.2 Definitions. For definitions of BONFIRE, FLAME-RESISTANT MATERIAL, OPEN BURNING, RECREATIONAL FIRE, RUBBISH and SMOKING MATERIAL, see Article 2.

1101.3 Permits and Plans. Permits are required to conduct open burning, store tires outdoors, store combustible material, operate a parade float and operate a commercial rubbish-handling operation as set forth in Section 105, Permits o.1, t.2, c.6, p.1 and c.8, respectively.

A plan showing location and dimensions of tire storage areas, tire piles, buildings, aisles and access roads shall be submitted with applications for tire storage permits.

SECTION 1102 — INCINERATORS, OPEN BURNING AND COMMERCIAL BARBECUE PITS

1102.1 General. Incinerators, open burning and commercial barbecue pits shall be in accordance with Section 1102.

1102.2 Incinerators.

1102.2.1 General. Free-standing noncommercial incinerators not connected to buildings shall be in accordance with Section 1102.2. Incinerators shall be in accordance with other governing agencies regulating emissions. For other requirements and for other types of incinerators, see the Building and Mechanical codes.

1102.2.2 Construction. Free-standing incinerators shall be constructed of concrete or masonry and shall have a completely enclosed combustion chamber. Incinerators shall be equipped with a permanently attached spark arrester. The spark arrester shall be constructed of iron, heavy wire mesh or other noncombustible material with openings not larger than $^1/_2$ inch (12.7 mm).

1102.2.3 Location. Free-standing incinerators shall not be located within 10 feet (3048 mm) of combustible walls, roofs or other combustible material; building openings; or property lines. Incinerators shall not be located within 5 feet (1524 mm) of noncombustible buildings or structures. Chimney stacks shall be constructed in accordance with the Building Code.

1102.2.4 Maintenance. Incinerators shall be maintained in good condition at all times.

1102.2.5 Discontinuance. The chief is authorized to require incinerator use to be immediately discontinued if the chief determines that smoke emissions are offensive to occupants of surrounding property or if the use of the incinerator is determined by the chief to constitute a hazardous condition.

1102.3 Open Burning.

1102.3.1 General. Open burning shall be conducted in accordance with Section 1102.3. Open burning shall also be conducted as required by other governing agencies regulating emissions.

EXCEPTION: Recreational fires shall be in accordance with Section 1102.4.

1102.3.2 Notification. Prior to commencement of open burning, the fire department shall be notified.

1102.3.3 Material restrictions. Open burning of rubbish containing paper products is prohibited.

1102.3.4 Time and atmospheric restrictions. Open burning shall only be performed when time and atmospheric conditions comply with the limits set forth in the open-burning permit.

1102.3.5 Location. Open burning shall not be conducted within 50 feet (15 240 mm) of any structure or other combustible material. Conditions which could cause the fire to spread to within 50 feet (15 240 mm) of a structure shall be eliminated prior to ignition.

EXCEPTION: Clearance from structures and other combustible material is allowed to be reduced as follows:

1. Not less than 15 feet (4572 mm) when burning is conducted in an approved burning appliance.
2. Not less than 25 feet (7620 mm) when the pile size is 3 feet (914 mm) or less in diameter and 2 feet (610 mm) or less in height.

1102.3.6 Fire-extinguishing equipment. A garden hose connected to a water supply or other approved fire-extinguishing equipment shall be readily available for use at open-burning sites.

1102.3.7 Attendance. Burning material shall be constantly attended by a person knowledgeable in the use of the fire-extinguishing equipment required by Section 1102.3.6 and familiar with the permit limitations which restrict open burning. An attendant shall supervise the burning material until the fire has been extinguished.

1102.3.8 Discontinuance. The chief is authorized to require that open burning be immediately discontinued if the chief determines that smoke emissions are offensive to occupants of surrounding property or if the open burning is determined by the chief to constitute a hazardous condition.

1102.4 Recreational Fires.

1102.4.1 General. Recreational fires shall be in accordance with Section 1102.4.

1102.4.2 Location. Recreational fires shall not be conducted within 25 feet (7620 mm) of a structure or combustible material unless contained in a barbecue pit. Conditions which could cause a fire to spread to within 25 feet (7620 mm) of a structure shall be eliminated prior to ignition.

1102.4.3 Fire-extinguishing equipment. Buckets, shovels, garden hoses or a fire extinguisher with a minimum 4-A rating shall be readily available for use at recreational fires.

1102.4.4 Attendance. Recreational fires shall be constantly attended by a person knowledgeable in the use of fire-extinguishing equipment required by Section 1102.4.3. An attendant shall supervise a recreational fire until such fire has been extinguished.

1102.4.5 Discontinuance. The chief is authorized to require that recreational fires be immediately discontinued if such fires are determined by the chief to constitute a hazardous condition.

1102.5 Commercial Barbecue Pits.

1102.5.1 Indoor locations. Barbecue pits used for commercial cooking operations in buildings shall be constructed as commercial food heat-processing equipment in accordance with the Mechanical Code. See also Section 1006.

1102.5.2 Outdoor locations.

1102.5.2.1 Construction. Barbecue pits in outdoor locations shall be constructed of concrete or approved noncombustible materials.

1102.5.2.2 Location. Barbecue pits outside of buildings shall not be located within 10 feet (3048 mm) of combustible walls or roofs or other combustible material.

1102.5.2.3 Portable fire extinguishers. Portable fire extinguishers shall be provided for commercial barbecue pits in accordance with U.F.C. Standard 10-1.

SECTION 1103 — COMBUSTIBLE MATERIALS

1103.1 General. Storage, accumulation, use and handling of combustible materials shall be in accordance with Section 1103.

1103.2 Storage and Accumulation of Rubbish and Vegetation.

1103.2.1 Rubbish within and adjacent to buildings and structures.

1103.2.1.1 General. Rubbish kept within or adjacent to buildings or structures shall be in accordance with Section 1103.2.1.

EXCEPTION: Commercial rubbish-handling operations shall be in accordance with Section 1103.2.3.

1103.2.1.2 Required storage conditions. Combustible rubbish kept or accumulated within or adjacent to buildings or structures shall be in containers complying with Section 1103.2.1.4 or in rooms or vaults constructed of noncombustible materials.

1103.2.1.3 Oily rags. Oily rags and similar materials shall be stored in metal, metal-lined or other approved containers equipped with tightfitting covers.

1103.2.1.4 Rubbish containers.

1103.2.1.4.1 General. Rubbish containers kept outside of rooms or vaults shall not exceed 40.5 cubic feet (1.15 m^3) capacity. Containers exceeding $5^1/_3$ cubic feet [40 gallons (0.15 m^3)] capacity shall be constructed of noncombustible materials or nonmetallic materials complying with Section 1103.2.1.4.2.

Containers exceeding $5^1/_3$ cubic feet [40 gallons (0.15 m^3)] capacity shall be provided with lids.

1103.2.1.4.2 Nonmetallic containers. Nonmetallic rubbish containers exceeding $5^1/_3$ cubic feet [40 gallons (0.15 m^3)] capacity shall be manufactured of materials having a peak rate of heat release not exceeding 300 kW/m^2 at a flux of 50 kW/m^2 when tested in accordance with nationally recognized standards. See Article 90, Standard a.4.10. Such containers shall be permanently labeled indicating capacity and peak rate of heat release.

1103.2.1.5 Removal. Combustible rubbish stored in containers outside of noncombustible vaults or rooms shall be removed from buildings at least once each working day.

1103.2.2 Rubbish within dumpsters. Dumpsters and containers with an individual capacity of 1.5 cubic yards [40.5 cubic feet (1.15 m^3)] or more shall not be stored in buildings or placed within 5 feet (1524 mm) of combustible walls, openings or combustible roof eave lines.

EXCEPTIONS: 1. Areas containing dumpsters or containers protected by an approved automatic sprinkler system.

2. Structures of Types I and II fire-resistive construction used for dumpster or container storage located not less than 10 feet (3048 mm) from other buildings.

1103.2.3 Commercial rubbish-handling operations. Occupancies exclusively performing commercial rubbish handling or recycling shall maintain rubbish or product to be processed or recycled as follows:

1. In approved vaults,
2. In covered metal or metal-lined receptacles or bins, or
3. Completely baled and stacked in an orderly manner in an approved location.

1103.2.4 Combustible vegetation. Cut or uncut weeds, grass, vines and other vegetation shall be removed when determined by the chief to be a fire hazard. When the chief determines that total removal of growth is impractical due to size or environmental factors, approved fuel breaks shall be established. Designated areas shall be cleared of combustible vegetation to establish the fuel breaks.

1103.3 Storage, Use and Handling of Miscellaneous Combustible Materials

1103.3.1 General. Storage, use and handling of miscellaneous combustible materials shall be in accordance with Section 1103.3.

1103.3.2 Storage in buildings.

1103.3.2.1 General. Storage of combustible materials in buildings shall be orderly.

1103.3.2.2 Ceiling clearance. Storage shall be maintained 2 feet (610 mm) or more below the ceiling in nonsprinklered areas of buildings.

Storage shall be maintained 18 inches (457 mm) or more below sprinkler head deflectors in sprinklered areas of buildings.

1103.3.2.3 Exits. Combustible material shall not be stored in exits or exit enclosures.

1103.3.2.4 Equipment rooms. Combustible material shall not be stored in boiler rooms, mechanical rooms or electrical equipment rooms.

1103.3.2.5 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 one-hour fire-resistive construction. Openings shall be protected by assemblies that are self-closing and are of noncombustible construction or solid wood core not less than $1\frac{3}{4}$ inch (44.5 mm) in thickness. Storage shall not be placed on exposed joists.

EXCEPTIONS: 1. Areas protected by approved automatic sprinkler systems.

2. Group R, Division 3 and Group U Occupancies.

1103.3.2.6 Fueled equipment. Fueled equipment, including but not limited to motorcycles, mopeds, lawn-care equipment and portable cooking equipment, shall not be stored, operated or repaired within a building.

EXCEPTIONS: 1. Buildings or rooms constructed for such use in accordance with the Building Code.

2. When allowed by other provisions of this code.

The chief is authorized to require removal of such equipment from any location when the presence of such equipment is determined by the chief to be hazardous.

For requirements in covered mall buildings, see Section 3504.3.

1103.3.3 Use of combustible decorative materials.

1103.3.3.1 General. Combustible decorative materials used in Group A; Group H and M wholesale and retail stores; Group E; Group I; and public areas of Group R, Division 1 Occupancies shall be flame resistant as determined by procedures set forth in Section 1103.3.3.

EXCEPTIONS: 1. The display of salable goods.

2. Educational materials and product brochures that are stored, distributed and maintained in an approved manner.

3. Live vegetation of a type approved by the chief.

4. Individual decorative items of a size and separated from others, as approved by the chief.

1103.3.3.2 Textile and film materials. Textile and film materials shall be treated and maintained flame resistant in accordance with nationally recognized standards. See Article 90, Standard n.2.3.

1103.3.3.3 Wood. Wood materials less than $\frac{1}{4}$ inch (6.4 mm) nominal thickness shall be treated with a flame-retardant coating in accordance with nationally recognized standards. See Article 90, Standard n.2.4.

1103.3.3.4 Foam plastics. Foam plastics and materials containing foam plastics shall be in accordance with the following:

1. Exhibit booth construction shall have a maximum heat-release rate of 100 kilowatts when tested in accordance with nationally recognized standards. See Article 90, Standard u.1.15.

2. Decorative objects, including but not limited to mannequins, murals and signs, shall have a maximum heat-release rate of 150 kilowatts when tested in accordance with nationally recognized standards. See Article 90, Standard u.1.15.

EXCEPTION: When the aggregate area of murals, signs or similar decorative objects occupies less than 10 percent of the floor or wall area, this requirement may be waived by the chief.

3. Theater, motion picture and television stage settings with or without horizontal projections and simulated caves or caverns shall have a maximum heat-release rate of 100 kilowatts when tested in accordance with nationally recognized standards. See Article 90, Standard u.1.15.

1103.3.3.5 Nonfoam plastics. Plastic materials other than foam plastics shall be flame resistant or shall be rendered flame resistant by treating with a flame-retardant coating.

1103.3.3.6 Maintenance of flame-resistant treatments. Treatments used to render materials flame resistant shall be renewed as often as necessary to maintain the materials' flame resistance in accordance with Section 1103.3.3.

1103.3.4 Atrium furnishings.

1103.3.4.1 Potential heat. Potential heat of combustible furnishings and decorative materials within atria shall not exceed 9,000 Btu per pound (20 934 J/g) when located within an area that is more than 20 feet (6096 mm) below ceiling-level sprinklers.

1103.3.4.2 Decorative materials. Decorative material in atria shall be noncombustible, flame resistant or treated with a flame retardant.

1103.3.5 Outside storage.

1103.3.5.1 Location. Outside storage of combustible materials shall not be located within 10 feet (3048 mm) of a property line.

EXCEPTIONS: 1. The separation distance is allowed to be reduced to 3 feet (914 mm) for storage not exceeding 6 feet (1829 mm) in height.

2. The separation distance is allowed to be reduced when the chief determines that no hazard to the adjoining property exists.

1103.3.5.2 Storage beneath buildings and structures. Combustible material shall not be stored beneath a building or structure.

1103.3.5.3 Storage beneath overhead projections from buildings. Combustible materials stored or displayed outside of buildings that are protected by automatic sprinklers shall not be stored or displayed under unsprinklered eaves, canopies or other projections or overhangs.

1103.3.5.4 Height. Storage in the open shall not exceed 20 feet (6096 mm) in height.

1103.3.6 Outside storage of tires.

1103.3.6.1 General. Outside tire storage shall be in accordance with Section 1103.3.6.

1103.3.6.2 Individual piles. Tires shall be restricted to individual piles not exceeding 5,000 square feet (464.5 m^2) of continuous area. Piles shall not exceed 50,000 cubic feet (1415.8 m^3) in volume or 10 feet (3048 mm) in height.

1103.3.6.3 Separation. A clear space of at least 40 feet (12 192 mm) shall be provided between piles. The clear space shall not contain flammable or combustible material or vegetation. Tire storage shall not be located within 10 feet (3048 mm) of any property line or building and shall not exceed 6 feet (1829 mm) in height when within 20 feet (6096 mm) of any property line or building.

SECTION 1104 — PARADE FLOATS

1104.1 Decorative Material. Decorative material on parade floats shall be noncombustible or flame retardant.

1104.2 Fire Protection. Motorized parade floats and towing apparatus shall be provided with a minimum 2-A, 10-B:C-rated portable fire extinguisher readily accessible to the operator.

SECTION 1105 — ASPHALT KETTLES

1105.1 Transporting. Asphalt kettles shall not be transported on a highway, road or street when the heat source for the kettle is operating.

EXCEPTION: Asphalt kettles in the process of patching road surfaces.

1105.2 Use. Asphalt kettles shall not be used inside or on the roof of a building.

1105.3 Fire Protection. A minimum 20-B:C-rated portable fire extinguisher shall be located within 30 feet (9144 mm) of each asphalt kettle when the heat source is operating. A minimum 20-B:C-rated portable fire extinguisher shall also be located on roofs during asphalt coating operations.

1105.4 Covers. Asphalt kettles shall be equipped with tightfitting covers.

1105.5 Location. Asphalt kettles shall not be located within 20 feet (6096 mm) of any combustible material, combustible building surface or building opening.

1105.6 Attendant. An attendant shall be within 100 feet (30 480 mm) of a kettle when the heat source is operating. Ladders or similar obstacles shall not form a part of the route between the attendant and the kettle.

EXCEPTION: Thermostatically controlled kettles.

SECTION 1106 — GAS METERS AND PIPING

Aboveground gas meters, regulators and piping exposed to vehicular damage due to proximity to alleys, driveways or parking areas shall be protected in an approved manner.

SECTION 1107 — HEAT-PRODUCING APPLIANCES

1107.1 General. Heating appliances shall be installed and maintained in accordance with their listing and the Building, Electrical and Mechanical codes. Clearance from combustible material shall be maintained as set forth in the Building and Mechanical codes and the product listing.

1107.2 Clothes Dryers. Clothes dryers shall be frequently cleaned to maintain the lint trap, mechanical and heating components free from excessive accumulations of lint.

EXCEPTION: Clothes dryers within private dwelling units of Group R Occupancies.

SECTION 1108 — POWERED INDUSTRIAL TRUCKS

1108.1 General. Powered industrial trucks shall be operated and maintained in accordance with Section 1108.

1108.2 Battery Chargers. Battery chargers shall be of an approved type. Combustible storage shall be kept a minimum of 5 feet (1524 mm) from battery chargers. Battery charging shall not be conducted in areas accessible to the public.

1108.3 Ventilation. Ventilation shall be provided in an approved manner in battery-charging areas to prevent a dangerous accumulation of flammable gases.

1108.4 Fire Extinguishers. Battery-charging areas shall be provided with a fire extinguisher having a minimum rating of 4-A-20B:C within 20 feet (6096 mm) of the battery charger.

1108.5 Refueling. Industrial trucks using liquid fuel or LP-gas shall be refueled outside of buildings or in areas specifically approved for that purpose, and in accordance with Articles 79 and 82.

1108.6 Repairs. Repairs to fuel systems, electrical systems or repairs utilizing open flame or welding shall be done in approved locations outside of buildings or in areas specifically approved for that purpose.

SECTION 1109 — CONTROL OF SOURCES OF IGNITION

1109.1 General. Ignition sources shall be in accordance with Section 1109.

1109.2 Clearance from Ignition Sources. Clearance between ignition sources, such as light fixtures, heaters and flame-producing devices, and combustible storage shall be maintained in an approved manner.

1109.3 Portable Fueled Open-flame Devices.

1109.3.1 General. Portable open-flame devices fueled by flammable or combustible gases or liquids shall be enclosed or installed in such a manner as to prevent the flame from contacting any combustible material.

EXCEPTIONS: 1. LP-gas-fueled devices as set forth in Article 82 not used for sweating pipe joints or removing paint.

2. Cutting and welding operations as set forth in Article 49.

3. Torches or flame-producing devices used as set forth in Section 1109.3.2.

1109.3.2 Use of torches and flame-producing devices.

1109.3.2.1 General. The use of torches and other flame-producing devices for sweating pipe joints, removing paint or applying roof membranes shall be in accordance with Section 1109.3.2.

1109.3.2.2 Location. Combustible material in close proximity of the open flame shall be protected from ignition by shielding or wetting.

1109.3.2.3 Fire protection. A minimum 2-A, 20-B:C-rated fire extinguisher or a charged water hose equipped with a nozzle shall be located within 30 feet (9144 mm) of the location where work is in progress.

1109.3.2.4 Fire watch. A fire watch shall be maintained in the vicinity of the locations where open-flame operations have been conducted for not less than one-half hour after such operations have ceased.

1109.4 Smoking.

1109.4.1 Designated areas. When the chief determines that smoking constitutes a fire hazard in any areas of piers, wharves, warehouses, stores, industrial plants, institutions, schools, places of assembly and in open spaces where combustible materials are stored or handled, the chief is authorized to order the owner or occupant to post approved NO SMOKING signs in each building, structure, room or place in which smoking is prohibited. Such signs shall be conspicuously and suitably located and shall be maintained. When necessary, the chief is authorized to designate specific safe locations in any building, structure or place where smoking is allowed.

1109.4.2 Hazardous environmental conditions. When the chief determines that hazardous environmental conditions necessitate controlled use of smoking materials, the ignition or use of such materials in mountainous, brush-covered or forest-covered areas or other designated areas is prohibited.

EXCEPTION: Designated smoking areas approved by the chief.

1109.5 Burning Objects. Lighted matches, cigarettes, cigars or other burning objects shall not be discarded in such a manner that could cause ignition of other combustible material.

1109.6 Hot Ashes and Spontaneous Ignition Sources. Hot ashes, cinders, smoldering coals or greasy or oily materials subject to spontaneous ignition shall not be deposited in a combustible receptacle, within 10 feet (3048 mm) of other combustible material including combustible walls and partitions or within 2 feet (610 mm) of openings to buildings.

EXCEPTION: The separation distance to other combustible materials is allowed to be reduced to 2 feet (610 mm) when the dangerous material is deposited in covered metal or noncombustible receptacles which are placed on a noncombustible floor, ground surface or stand.

1109.7 Sparks from Chimneys. Chimneys used with fireplaces or heating appliances in which solid or liquid fuel is used shall be maintained with a spark arrester as required for incinerators by the Mechanical Code.

EXCEPTION: Chimneys which are located more than 200 feet (60 960 mm) from any mountainous, brush-covered or forest-covered land or land covered with flammable material and are not attached to a structure having less than a Class C roof covering, as set forth in the Building Code.

SECTION 1110 — VACANT BUILDINGS

1110.1 General. Buildings and properties which are vacant or in the process of being vacated shall be in accordance with Section 1110.

EXCEPTION: Occupancies regulated by Article 80.

1110.2 Removal of Combustible and Hazardous Materials. Upon vacating or abandoning a building or property, the owner or occupant thereof shall remove all combustible and hazardous materials.

1110.3 Maintenance of Vacant Buildings and Properties. Vacant buildings and properties shall be maintained free of accumulations of combustible or hazardous materials.

Vacant buildings shall be maintained, securely locked or barricaded to prevent entry by unauthorized persons.

SECTION 1111 — CHANGES IN USE OR OCCUPANCY OF BUILDINGS OR STRUCTURES

Changes made in the character or use of an occupancy shall be approved by the building official.

SECTION 1112 — MAINTENANCE OF FIRE-RESISTIVE CONSTRUCTION

1112.1 Fire-resistive Construction. Required fire-resistive construction, including occupancy separations, area separation walls, exterior walls due to location on property, fire-resistive requirements based on type of construction, draft-stop partitions and roof coverings shall be maintained as specified in the Building Code and this code and shall be properly repaired, restored or replaced when damaged, altered, breached, penetrated, removed or improperly installed.

When required fire-rated gypsum wallboard walls or ceilings are broken to the extent that through openings exist, the damaged gypsum wallboard shall be replaced or returned to the required level of fire resistance using a listed repair system or using materials and methods equivalent to the original construction.

1112.2 Fire Doors, Windows, Dampers and Other Fire Assemblies for Protection of Openings.

1112.2.1 Maintenance. Required fire assemblies shall be maintained as specified in the Building Code and this code. These assemblies shall bear an approved label or other identification showing the rating thereof and shall be properly repaired, restored or replaced when damaged, altered, breached, penetrated, removed or improperly installed.

1112.2.2 Operation. Fire assemblies shall not be obstructed or otherwise impaired from their proper operation at any time.

1112.2.3 Identification. When required by the chief, a sign shall be displayed permanently near or on each required fire door in letters not less than 1 inch (25.4 mm) high to read as follows:

FIRE DOOR
DO NOT OBSTRUCT

1112.2.4 Testing. Horizontal or vertical sliding and rolling fire doors shall be inspected and tested annually by the owner or the owner's authorized representative to check for proper operation and full closure. Resetting of the release mechanism shall be done in accordance with the manufacturer's written instructions. A written record shall be maintained and shall be available to the inspection authority.

SECTION 1113 — MAINTENANCE OF INTERIOR WALL AND CEILING FINISHES

Interior wall and ceiling finishes shall be maintained in accordance with the Building Code.

SECTION 1114 — FLOOR OPENINGS

Floor openings shall be surrounded by guardrails as set forth in the Building Code or shall have covers which are automatic closing or maintained in a closed position at all times.

ARTICLE 12 — MAINTENANCE OF EXITS AND EMERGENCY ESCAPES

SECTION 1201 — GENERAL

1201.1 Scope. Maintenance of exits and emergency escapes in buildings and structures used or intended to be used for human occupancy shall be in accordance with Article 12.

See Articles 24, 25, 32, 77 and 81 for additional exit requirements.

All references to the Building Code are to the code edition under which the building was constructed.

1201.2 Definitions. For definitions, see Article 2 and the Building Code.

SECTION 1202 — ADEQUACY OF EXITS IN EXISTING OCCUPANCIES

1202.1 General. Exits conforming to the requirements of the Building Code under which they were constructed may be considered as complying exits if, in the opinion of the chief, they do not constitute a distinct hazard to life. The required fire-resistive rating of walls, ceilings and openings that are part of an exit shall be maintained.

Buildings or structures that were not constructed under the requirements of a building code shall meet the minimum requirements of Article 12. See also Appendices I-A and I-B.

1202.2 Abatement of Buildings and Structures with Inadequate Exits. Buildings and structures which are not provided with adequate exits or emergency escapes are unsafe and shall be subject to the abatement procedures specified in Section 103.4.5.

SECTION 1203 — EXIT OBSTRUCTIONS

Obstructions, including storage, shall not be placed in the required width of an exit, except projections as allowed by the Building Code. Exits shall not be obstructed in any manner and shall remain free of any material or matter where its presence would obstruct or render the exit hazardous.

SECTION 1204 — AISLES

1204.1 General. Aisles leading to required exits shall be provided from all portions of buildings. Aisles located within an accessible route of travel shall also comply with the Building Code requirements for accessibility. (See U.B.C. Chapter 11.)

1204.2 Aisle Width.

1204.2.1 General. Aisle width shall be in accordance with Section 1204.2 for occupancies, other than assembly occupancies, without fixed seats. Aisle width in assembly occupancies shall be in accordance with Section 2501.9.

1204.2.2 Width in occupancies without fixed seats. The width of aisles in occupancies without fixed seats shall be provided in accordance with the following:

1. In areas serving employees only, the minimum aisle width shall be 24 inches (610 mm) but not less than the width required by the number of employees served.

2. In public areas of Groups B and M Occupancies, the minimum clear aisle width shall be 36 inches (914 mm) where tables, counters, furnishings, merchandise or other similar obstructions are placed on one side of the aisle only and 44 inches (1118 mm) when such obstructions are placed on both sides of the aisle.

SECTION 1205 — FIRE ESCAPE

When fire escapes are used as an approved exit, they shall be maintained in accordance with this code. Fire escapes and related balconies, ladders, landings and operating devices shall not be obstructed in any manner.

SECTION 1206 — EMERGENCY ESCAPES

Emergency escape or rescue windows, doors or window wells required by the Building Code for sleeping rooms of Group R Occupancies shall be maintained free of any obstruction, including bars, grates or similar devices which would inhibit egress.

EXCEPTION: Bars, grilles, grates or similar devices are allowed provided that such devices are equipped with approved release mechanisms which are openable from the inside without the use of a key or special knowledge or effort, the release mechanisms are maintained operable, and the building is equipped with smoke detectors installed in accordance with the Building Code.

SECTION 1207 — DOORS

1207.1 General. Exit doors shall be maintained in accordance with Section 1207. Exit doors shall be maintained in an operable condition. Doors installed as part of required fire assemblies shall be maintained in accordance with Section 1112.

1207.2 Swing and Opening Force. When required by the Building Code, exit doors shall be of the pivoted or side-hinged swinging type. Exit doors shall swing in the direction of exit travel when serving any hazardous area or when the area served has an occupant load of 50 or more. The door shall swing to full-open position when an opening force not to exceed 30 pounds (133.45 N) is applied to the latch side.

1207.3 Locking Devices. Exit doors shall be openable from the inside without the use of a key or any special knowledge or effort. Exit doors shall not be locked, chained, bolted, barred, latched or otherwise rendered unusable. All locking devices shall be of an approved type.

EXCEPTIONS: 1. In Groups B, F, M and S Occupancies, key-locking hardware may be used on the main exit when the main exit consists of a single door or pair of doors if there is a readily visible, durable sign on, or adjacent to, the door stating THIS DOOR MUST REMAIN UNLOCKED DURING BUSINESS HOURS. This sign shall be in letters not less than 1 inch (25.4 mm) high on a contrasting background. When unlocked, the single door or both leaves of a pair of doors must be free to swing without operation of any latching device. The use of this exception may be revoked by the chief or building official for due cause.

2. Exit doors from individual dwelling units; Group R, Division 3 congregate residences; and guest rooms of Group R Occupancies having an occupant load of 10 or less may be provided with a night latch, dead bolt or security chain, provided such devices are openable from the inside without the use of a key or tool and mounted at a height not to exceed 48 inches (1219 mm) above the finished floor.

Manually operated edge- or surface-mounted flush bolts and surface bolts are prohibited. When exit doors are used in pairs and approved automatic flush bolts are used, the door leaf having the automatic flush bolts shall have no door knob or surface-mounted hardware. The unlatching of any leaf shall not require more than one operation.

EXCEPTIONS: 1. Group R, Division 3 Occupancies.

2. When a pair of doors serving a room not normally occupied is needed for the movement of equipment, manually operated edge or surface bolts may be used and a door closer need not be provided on the inactive leaf.

1207.4 Panic Hardware. Panic hardware, when installed, shall comply with the requirements of the Building Code. The activating member shall be mounted at a height of not less than 30 inches (762 mm) nor more than 44 inches (1118 mm) above the floor. The unlatching force shall not exceed 15 pounds (66.72 N) when applied in the direction of exit travel.

When balanced doors are used and panic hardware is required, panic hardware shall be of the push-pad type and the pad shall not extend across more than one half of the width of the door measured from the latch side.

1207.5 Special Egress-control Devices. When special egress-control devices or systems are installed, such devices or systems shall be maintained in accordance with the Building Code requirements for the original installation.

1207.6 Door Identification. Exit doors shall be marked so that they are readily distinguishable from the adjacent construction.

1207.7 Additional Doors. When required by the Building Code, additional doors provided for egress purposes shall be in accordance with all provisions of Article 12.

SECTION 1208 — GATES AND BARRIERS

1208.1 General. Gates and barriers installed in exit pathways shall be in accordance with Section 1208.

1208.2 Latch. Gates and barriers shall be openable without the use of a key or any special knowledge or effort. Gates and barriers in an exit shall not be locked, chained, bolted, barred, latched or otherwise rendered unopenable at times when the building or area served by the exit is occupied.

EXCEPTION: Gates or barriers used to restrict access to various portions of a building or area, provided the gates or barriers do not obstruct access to required exits from occupied spaces and any dead ends created by the installation of such devices do not exceed 20 feet (6096 mm) in length.

1208.3 Width. Gates and barriers installed across an exit shall be of sufficient size as to be capable of opening so that the clear width of the opening is not less than the exit width required by the Building Code.

1208.4 Swing. Gates and barriers installed across an exit shall swing in the direction of exit travel when required by the Building Code for exit doors.

SECTION 1209 — EXIT CORRIDORS

Exit corridors shall be maintained in accordance with the Building Code. Partitions, rails, counters and similar space dividers not over 5 feet 9 inches (1753 mm) in height above the floor shall not be construed to form corridors.

SECTION 1210 — STAIRWAYS AND RAMPS

1210.1 General. Exit stairways shall be maintained in accordance with the Building Code.

1210.2 Barriers. Barriers provided in exit stairways to prevent exit traffic ascending or descending a stairway from going beyond the grade level shall be maintained in an operable condition.

1210.3 Storage under Stairways. Storage is prohibited under exit stairways.

EXCEPTION: Storage is allowed under interior or exterior stairways when such stairways are not within exit enclosures and such spaces are protected on the enclosed side by one-hour fire-resistive construction as specified in the Building Code.

1210.4 Stairway Identification. Approved stairway identification signs shall be located at each floor level in all enclosed stairways in buildings four or more stories in height. The sign shall identify the stairway, indicate whether there is roof access, the floor level, and the upper and lower terminus of the stairway. The sign shall be located approximately 5 feet (1524 mm) above the floor landing in a position which is readily visible when the door is in the open or closed position. See Appendix I-C.

1210.5 Enclosures. Stair and ramp enclosures required by the Building Code shall be maintained and shall not have openings other than exit doorways and openings in exterior walls.

1210.6 Ramps. Ramps used as exits shall be maintained in accordance with the Building Code.

SECTION 1211 — EXIT ILLUMINATION

1211.1 General. Exit illumination shall be provided and maintained in accordance with the Building Code. Exits shall be illuminated when the building or structure is occupied.

1211.2 Emergency Power Equipment. Equipment providing emergency power for exit illumination and exit signs shall be maintained in an operable condition.

SECTION 1212 — EXIT SIGNS

1212.1 General. When two or more exits from a story are required (see U.B.C. Section 1003), exit signs shall be installed at stair enclosure doors, horizontal exits and other required exits from the story. When two or more exits are required from a room or area, exit signs shall be installed at the required exits from the room or area and where otherwise necessary to clearly indicate the direction of egress.

EXCEPTIONS: 1. Main exterior exit doors which obviously and clearly are identifiable as exits need not be signed when approved by the building official.

2. Group R, Division 3, and individual units of Group R, Division 1 Occupancies.

3. Exits from rooms or areas with an occupant load of less than 50 when located within a Group I, Division 1.1, 1.2 or 2 Occupancy or a Group E, Division 3 day-care occupancy.

1212.2 Additional Exit Signs. When the exit way is not easily identified from any part of a building, regardless of occupant load, the chief is authorized to require additional signs, lights or markings to assure that the exit way meets the intent of this code.

1212.3 Graphics. The color and design of lettering, arrows and other symbols on exit signs shall be in high contrast with their background. Words on the sign shall be in block letters 6 inches (152 mm) in height with a stroke of not less than $^3/_4$ inch (19 mm).

1212.4 Illumination. Signs shall be internally or externally illuminated by two electric lamps or shall be of an approved self-luminous type. When the luminance on the face of an exit sign is from an external source, it shall have an intensity of not less than 5.0 footcandles (53.82 lux) from either lamp. Internally illuminated signs shall provide equivalent luminance.

1212.5 Power Supply. Current supply to one of the lamps for exit signs shall be provided by the premises' wiring system. Power to the other lamp shall be from storage batteries or an on-site generator set and the system shall be installed in accordance with the Electrical Code. For high-rise buildings, see the Building Code. (See U.B.C. Section 403.)

1212.6 Floor-level Exit Signs. When exit signs are required by the Building Code (see U.B.C. Section 1013.1), additional approved low-level exit signs which are internally or externally illuminated, photoluminescent or self-luminous, shall be provided in all interior exit corridors serving guest rooms of hotels in Group R, Division 1 Occupancies.

The bottom of the sign shall not be less than 6 inches (152 mm) or more than 8 inches (203 mm) above the floor level. For exit doors, the sign shall be on the door or adjacent to the door with the closest edge of the sign within 4 inches (102 mm) of the door frame.

1212.7 Amusement Building Exit Marking. Approved directional exit marking and exit signs shall be provided in accordance with the Building Code. Approved low-level exit signs and directional marking shall be located not more than 8 inches (203 mm) above the walking surface and at the exit path. Such marking shall be activated in accordance with the Building Code. (See U.B.C. Section 408.5.3.)

1212.8 Concealment and Obstruction. Exit signs and directional exit markings shall not be concealed or obstructed.

SECTION 1213 — DISCHARGE, DISPERSAL AND REFUGE

1213.1 General. Areas designated for occupant discharge, dispersal or refuge shall be maintained unobstructed and clear of storage.

1213.2 Exit Plans. Approved plans for exiting shall be posted when required by the chief.

1213.3 Special Exit Facilities. When special conditions exist for exiting, such as exits through an adjacent room, exit courts and exterior exits, the exit system shall be maintained. When areas in a room are dedicated for exit use, the spaces so dedicated shall remain usable at all times the building is occupied.

ARTICLE 13 — EMERGENCY PROCEDURES

SECTION 1301 — GENERAL

1301.1 Scope. Reporting of emergencies, emergency plans and emergency procedures shall be in accordance with Article 13. See also Articles 51, 80 and 81.

1301.2 Definitions. For definitions of ALARM, FALSE ALARM, and FIRE, see Article 2.

SECTION 1302 — REPORTING OF EMERGENCIES AND FALSE ALARMS

1302.1 General. Reporting of fires and hazardous materials releases shall be in accordance with Section 1302.

1302.2 Reporting Emergencies. In the event a fire occurs or the discovery of a fire, smoke or unauthorized release of flammable or hazardous materials on any property occurs, the owner or occupant shall without delay report such condition to the fire department.

1302.3 False Alarms. False alarms shall not be given, signaled or transmitted or caused or permitted to be given, signaled or transmitted in any manner.

SECTION 1303 — EMERGENCY PLANS AND PROCEDURES

1303.1 General. Emergency plans, staff training and fire drills shall be provided in accordance with Section 1303. See also Appendix I-B.

1303.2 Implementation. In the event a fire is detected in a building or a fire alarm activates, the emergency plan shall be implemented.

1303.3 Occupancy-based Requirements.

1303.3.1 General. Emergency plans, employee duty assignments, employee training and fire drills as specified in Sections 1303.4, 1303.5 and 1303.6 shall be provided in Groups A, E, I and Group R, Division 1 Occupancies. Additional requirements shall be as set forth in Sections 1303.3.2 through 1303.3.5.

EXCEPTIONS: 1. Group A Occupancies used exclusively for religious worship with an occupant load of less than 2,000.

2. Group A, Division 3 Occupancies.

3. Group R, Division 1 Occupancy apartments without full-time staff need only comply with Section 1303.3.5.3.

1303.3.2 Group A Occupancies. Fire drills shall be conducted quarterly and shall be for employees only.

1303.3.3 Group E Occupancies.

1303.3.3.1 General. Exterior assembly areas shall be designated and shall be located away from the building being evacuated and so as to avoid interference with fire department operations. Exterior assembly areas shall be arranged to keep each evacuated class or group separated to provide accountability of all individuals involved in the drill.

1303.3.3.2 Fire drills. Fire drills in Group E Occupancies shall be conducted as follows:

1. **Frequency.** Fire drills shall be conducted at least once each month during school sessions.

   EXCEPTION: During severe weather, fire drills may be postponed when approved by the chief.

2. **Extent of evacuation.** Fire drills shall include the complete evacuation of all persons from the building or portion thereof used for educational purposes.

EXCEPTION: The staff member responsible for notifying the fire department and handling emergency communications.

3. **Fire department notification.** When required by the chief, the fire department shall be notified prior to each drill.

4. **Initiation.** When a fire alarm system is provided, fire drills shall be initiated by activation of the fire alarm system.

1303.3.4 Group I Occupancies.

1303.3.4.1 Emergency plan. Additional information provided on emergency plans shall include procedures for use of alarms, notification of occupants and emergency responders in the event of alarm system malfunctions, isolating the fire, evacuating each fire area and the building, and relocating nonambulatory persons. Copies of the plan shall be given to all supervisory personnel and a copy shall be available on the premises to all personnel at all times.

1303.3.4.2 Training.

1303.3.4.2.1 General. In addition to other specific duty assignments, all employees shall be trained to recognize and respond to fire alarm signals, and to initiate fire alarm signals utilizing both the fire alarm system and the public address system when provided.

1303.3.4.2.2 Training frequency. Employees shall be provided with refresher training for their assigned duties every six months.

1303.3.4.3 Fire drills. Fire drills shall be conducted quarterly for each shift. Fire drills shall be for staff members only. Fire drills shall be initiated by either the activation of the fire alarm system or a coded public announcement.

1303.3.4.4 Additional requirements for occupancies with restrained occupants.

1303.3.4.4.1 Staffing. Group I Occupancies with restrained occupants shall be staffed at all times. Staff shall be within three floors or 300 feet (91 440 mm) horizontally to the access door of each occupant housing area. When staff is located outside of a locked occupant housing area, the staff shall be able to release all locks necessary for emergency evacuation or rescue and initiate other actions required by the emergency plan to initiate evacuation within two minutes.

1303.3.4.4.2 Notification by occupants. Provisions shall be made so that restrained occupants can notify the staff of an emergency.

1303.3.4.4.3 Keys. Keys necessary for the unlocking of exit doors shall be individually identifiable by both sight and touch.

1303.3.5 Group R, Division 1 Occupancies.

1303.3.5.1 Fire drills. Fire drills shall be conducted quarterly for each shift. Fire drills shall be for staff members only.

1303.3.5.2 Exit diagrams. A diagram depicting two evacuation routes shall be posted on or immediately adjacent to every required exit door from a sleeping room.

EXCEPTION: Posting of diagrams is not required in apartment buildings.

1303.3.5.3 Fire emergency guide for apartment buildings.

1303.3.5.3.1 General. A fire emergency guide shall be provided for apartment buildings which describes the location, function and use of all fire-protection equipment and appliances accessible to tenants, including fire alarm systems, single-station smoke detectors and portable fire extinguishers. The guide shall also include an emergency evacuation plan for each dwelling unit.

1303.3.5.3.2 Review and maintenance of guides. Emergency guides shall be reviewed by the owner or manager at least annually and revised whenever changes are made in the occupancy or

physical arrangement of the building. Emergency guides and revisions shall be submitted to the fire department for review when required by the chief.

1303.3.5.3.3 Distribution. A copy of the emergency guide shall be given to each tenant prior to the time of initial occupancy.

1303.3.6 Group R, Division 4 Occupancies. When Appendix Chapter 3, Division IV, of the Building Code is adopted, Group R, Division 4 Occupancies shall comply with all of the emergency plans and procedures requirements set forth in Section 1303 for a Group I Occupancy.

1303.4 Emergency Plans.

1303.4.1 General. Emergency plans shall include the procedure for reporting of emergencies and notifying, relocating and evacuating occupants; staff member duties during emergencies; floor plans identifying the locations of portable fire extinguishers, other manual fire-extinguishing equipment, manual fire alarm pull stations and fire alarm control panels; floor plans identifying the primary and secondary routes of evacuation for each room or portion of the occupancy; floor plans indicating the locations of interior areas of refuge; and site maps identifying the designated exterior assembly area for each evacuation route.

1303.4.2 Review. Emergency plans shall be submitted to the fire department for review when required by the chief.

1303.4.3 Maintenance. Emergency plans shall be reviewed and updated annually. Additional reviews and updates shall be provided whenever changes are made in the occupancy or physical arrangement of the building. Revised plans shall be submitted for review in accordance with Section 1303.4.2.

1303.5 Employee Duties, Assignments and Training. When required by Section 1303.3, all employees shall be assigned duties for emergencies and shall be trained in their duties in accordance with Section 1303.5. Training shall include familiarization with assigned duties, evacuation routes, areas of refuge, exterior assembly areas and procedures for leading groups or assisting individuals to evacuate.

Employees shall be trained to know the locations and proper use of portable fire extinguishers. Employees shall be familiar with fire alarm signals, when alarms are provided, and emergency action required under potential emergency conditions.

Employees shall receive training in the emergency plans and their duties as part of new employee orientation and at least annually thereafter.

1303.6 Fire Drills.

1303.6.1 General. When required by Section 1303.3, fire drills shall be conducted in accordance with Section 1303.6. Fire drills shall be conducted in a manner that provides for execution of procedures set forth in the emergency plan. In addition, fire drills shall include a review of the emergency plan and execution of assigned employee duties.

When fire drills are conducted, the orderly evacuation of the building shall receive priority over the speed of evacuation.

1303.6.2 Drill participation. When fire drills are conducted, all persons who are subject to the fire drill requirements shall participate in the drill.

1303.6.3 Drill times and conditions. Fire drills shall be conducted at varying times and under varying conditions to simulate conditions that could occur during a fire or other emergency.

1303.6.4 Records. Records of fire drills shall be maintained on the premises for review by the fire department. Records shall include the date and time of each drill, the person conducting the drill and other information relative to the drill. In Group E Occupancies, the records shall include the time required to evacuate the building.

PART IV

SPECIAL OCCUPANCY USES

ARTICLE 24 — AIRPORTS, HELIPORTS AND HELISTOPS

SECTION 2401 — GENERAL

2401.1 Scope. Airports, heliports, helistops and aircraft hangars shall be in accordance with Article 24.

2401.2 Permits. For permits to use structures or enclosures for aircraft servicing or repair and aircraft refueling vehicles, see Section 105, Permits a.2 and a.3.

2401.3 Dispensing Flammable and Combustible Liquids. Dispensing, transferring and storage of flammable and combustible liquids inside of a building or structure shall be in accordance with Article 79.

2401.4 Transferring Fuel. Flammable and combustible liquids shall not be dispensed into or removed from the fuel system of an aircraft within an aircraft hangar.

Flammable and combustible liquids shall not be dispensed into or removed from a container, tank, vehicle or aircraft except in a location approved by the chief.

2401.5 Application of Flammable and Combustible Liquid Finishes. The application of Class I or II liquid finishes shall be done only in locations approved by the chief.

2401.6 Cleaning Parts. Aircraft, engines and parts of aircraft shall not be cleaned with a flammable liquid in an aircraft hangar or within 50 feet (15 240 mm) of another aircraft, building or hangar.

2401.7 Drip Pans. Aircraft hangars shall be equipped and maintained with metal drip pans under the engines of all aircraft stored or parked therein.

2401.8 Sources of Ignition. Open flames, flame-producing devices and other sources of ignition shall not be permitted in a hangar, except in approved locations.

2401.9 Smoking. NO SMOKING signs shall be provided in accordance with Section 1109.4.1.

2401.10 Running Engines. Aircraft engines shall not be run in aircraft hangars except in approved engine test areas.

2401.11 Repairing Aircraft. Repairing of aircraft requiring the use of open flames, spark-producing devices or the heating of parts above 500°F. (260°C.) shall be done in the open or in an area conforming with the Building Code for a Group H, Division 5 Occupancy.

2401.12 Combustible Storage. Combustible materials and other hazardous materials stored in an aircraft hangar shall be stored in locations and containers approved by the chief.

2401.13 Portable Fire Extinguishers.

2401.13.1 General. Portable fire extinguishers suitable for flammable or combustible liquid and electrical-type fires shall be provided as specified by the chief.

2401.13.2 On towing vehicles. Vehicles used for towing aircraft shall be equipped with at least one fire extinguisher having a minimum rating of 20-B:C in accordance with U.F.C. Standard 10-1.

2401.13.3 On welding apparatus. Welding apparatus shall be equipped with at least one fire extinguisher having a minimum rating of 2-A:10-B:C in accordance with U.F.C. Standard 10-1.

2401.13.4 On aircraft refuelers. Aircraft refuelers shall be equipped with at least two fire extinguishers having a minimum rating of 20-B:C in accordance with U.F.C. Standard 10-1. A fire extinguisher shall be readily accessible from either side of the vehicle.

2401.13.5 At aircraft motor vehicle fuel-dispensing stations. Portable fire extinguishers at aircraft motor vehicle fuel-dispensing stations shall be located such that pumps or dispensers are not more than 75 feet (22 860 mm) from one such extinguisher. Fire extinguishers shall be provided as follows:

1. When the open-hose discharge capacity of the aircraft fueling system is not more than 200 gallons per minute (757 L per minute), at least two extinguishers having a minimum rating of 20-B:C in accordance with U.F.C. Standard 10-1, shall be provided.

2. When the open-hose discharge capacity of the aircraft fueling system is more than 200 gallons per minute (757 L per minute) but not over 350 gallons per minute (1325 L per minute), at least one wheeled extinguisher having a minimum rating of 80-B:C in accordance with U.F.C. Standard 10-1, and having a minimum capacity of 125 pounds (57 kg) of agent, shall be provided.

3. When the open-hose discharge capacity of the aircraft fueling system is more than 350 gallons per minute (1325 L per minute), at least two wheeled extinguishers having a minimum rating of 80-B:C each, in accordance with U.F.C. Standard 10-1, and having a minimum capacity of 125 pounds (57 kg) of agent each, shall be provided.

2401.13.6 Reporting use. Use of any fire extinguisher equipment under any circumstances shall be reported to the manager of the airport and the chief immediately after use.

2401.14 Aircraft Motor Vehicle Fuel-dispensing Stations. Aircraft motor vehicle fuel-dispensing stations shall be in accordance with Article 52.

2401.15 Regulations Not Covered. Regulations not specifically contained herein pertaining to airports, aircraft hangars and appurtenant operations shall be in accordance with nationally recognized standards and U.F.C. Standard 24-1.

SECTION 2402 — REFUELER UNITS

2402.1 Construction of Aircraft Refuelers and Accessories.

2402.1.1 General. Tank vehicles shall be in accordance with Section 2402 and shall be designed and constructed in accordance with U.F.C. Standards 24-1 and 79-4.

2402.1.2 Transfer apparatus. Aircraft refueler units shall be equipped and maintained with an approved transfer apparatus.

If such transfer apparatus is operated by an individual unit of the internal combustion motor type, such power unit shall be located as remotely as practicable from pumps, piping, meters, air eliminators, water separators, hose reels, and similar equipment, and shall be housed in a separate compartment from any of the aforementioned items; the fuel tanks in connection therewith shall be suitably designated and installed, and the maximum capacity shall not exceed 5 U.S. gallons (18.9 L) when such tank is installed on any such engine in any compartment housing any such engine. The exhaust pipe, muffler and tail pipe shall be shielded.

If operated by gears or chains, the gears, chains, shafts, bearings, housing and all parts thereof shall be of an approved design and shall be installed in a workmanlike manner and so maintained.

Flexible connections for the purpose of eliminating vibration are allowed if the material used therein is designated, installed and maintained in an approved manner, provided such connections do not exceed 24 inches (610 mm) in length.

2402.1.3 Pumps. Pumps of a positive displacement type shall be provided with a bypass relief valve set at a pressure of not more than 35 percent in excess of the normal working pressure of such

unit. Such units shall be equipped and maintained with a pressure gage on the discharge side of the pump.

2402.1.4 Dispensing hoses and nozzles. Hoses shall be designed for the transferring of hydrocarbon liquids.

The length of hose shall be limited to the actual needs of the individual transfer apparatus. Hoses shall be equipped with an approved shutoff nozzle. Fuel transfer nozzles shall be of self-closing type, designed to be actuated by hand pressure only. Notches and other devices shall not be used for holding a nozzle valve handle in the open position. Nozzles shall be equipped with a grounding cable complete with proper attachment for aircraft to be serviced.

2402.1.5 Protection of electrical equipment. Electric wiring, switches, lights and other sources of ignition, when located in a compartment housing piping, pumps, air eliminators, water separators, hose reels or similar equipment, shall be enclosed in a vapor-tight housing. Electrical motors located in such a compartment shall be of a type approved for use as specified in the Electrical Code.

2402.1.6 Venting of equipment compartments. Compartments housing piping, pumps, air eliminators, water separators, hose reels and similar equipment shall be adequately ventilated at floor level or within the floor itself.

2402.1.7 Accessory equipment. Ladders, hose reels and similar accessory equipment shall be of an approved type and constructed substantially as follows:

1. Ladders constructed of noncombustible material are allowed to be used with or attached to aircraft refueler units, provided the manner of attachment or use of such ladders is approved and does not occasion or constitute an additional fire or accident hazard in the operation of such refueler units.

2. Hose reels used in connection with refueler units shall be constructed of noncombustible materials and shall be provided with a packing gland or other device which will preclude fuel leakage between reels and fuel manifolds.

2402.1.8 Bonding and grounding.

2402.1.8.1 General. Transfer apparatus shall be metallically interconnected with tanks, chassis, axles and springs of aircraft refueler units.

2402.1.8.2 Grounding cables. Aircraft refueler units shall be provided and maintained with a substantial heavy-duty ground cable of sufficient length to be bonded to the aircraft to be serviced. Such cable shall be metallically connected to the transfer apparatus or chassis of the aircraft refueler unit on one end and shall be provided with a suitable metal clamp on the other end, to be fixed to the aircraft.

The ground cable shall be bare or have a transparent protective sleeve and be carried on a reel or in a compartment provided for no other purpose in such a manner that it will not be subjected to sharp kinks or accidental breakage under conditions of general use.

2402.2 Operation, Maintenance and Use of Aircraft Refueler Units.

2402.2.1 General. The operation, maintenance and use of aircraft refueler units shall be in accordance with Section 2402.2 and other applicable provisions of Article 24.

2402.2.2 Garaging. Aircraft refueler units shall be stored outside of, and not less than 50 feet (15 240 mm) from, any building at a location approved by the manager of the airport and the chief.

2402.2.3 Repairing. Mechanical repairs on such units shall be done only at approved locations. Minor adjustments or repairs are allowed when necessary to move such unit to the storage location when failure occurs elsewhere in the airport.

2402.2.4 Operators. Aircraft refueler units which are operated by a person other than the permittee or the permittee's regularly authorized employee shall be provided with a legible sign visible from the outside thereof showing the name of the person, firm or corporation operating such unit.

2402.3 Fueling and Defueling.

2402.3.1 Parking location. Aircraft refueler units shall not be located, parked or permitted to stand under any portion of an aircraft or in a position where such unit would obstruct egress from an aircraft should fire occur during fuel transfer operations.

2402.3.2 Bonding and grounding. Aircraft refueler units shall be electrically bonded to the aircraft being fueled or defueled and either the aircraft refueler unit or the aircraft shall be grounded in an approved manner. A drag chain or flexible ground conductor shall not be deemed to fulfill the requirements of Section 2402.3.2 for grounding during fuel transfer.

Transfer nozzles shall be equipped with approved bonding conductors which shall be clipped or otherwise positively engaged with the bonding attachment provided on the aircraft adjacent to the fuel tank cap.

Bonding and ground connections required by Section 2402.3.2 shall be made prior to fuel transfer and shall not be disconnected until fuel transfer operations are completed.

2402.3.3 Transfer personnel. During fuel transfer operations, a qualified person shall be in control of each transfer nozzle and another qualified person shall be in immediate control of the fuel-pumping equipment to shut off or otherwise control the flow of fuel from the time fueling operations are begun until they are completed.

EXCEPTION: For underwing refueling, the person stationed at the point of fuel intake is not required.

2402.3.4 Hold-open devices on nozzles. Fuel transfer nozzles shall not be held in the open position by a device other than by direct hand pressure of the operator.

2402.4 Qualified Operators. Aircraft refueler units shall be attended and operated only by persons instructed in methods of proper use and operation and who are qualified to use such refueler units in accordance with minimum safety requirements. Qualified operators shall carry on their person an identification card issued by their employer certifying their qualifications.

2402.5 Protection of Hoses. Before an aircraft refueler unit is moved, fuel transfer hoses shall be properly placed on the approved reel or in the compartment provided, or stored on top decking of the refueler if proper height rail is provided for security and protection of such equipment. Fuel transfer hose shall not be looped or draped over any part of the refueler unit, except as herein provided. Fuel transfer hose shall not be dragged when such refueler unit is moved from one fueling position to another.

2402.6 Maintenance. Aircraft refueler units and equipment used in connection therewith shall be maintained in a safe operating condition and good repair at all times.

Upon finding any aircraft servicing equipment which is in use during fueling operations to be defective or in a state of disrepair, and by reason of such defect or state of disrepair the use of such aircraft servicing equipment constitutes an undue fire hazard, the chief is authorized to order the use of such equipment discontinued until repairs, replacements or changes are made to render the same safe for continued use. Defective equipment shall not be used until the same is rendered safe to the satisfaction of the chief.

2402.7 Loading and Unloading. Aircraft refueler units shall be loaded only at an approved loading rack, except, when defueling aircraft, loading from the fuel tanks of aircraft is allowed.

The fuel cargo of such units shall be unloaded only by approved transfer apparatus into the fuel tanks of aircraft, underground storage tanks or approved gravity storage tanks.

2402.8 Passengers. Passenger traffic is allowed during the time fuel transfer operations are in progress, provided the following provisions are strictly enforced by the owner of such aircraft or the owner's authorized employee:

1. Smoking and producing an open flame in the cabin of the aircraft or on the outside thereof within 50 feet (15 240 mm) of such aircraft shall be prohibited.

A qualified employee of the aircraft owner shall be responsible for seeing that the passengers are not allowed to smoke when remaining aboard the aircraft or while going across the ramp from the gate to such aircraft, or vice versa.

2. Passengers shall not be permitted to linger about the plane, but shall proceed directly between the loading gate and the aircraft.

3. Passenger loading stands shall be left in loading position until all fuel transfer operations are completed.

4. Fuel transfer operations shall not be performed on the main exit side of any aircraft containing passengers except when the owner of such aircraft or a capable and qualified employee of such owner shall remain inside the aircraft to direct and assist the escape of such passengers through regular and emergency exits in the event fire should occur during such fuel transfer operations.

2402.9 Sources of Ignition. Smoking and producing open flames within 50 feet (15 240 mm) of a point where fuel is being transferred shall be prohibited. Electrical and motor-driven devices shall not be connected to or disconnected from an aircraft at any time fueling operations are in progress on such aircraft.

SECTION 2403 — HELISTOPS

2403.1 General. Helistops shall be maintained in accordance with Section 2403. Helistops on buildings shall be constructed in accordance with the Building Code.

2403.2 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) but no width less than 5 feet (1524 mm). The clear area shall be maintained.

2403.3 Class I and Class II Liquid Spillage. Landing areas on structures shall be so maintained as to confine Class I or II liquid spillage to the landing area itself, and provision shall be made to drain such spillage away from any exit or stairway serving the helicopter landing area or from a structure housing such exit or stairway.

2403.4 Exits. Exits and stairways from helistops shall be maintained in accordance with Article 12. Landing areas located on buildings or structures shall have two or more exits. For landing platforms or roof areas less than 60 feet (18 288 mm) in length or less than 2,000 square feet (185.8 m^2) in area, the second exit is allowed to be a fire escape or ladder leading to the floor below.

2403.5 Federal Approval. Before operating helicopters from helistops, approval shall be obtained from the Federal Aviation Administration.

ARTICLE 25 — PLACES OF ASSEMBLY

SECTION 2501 — GENERAL

2501.1 Scope. Places of assembly shall be in accordance with Article 25.

2501.2 Definitions. For definitions of ASSEMBLY; BLEACHERS; DISPERSAL AREA, SAFE; FOLDING AND TELESCOPING SEATING; FOOTBOARDS; GRANDSTANDS; OPEN-AIR GRANDSTANDS AND BLEACHERS; PERMANENT STANDS; REVIEWING STANDS; SMOKE-PROTECTED ASSEMBLY SEATING and TEMPORARY SEATING FACILITIES, see Article 2.

2501.3 Permits and Plans. For permits to operate a place of assembly, operate a carnival or fair, use liquid- or gas-fueled vehicles or equipment for competition or display inside an assembly occupancy, or use candles or other open-flame devices in assembly areas, see Section 105, Permits c1., c.2, l.2 and p.2.

Plans of carnival and fair grounds shall be submitted when required by the chief.

2501.4 Supervision and Communication System.

2501.4.1 Supervision. Places of assembly shall be under the constant supervision of a competent adult on the premises during the time that the premises are open to the public.

2501.4.2 Communication. When required by the chief, places of assembly shall be provided with a method for notifying the fire department in the event of an emergency. Such method can consist of a telephone, an alarm system connected to the fire department or other approved agency, or other approved means. Methods of notifying the fire department shall be readily available to the public.

2501.5 Decorative Materials. Combustible decorative materials shall be in accordance with Section 1103.3.3.

2501.6 Pyroxylin-coated Fabrics. Pyroxylin-coated fabrics used as a decorative material in accordance with Section 2501.6 or a surface covering on fixed furnishings, shall be limited in amount to the following:

1. Fabrics containing 1.4 ounces to 1.7 ounces of cellulose nitrate per square yard (47.59 g/m^2 to 57.6 g/m^2) shall not be used in excess of a total amount equivalent to 1 square foot of fabric surface to 15 cubic feet of room volume (0.22 m^2/m^3).

2. Fabrics containing 1.7 ounces or more of cellulose nitrate per square yard (57.6 g/m^2) shall not be used in excess of a total amount equivalent to 0.5 square feet of fabric surface to 15 cubic feet of room volume (0.11 m^2/m^3).

3. Measurement can be accomplished by folding a piece to five thicknesses and measuring to see if the thickness of five layers exceeds $^1/_8$ inch (3.2 mm).

2501.7 Motion Picture Screens. In places of assembly, motion picture screens or screen masking shall be in accordance with Section 2501.5.

2501.8 Exit Doors.

2501.8.1 General. Exit doors shall comply with Sections 1207 and 2501.8.

2501.8.2 Panic hardware. Exit doors from Group A Occupancies having an occupant load of 50 or more shall not be provided with a latch or lock unless it is panic hardware.

EXCEPTIONS: 1. In Group A, Division 3 Occupancies and in all churches, panic hardware may be omitted from the main exit when the main exit consists of a single door or pair of doors. A key-locking device may be used in place of the panic hardware, provided there is a readily visible durable sign adjacent to the doorway stating THIS DOOR MUST REMAIN UNLOCKED DURING BUSINESS HOURS. The sign shall

be in letters not less than 1 inch (25.4 mm) high on a contrasting background. When unlocked, the single door or both leaves of a pair of doors must be free to swing without operation of any latching device. When a pair of doors is installed, one leaf shall have no locking devices whatsoever, and the second leaf shall be arranged to latch or lock into the frame and into the first leaf in such a manner that a single unlocking action will unlock both leaves simultaneously. Flush, edge or surface bolts or any other type of device that may be used to close or restrain the door other than by operation of the locking device is prohibited. The use of this exception may be revoked by the building official for due cause.

2. Panic hardware may be waived on gates surrounding stadiums when the gates are under constant immediate supervision while the public is present and provided safe dispersal areas based on 3 square feet (0.28 m^2) per occupant are located between the stadium and the fence. Gates may be horizontal sliding or swinging and may exceed the 4-foot-width (1219 mm) limitation. The required dispersal area shall be located not less than 50 feet (15 240 mm) from the stadium.

2501.9 Aisles.

2501.9.1 General. Aisles leading to required exits shall be provided from all portions of buildings. Aisles located within an accessible route of travel shall also comply with the Building Code for accessibility (see U.B.C. Chapter 11).

2501.9.2 Width without fixed seats. The width of aisles in assembly occupancies without fixed seats shall comply with Section 2501.9.2. Aisle widths shall be provided in accordance with the following:

1. In areas serving employees only, the minimum aisle width may be 24 inches (610 mm) but not less than the width required by the number of employees served.

2. In assembly occupancies without fixed seats, the minimum clear aisle width shall be 36 inches (914 mm) where tables, counters, furnishings, merchandise or other similar obstructions are placed on one side of the aisle only and 44 inches (1118 mm) when such obstructions are placed on both sides of the aisle.

2501.9.3 Width with fixed seats. Aisles in assembly occupancies with fixed seats shall comply with Section 2501.9.3. The clear width of aisles shall be based on the number of occupants within the portion of the seating areas served by the aisle.

The minimum clear width of aisles and other means of egress shall be in accordance with Table 2501-A or, for buildings providing smoke-protected assembly seating and for which an approved life-safety evaluation is conducted, in accordance with Table 2501-B. For Table 2501-B, the number of seats specified must be within a single assembly place, and interpolation shall be permitted between the specified values shown. For both tables, the minimum clear widths shown shall be modified in accordance with the following:

1. **Factor *A*:** If risers exceed 7 inches (178 mm) in height, multiply the stair width in the tables by factor A, where:

$$A = 1 + \frac{(\text{riser height} - 7.0 \text{ inches})}{5}$$

For SI:

$$A = 1 + \frac{(\text{riser height} - 178 \text{ mm})}{127}$$

2. **Factor *B*:** Stairs not having a handrail within a 30-inch (760 mm) horizontal distance shall be 25 percent wider than otherwise calculated. Multiply by factor B, where $B = 1.25$.

3. **Factor *C*:** Ramps steeper than 1 in 10 slope where used in ascent shall be 10 percent wider than otherwise calculated. Multiply by factor C, where $C = 1.10$.

Where exiting is possible in two directions, the width of such aisles shall be uniform throughout their length.

When aisles converge to form a single path of exit travel, the aisle width shall not be less than the combined required width of the converging aisle.

In assembly rooms with fixed seats arranged in rows, the clear width of aisles shall not be less than set forth above and not less than the following:

Forty-eight inches (1219 mm) for stairs having seating on both sides.

Thirty-six inches (914 mm) for stairs having seating on one side.

Twenty-three inches (584 mm) between a stair handrail and seating when the aisles are subdivided by the handrail.

Forty-two inches (1067 mm) for level or ramped aisles having seating on both sides.

Thirty-six inches (914 mm) for level or ramped aisles having seating on one side.

Twenty-three inches (584 mm) between a stair handrail and seating when an aisle does not serve more than five rows on one side.

2501.9.4 Aisle termination. Aisles shall terminate at a cross aisle, foyer, doorway or vomitory. Aisles shall not have a dead end greater than 20 feet (6096 mm) in length.

EXCEPTION: A longer dead-end aisle is permitted when seats served by the dead-end aisle are not more than 24 seats from another aisle measured along a row of seats having a minimum clear width of 12 inches (305 mm) plus 0.6 inch (15 mm) for each additional seat above seven in a row.

Each end of a cross aisle shall terminate at an aisle, foyer, doorway or vomitory.

2501.9.5 Ramp slope. The slope of ramped aisles shall not be more than 1 unit vertical in 8 units horizontal (12.5% slope). Ramped aisles shall have a slip-resistant surface.

2501.9.6 Aisle steps.

2501.9.6.1 When prohibited. Steps shall not be used in aisles having a slope of 1 unit vertical to 8 units horizontal (12.5% slope) or less.

2501.9.6.2 When required. Aisles with a slope steeper than 1 unit vertical to 8 units horizontal (12.5% slope) shall consist of a series of risers and treads extending across the entire width of the aisle.

The height of risers shall not be more than 7 inches (178 mm) or less than 4 inches (102 mm) and the tread run shall not be less than 11 inches (279 mm). The riser height shall be uniform within each flight and the tread run shall be uniform throughout the aisle. Variations in run or height between adjacent treads or risers shall not exceed $^3/_{16}$ inch (4.8 mm). A contrasting marking stripe or other approved marking shall be provided on each tread at the nosing or leading edge such that the location of each tread is readily apparent when viewed in descent. Such stripe shall be a minimum of 1 inch (25.4 mm) wide and a maximum of 2 inches (51 mm) wide.

EXCEPTION: When the slope of aisle steps and the adjoining seating area is the same, the riser heights may be increased to a maximum of 9 inches (229 mm) and may be nonuniform but only to the extent necessitated by changes in the slope of the adjoining seating area to maintain adequate sightlines. Variations may exceed $^3/_{16}$ inch (4.8 mm) between adjacent risers provided the exact location of such variations is identified with a marking stripe on each tread at the nosing or leading edge adjacent to the nonuniform riser. The marking stripe shall be distinctively different from the contrasting marking stripe.

2501.9.7 Handrails. Handrails shall comply with the height, size and shape dimensions set forth in the Building Code (See U.B.C. Section 1006.9) and shall have rounded terminations or bends. Ramped aisles having a slope steeper than 1 unit vertical to 15 units horizontal (6.7% slope) and aisle stairs (two or more adjacent steps) shall have handrails located either at the side or within the aisle width. Handrails may project into the required aisle width a distance of $3^1/_2$ inches (89 mm).

EXCEPTIONS: 1. Handrails may be omitted on ramped aisles having a slope not greater than 1 unit vertical in 8 units horizontal (12.5% slope) when fixed seating is on both sides of the aisle.

2. Handrails may be omitted when a guardrail is at the side of an aisle which conforms to the size and shape requirements for handrails.

Handrails located within the aisle width shall be discontinuous with gaps or breaks at intervals not to exceed five rows. These gaps or breaks shall have a clear width of not less than 22 inches (559

mm) and not more than 36 inches (914 mm) measured horizontally. Such handrails shall have an additional intermediate handrail located 12 inches (305 mm) below the main handrail.

2501.10 Seating.

2501.10.1 Spacing. When seating rows have 14 or less seats, the minimum clear width between rows shall not be less than 12 inches (305 mm) measured as the clear horizontal distance from the back of the row ahead and the nearest projection of the row behind. Where seats are automatic or self-rising, measurement may be made with the seats in the raised position. Where seats are not automatic or self-rising, the minimum clear width shall be measured with the seat in the down position.

The clear width shall be increased as follows:

1. For rows of seating served by aisles or doorways at both ends, there shall be no more than 100 seats per row and the minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.3 inch (7.62 mm) for every additional seat beyond 14, but the minimum clear width need not exceed 22 inches (559 mm). If the aisles are dead ended, see Section 2501.9.4 for further limitations.

2. For rows of seating served by an aisle or a doorway at one end only, the minimum clear width of 12 inches (305 mm) between rows shall be increased by 0.6 inch (15 mm) for every additional seat beyond seven, but the minimum clear width need not exceed 22 inches (559 mm). In addition, the distance to the point where the occupant has a choice of two directions of travel to an exit shall not exceed 30 feet (9144 mm) from the point where the occupant is seated.

2501.10.2 Bonding of chairs. Loose seats, folding chairs or similar seating facilities that are not fixed to the floor shall be bonded together in groups of three or more.

EXCEPTIONS: 1. When not more than 300 such seats, chairs or facilities are provided, bonding is not required.

2. The bonding of chairs is not required when tables are provided, as when the occupancy is used for dining or similar purposes.

When bonding of chairs is required, aisles and exits shall be provided as required by Section 2501.9.3.

2501.10.3 Bleacher seats and grandstands. Bleacher seats and reviewing stands shall be in accordance with Sections 2502 and 2503.

2501.11 Use of Exit Ways. Interior and exterior stairways, smokeproof enclosures, hallways, corridors, vestibules, balconies and bridges leading to a stairway or an exit shall not be used in any way that will obstruct their use as an exit or that will present a hazardous condition.

2501.12 Ashtrays. Where smoking is allowed, approved noncombustible ashtrays or match receivers shall be provided on each table and at other convenient places.

2501.13 Fire Appliances. Fire appliances shall be kept in proper working condition. Extinguishers and hose and similar appliances shall be visible and accessible at all times. It shall be the duty of the owner and the occupant of each building or part of a building occupied as a place of assembly to properly train sufficient regular employees in the use of fire appliances. See also Section 1303.5.

2501.14 Plan of Exit Ways and Aisles. When required by the chief, a plan indicating the seating arrangements, location and width of exit ways and aisles shall be submitted for approval, and an approved copy of the plan shall be kept on display on the premises.

2501.15 Marking and Lighting of Exits. Exits in places of assembly shall be identified and lighted in accordance with Sections 1211 and 1212.

2501.16 Maximum Occupant Load.

2501.16.1 Posting of room capacity. Any room having an occupant load of 50 or more where fixed seats are not installed, and which is used for assembly purposes, shall have the capacity of the

room posted in a conspicuous place on an approved sign near the main exit from the room. Such sign shall be maintained legible by the owner or the owner's authorized agent and shall indicate the number of occupants permitted for each room use.

2501.16.2 Determination of occupant load. The number of persons in a building or portion thereof shall not exceed the amount determined as specified in the Building Code, except that where such additional exit facilities are provided the occupant load can be increased by not more than 10 percent, when approved by the chief, without being considered overcrowding.

2501.16.3 Overcrowding. Overcrowding and admittance of persons beyond the approved capacity of a place of assembly are prohibited. The chief, upon finding overcrowding conditions or obstructions in aisles, passageways or other means of egress, or upon finding a condition which constitutes a serious menace to life, is authorized to cause the performance, presentation, spectacle or entertainment to be stopped until such condition or obstruction is corrected.

2501.17 Candles and other open-flame devices. Candles and other open-flame devices shall not be used in places of assembly or in drinking or dining establishments.

EXCEPTIONS: 1. When used in conjunction with approved heating or cooking appliances in areas not accessible to the public.

2. When used in conformance with Section 2501.18.

2501.18 Requirements for Use of Candles and Other Open-flame Devices.

2501.18.1 General. The use of candles and other open-flame devices shall be in accordance with Section 2501.18.

2501.18.2 Flaming foods and beverages. The preparation of flaming foods or beverages shall be in accordance with the following:

1. Flammable liquids used in the preparation of flaming foods and beverages shall be dispensed from one of the following:

1.1 A 1-ounce (29.6 mL) container, or

1.2 A container not to exceed 1 quart (946.4 mL) with a controlled pouring device that will limit the flow to 1 ounce (29.6 mL).

2. Flaming foods or beverages shall be prepared only in the immediate vicinity of the table being served. They shall not be transported or carried while burning,

3. The person preparing the flaming foods or beverages shall have a wet cloth towel immediately available for use in smothering the flames in the event of an emergency,

4. The serving of flaming foods or beverages shall be done in a safe manner and shall not create high flames. The pouring, ladling or spooning of liquids is restricted to a maximum height of 8 inches (203.2 mm) above the receiving receptacle, and

5. Containers shall be secured to prevent spillage when not in use.

2501.18.3 Candles and other open-flame decorative lighting. Candles and other open-flame decorative lighting shall be in accordance with the following:

1. Class I and II liquids and LP-gas shall not be used,

2. Liquid- or solid-fueled lighting devices containing more than 8 ounces (236.6 mL) must self-extinguish and not leak fuel at a rate of more than $^1/_4$ teaspoon per minute (1.26 mL per minute) if tipped over,

3. The device or holder shall be constructed to prevent the spilling of liquid fuel or wax at the rate of more than $^1/_4$ teaspoon per minute (1.26 mL per minute) when the device or holder is not in an upright position,

4. 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 from vertical,

EXCEPTION: Units that self-extinguish if tipped over and that do not spill fuel or wax at the rate of more than $^1/_4$ teaspoon per minute (1.26 mL per minute) if tipped over.

5. The flame shall be enclosed, except as follows:

5.1 Openings on the sides shall not be more than $^3/_8$ inch (9.5 mm) in diameter.

5.2 Openings on the top and the distance to the top shall be such that a single layer of tissue paper placed on the top will not ignite in 10 seconds.

6. Chimneys shall be made of noncombustible materials. Such chimneys shall be securely attached to the open-flame device,

EXCEPTION: The chimney need not be attached to any open-flame device that will self-extinguish if the device is tipped over.

7. Fuel canisters shall be safely sealed for storage,

8. Storage and handling of combustible liquid shall be in accordance with Article 79,

9. Shades, if used, shall be made of noncombustible materials and securely attached to the open-flame device holder or chimney,

10. Candelabra with flame-lighted candles shall be securely fastened in place to prevent overturning and located away from occupants using the area and away from possible contact of drapes, curtains or other combustibles, and

11. When, in the opinion of the chief, adequate safeguards have been taken, hand-held flame-lighted candles can be allowed. Hand-held candles shall not be passed from one person to another while lighted.

2501.18.4 Theatrical performances. When approved by the chief, open-flame devices used in conjunction with theatrical performances are allowed to be used when adequate safety precautions have been taken.

2501.19 Standby Personnel. When, in the opinion of the chief, it is essential for public safety in a place of assembly or any other place where people congregate, due to the number of persons, or the nature of the performance, exhibition, display, contest or activity, the owner, agent or lessee shall employ one or more qualified persons, as required and approved by the chief, to be on duty at such place. Such individuals shall be subject to the chief's orders at all times when so employed and shall be in uniform and remain on duty during the times such places are open to the public, or when such activity is being conducted. Before each performance or the start of such activity, such individuals shall inspect the required fire appliances provided to see that they are in proper place and in good working order, and shall keep diligent watch for fires during the time such place is open to the public or such activity is being conducted and take prompt measures for extinguishment of fires that may occur. Such individuals shall not be required or permitted, while on duty, to perform any other duties than those herein specified.

TABLE 2501-A—MINIMUM WIDTH OF AISLES AND OTHER MEANS OF EGRESS IN ASSEMBLY OCCUPANCIES WITHOUT SMOKE-PROTECTED ASSEMBLY SEATING[1]

NUMBER OF SEATS	CLEAR WIDTH PER SEAT SERVED IN INCHES	
	Stairs	Passageway, Ramps and Doorways
	× 25.4 for mm	
Unlimited	0.300 × A × B	0.220 × C

[1]See Section 2501.9.3 for determining factors A, B and C.

TABLE 2501-B—MINIMUM WIDTH OF AISLES AND OTHER MEANS OF EGRESS IN ASSEMBLY OCCUPANCIES WITH SMOKE-PROTECTED ASSEMBLY SEATING[1]

NUMBER OF SEATS[2]	CLEAR WIDTH PER SEAT SERVED IN INCHES	
	Stairs	Passageways, Ramps and Doorways
	× 25.4 for mm	
2,000	0.300 × A × B	0.220 × C
5,000	0.200 × A × B	0.150 × C
10,000	0.130 × A × B	0.100 × C
15,000	0.096 × A × B	0.070 × C
20,000	0.076 × A × B	0.056 × C
25,000 or more	0.060 × A × B	0.044 × C

[1]See Section 2501.9.3 for determining factors A, B and C.

[2]Interpolation between the number of seats listed is allowed with a corresponding interpolation between the widths shown.

SECTION 2502 — REVIEWING STANDS, GRANDSTANDS, BLEACHERS, AND FOLDING AND TELESCOPING SEATING

2502.1 General. Reviewing stands, grandstands, bleachers, and folding and telescoping seating shall be in accordance with Section 2502.

2502.2 Height of Reviewing Stands, Grandstands, Bleachers, and Folding and Telescoping Seating. The height of reviewing stands, grandstands, bleachers, and folding and telescoping seating shall be in accordance with the Building Code (see U.B.C. Section 303.2).

2502.3 Design Requirements. Reviewing stands, grandstands and bleachers shall be designed in accordance with the Building Code (see U.B.C. Chapter 16 and Section 1806.9).

2502.4 General Requirements.

2502.4.1 Row spacing. There shall be a clear space of not less than 12 inches (305 mm) measured horizontally between the back or backrest of each seat and the front of the seat immediately behind it. The minimum spacing of rows of seats measured from back to back shall be:

1. Twenty-two inches (559 mm) for seats without backrests.
2. Thirty inches (762 mm) for seats with backrests.
3. Thirty-three inches (838 mm) for chair seating.

2502.4.2 Rise between rows. The maximum rise from one row of seats to the next shall not exceed 16 inches (406 mm) unless the seat spacing from back to back measured horizontally is 40 inches (1016 mm) or more.

EXCEPTION: When automatic- or self-rising seats are installed, the rise between rows may be increased to 24 inches (610 mm) with the horizontal spacing back to back of 33 inches (838 mm).

2502.4.3 Seating capacity determination. When bench-type seating is used, the number of seats shall be based on one person for each 18 inches (457 mm) of length of the bench.

2502.4.4 Aisles.

2502.4.4.1 Aisles required. Aisles shall be provided in all seating facilities except that aisles may be omitted when all of the following conditions exist:

1. Seats are without backrests,
2. The rise from row to row does not exceed 12 inches (305 mm) per row,

3. The number of rows does not exceed 11 in height,
4. The top seating board is not over 10 feet (3048 mm) above grade, and
5. The first seating board is not more than 20 inches (508 mm) above grade.

2502.4.4.2 Obstructions. No obstruction shall be placed in the required width of any aisle or exitway.

2502.4.4.3 Width. Aisles serving seats on both sides shall have a minimum width of 42 inches (1067 mm). When serving seats on only one side, the aisle shall have a minimum width of 36 inches (914 mm). Except for temporary seating facilities, the required width for aisles shall equal the greater of the two minimum required widths determined in accordance with the Building Code (see U.B.C. Section 1014.3) and Section 2502.4.4.3.

2502.4.5 Cross aisles and vomitories. Cross aisles and vomitories shall not be less than 54 inches (1372 mm) in clear width and shall extend to an exit, enclosed stairway or exterior perimeter ramp. Except for temporary seating facilities, the required width for cross aisles shall equal the greatest of three minimum required widths determined in accordance with the Building Code requirements for exits and aisles (see U.B.C. Section 1014) and Section 2502.4.5.

2502.4.6 Stairways and ramps. Except as otherwise provided in Section 2502.4.6, grandstands, bleachers, and folding and telescoping seating shall comply with other applicable sections of the Building Code for exits. Stairways and ramps shall have a maximum rise and run as provided in the Building Code (see U.B.C. Sections 1006.3 and 1007), except those within the seating facility which serve as aisles at right angles to the rows of seats where the rise shall not exceed 8 inches (203 mm). When an aisle terminates at an elevation more than 8 inches (203 mm) above grade or floor below, the aisle shall be provided with a stairway or ramp which width is not less than the width of the aisle.

Stairways and ramps shall have handrails as provided in the Building Code (see U.B.C. Sections 1006 and 1007), except stairways within the seating facility which serve as aisles at right angles where handrails shall be provided at one side or along the center line. A minimum clear width of 48 inches (1219 mm) between seats shall be provided for aisle stairways having center-aisle handrails. When there is seating on both sides of the aisle, handrails shall be discontinuous with openings at intervals not exceeding five rows for access to seating. The opening shall have a clear width of at least 22 inches (559 mm) and not greater than 36 inches (914 mm) measured horizontally, and the handrail shall have rounded terminations. When handrails are provided in the middle of the aisle stairs, there shall be an additional intermediate rail located approximately 12 inches (305 mm) below the top of the handrail.

EXCEPTION: Temporary seating facility stairways within the seating area which serve as aisles at right angles need not be provided with handrails.

2502.4.7 Guardrails. Perimeter guardrails or enclosing walls or fencing shall be provided for all portions of elevated seating facilities which are more than 30 inches (762 mm) above grade or floor. Construction of guardrails shall comply with the Building Code (see U.B.C. Section 509 and Table 16-B). Guardrails shall be 42 inches (1067 mm) above the rear of a seat board or 42 inches (1067 mm) above the rear of the steps in an aisle when the guardrail is parallel and adjacent to the aisle.

EXCEPTION: Guardrails at the front of the front row of seats, which are not located at the end of an aisle and where there is no cross aisle, may have a height of 26 inches (660 mm) and need not meet the 4-inch-maximum (102 mm) spacing specified in the Building Code (see U.B.C. Section 509); however, a midrail shall be installed.

The open vertical space between footboards and seats shall not exceed 9 inches (228.6 mm) when footboards are more than 30 inches (762 mm) above grade.

2502.4.8 Toeboards. A 4-inch-high (102 mm) vertical barrier shall be installed along the edge of walking platforms whenever guardrails are required.

EXCEPTION: Toeboards shall not be required at the ends of footboards.

2502.4.9 Footboards. Footboards shall be provided for all rows of seats above the third row or beginning at such a point where the seat is more than 2 feet (610 mm) above the grade or floor below. When the same platform is used for both seating and footrests, footrests are not required, provided each level or platform is not less than 24 inches (610 mm) wide. When aisles are required by Section 2502.4.4, footboards not less than 18 inches (457 mm) in width shall be installed between each row of seats.

2502.5 Grandstands, Bleachers, and Folding and Telescoping Seating within Buildings. Except as otherwise provided in Sections 2502.5 and 2502.6, grandstands, bleachers, and folding and telescoping seating within a building shall comply with the other applicable sections of the Building Code (see U.B.C. Chapter 10).

EXCEPTIONS: 1. When seats are without backrests, there may be nine seats between any seat and an aisle.

2. When seats are without backrests, dead ends in vertical aisles shall not exceed a depth of 16 rows.

2502.6 Open-air Grandstands, Bleachers, and Folding and Telescoping Seating.

2502.6.1 General. Except as otherwise provided in Sections 2502.6.2 through 2502.6.10, open-air grandstands, bleachers, and folding and telescoping seating shall comply with the other applicable requirements for exits in the Building Code (see U.B.C. Chapter 10).

2502.6.2 Number of seats between aisles. The number of seats between any seat and an aisle shall not be greater than 20 when the seats are without backrests and nine if the seats have backrests.

2502.6.3 Dead ends. Dead ends in vertical aisles shall not exceed a depth of 16 rows for permanent grandstands and 26 rows for temporary grandstands.

2502.6.4 Distance to exit. The line of travel from any seat to a safe dispersal area exit ramp, enclosed stairway or vomitory shall not be more than 200 feet (60 960 mm). When the seats have no backrests, the distance may be a direct line measurement.

2502.6.5 Safe dispersal area. Each safe dispersal area shall have a minimum of two exits. If more than 6,000 persons are to be accommodated within a dispersal area, there shall be a minimum of three exits and for more than 9,000 persons there shall be at least four exits. The aggregate clear width of exits from a safe dispersal area shall be determined on the basis of not less than one exit unit of 22 inches (559 mm) for each 500 persons to be accommodated, and no exit shall be less than 44 inches (1118 mm) in width.

2502.6.6 Two exits required. Two exits shall be provided from every facility which accommodates more than 300 persons.

2502.6.7 Three exits required. Three exits shall be required when a facility or section thereof accommodates more than 1,000 persons.

2502.6.8 Four exits required. Four exits shall be required when a facility or section thereof accommodates more than 3,000 persons.

2502.6.9 Determination of exit width. The total width of exits in feet (mm) shall not be less than the total occupant load served divided by 150 (0.492) when exiting by stairs and divided by 200 (0.656) when exiting by ramps, corridors, tunnels or vomitories.

2502.6.10 Minimum exit width. Exits shall not be less than 42 inches (1067 mm) in width.

SECTION 2503 — SECURING OF CHAIRS

2503.1 Raised Stands. Chairs and benches used on raised stands shall be secured to the platforms upon which they are placed.

EXCEPTION: When less than 25 chairs are used upon a single raised platform, the fastening of seats to the platform is not required.

2503.2 Ground Seats. When more than 500 loose chairs are used in connection with athletic events, chairs shall be fastened together in groups of not less than three and shall be tied or staked to the ground.

SECTION 2504 — OUTDOOR CARNIVALS AND FAIRS

2504.1 General. The grounds of carnivals and fairs, including concession booths, shall be in accordance with Section 2504.

2504.2 Grounds.

2504.2.1 General. Grounds shall be in accordance with Section 2504.2.

2504.2.2 Access. Fire apparatus access roads shall be provided in accordance with Section 3205.

2504.2.3 Fire appliances.

2504.2.3.1 General. Fire appliances shall be provided for the entire midway, as required by the chief.

2504.2.3.2 Location. Maximum travel distance to a portable fire extinguisher shall not exceed 75 feet (22 860 mm).

2504.2.4 Electrical equipment. Electrical equipment and installations shall comply with the Electrical Code.

2504.3 Concession Stands.

2504.3.1 General. Concession stands shall be in accordance with Section 2504.3.

2504.3.2 Location. Concession stands utilized for cooking shall have a minimum of 10 feet (3048 mm) of clearance on two sides and shall not be located within 10 feet (3048 mm) of amusement rides or devices.

2504.3.3 Fire extinguishers. A 40-B:C-rated dry chemical fire extinguisher shall be provided where deep-fat fryers are used.

2504.4 Internal Combustion Power Sources.

2504.4.1 General. Internal combustion power sources, including motor vehicles, generators and similar equipment, shall be in accordance with Section 2504.4.

2504.4.2 Fueling. Fuel tanks shall be of adequate capacity to permit uninterrupted operation during normal operating hours. Refueling shall be conducted only when the ride is not in use.

2504.4.3 Protection. Internal combustion power sources shall be isolated from contact with the public by either physical guards, fencing or an enclosure.

2504.4.4 Fire extinguishers. A minimum of one fire extinguisher with a rating of not less than 2-A:10-B:C shall be provided.

SECTION 2505 — LIQUID- AND GAS-FUELED VEHICLES AND EQUIPMENT

2505.1 General. Liquid- and gas-fueled vehicles and equipment used for display, competition or demonstration within assembly occupancies shall be in accordance with Section 2505.

2505.2 Displays.

2505.2.1 General. Display of liquid- and gas-fueled vehicles and equipment inside an assembly occupancy shall be in accordance with Section 2505.2.

2505.2.2 Batteries. Batteries shall be disconnected in an approved manner.

2505.2.3 Fuel systems.

2505.2.3.1 Fueling. Vehicles or equipment shall not be fueled or defueled within the building.

2505.2.3.2 Quantity limit. Fuel in the fuel tank shall not exceed one quarter of the tank capacity or 5 gallons (18.9 L), whichever is less.

2505.2.3.3 Inspection. Fuel systems shall be inspected for leaks.

2505.2.3.4 Closure. Fuel-tank openings shall be locked and sealed to prevent the escape of vapors.

2505.2.4 Location. The location of vehicles or equipment shall not obstruct or block exits.

2505.3 Competitions and Demonstrations.

2505.3.1 General. Liquid- and gas-fueled vehicles and equipment used for competition or demonstration within an assembly occupancy shall be in accordance with Section 2505.3.

2505.3.2 Fuel storage. Fuel for the vehicles or equipment shall be stored in approved containers in an approved location outside of the building.

2505.3.3 Fueling. Refueling shall be performed outside of the building at an approved site.

2505.3.4 Spills. Fuel spills shall be cleaned up immediately.

ARTICLE 26 — BOWLING ALLEYS

SECTION 2601 — SCOPE

The storage, use and handling of flammable and combustible liquids and woodworking operations within bowling alleys and pin-refinishing rooms shall be in accordance with Article 26.

SECTION 2602 — PERMITS

For permits for bowling pin refinishing or bowling alley resurfacing, see Section 105, Permit b.1.

SECTION 2603 — ALLEY RESURFACING AND REFINISHING

2603.1 General. Alley resurfacing and refinishing operations shall not be conducted during business hours. The fire department shall be notified a minimum of 24 hours in advance of such operations.

2603.2 Finishes. The amount of flammable and combustible liquid applied to alley surfaces for refinishing shall not exceed the use-open system exempt amounts in Section 7903.2.

2603.3 Ventilation. To prevent the accumulation of flammable vapors, mechanical ventilation at a minimum rate of 1 cubic foot per minute per square foot (5.1 L/s per square meter) of alley area being refinished shall be provided. Such exhaust is allowed to be by approved temporary or portable means. Vapors shall be exhausted to the exterior of the building. Heating, ventilation and air-conditioning systems shall not be operated during resurfacing or refinishing operations or within four hours of the application of flammable or combustible liquids.

2603.4 Ignition Sources. The control of ignition sources shall be in accordance with Section 1109. Open-flame devices and electrical equipment not classified for Class I locations, as defined in the Electrical Code, shall not be operated during or within four hours of the application of flammable or combustible liquids.

SECTION 2604 — PIN-REFINISHING ROOMS

2604.1 Construction. Rooms used for the refinishing of bowling pins involving the application of flammable or combustible liquids or woodworking operations shall be constructed in accordance with the Building Code.

2604.2 Flammable and Combustible Liquids. The storage, use and handling of flammable and combustible liquids shall be in accordance with Article 79.

2604.3 Sanding and Buffing. Sanding and buffing equipment shall be provided with approved equipment for collecting dust during bowling pin-refinishing operations in accordance with Article 76 and the Mechanical Code.

2604.4 Combustible Waste. Combustible waste shall be in accordance with Section 1103.

2604.5 Ignition Sources. The control of ignition sources shall be in accordance with Section 1109.

ARTICLE 27 — CELLULOSE NITRATE PLASTICS (PYROXYLIN), STORAGE AND HANDLING

SECTION 2701 — SCOPE

Cellulose nitrate storage and handling shall be in accordance with Article 27.

SECTION 2702 — DEFINITIONS

For the definition of CELLULOSE NITRATE PLASTICS (Pyroxylin), see Article 2.

SECTION 2703 — PERMITS

For permits to store, handle, manufacture or assemble articles of cellulose nitrate, see Section 105, Permit c.4.

SECTION 2704 — DISPLAY OF PLASTICS

2704.1 General. Displays of cellulose nitrate plastic (pyroxylin) articles in stores shall be in show cases or show windows except as set forth in Section 2704.2.

2704.2 Display on Tables and Counters.

2704.2.1 General. Articles are allowed to be placed on tables less than 3 feet (914 mm) wide and 10 feet (3048 mm) long. Tables shall be spaced at least 3 feet (914 mm) apart. Where articles are displayed on counters, they shall be arranged in like manner.

2704.2.2 Combustible storage. Spaces underneath tables shall be kept free of storage of any kind and of accumulations of paper, refuse and other combustible material.

2704.2.3 Location. Sales or display tables shall be so located that in the event of a fire at the table, the table will not interfere with free exit from the room, in at least one direction.

2704.3 Lighting. Lighting shall not be located directly above cellulose nitrate plastic (pyroxylin) material, unless provided with a suitable guard to prevent heated particles falling.

SECTION 2705 — STORAGE AND HANDLING

Raw cellulose nitrate plastic (pyroxylin) material in a factory building shall be kept and handled as follows:

1. Where raw material in excess of 25 pounds (11.3 kg) is received in a building or fire area, an approved vented cabinet or approved vented vault equipped with an approved automatic fire sprinkler system shall be provided for the storage of the material.

2. Cabinets in any one workroom shall not contain more than 1,000 pounds (453.6 kg) of raw material. Each cabinet shall not contain more than 500 pounds (226.8 kg). Each compartment shall not contain more than 250 pounds (113.4 kg).

3. Raw material in excess of that allowed by Item 2 above shall be kept in vented vaults not exceeding 1,500-cubic-foot capacity (42.5 m^3), with one approved automatic sprinkler head to each 125 cubic feet (3.5 m^3) of total vault space, and with construction and venting in conformance with nationally recognized standards and as approved by the chief.

4. Cellulose nitrate plastic (pyroxylin) shall not be stored within 2 feet (610 mm) of heat-producing appliances, steam pipes, radiators or chimneys.

5. In factories manufacturing articles of cellulose nitrate plastics (pyroxylin), such sprinklered and vented cabinets, vaults or storage rooms, approved by the chief, shall be provided as are necessary to prevent the accumulation in workrooms of raw stock in process or finished articles.

6. In the workrooms of cellulose nitrate plastic (pyroxylin) factories, operators shall not be stationed closer together than 3 feet (914 mm), and the amount of material per operator shall not exceed one-half day's supply and shall be limited to the capacity of three tote boxes, including material awaiting removal or use.

7. Waste cellulose nitrate plastic (pyroxylin) materials such as shavings, chips, turnings, sawdust edgings and trimmings shall be kept under water in metal receptacles until removed from the premises.

SECTION 2706 — FIRE-PROTECTION EQUIPMENT

The manufacture or storage of articles of cellulose nitrate plastic (pyroxylin) in quantities exceeding 100 pounds (45.4 kg) shall be located in a building or portion thereof equipped with an approved automatic sprinkler system.

SECTION 2707 — SOURCES OF IGNITION

2707.1 General. Sources of ignition shall not be located in rooms in which cellulose nitrate plastic (pyroxylin) in excess of 25 pounds (11.3 kg) is handled or stored.

2707.2 Heating. Rooms in which cellulose nitrate plastic (pyroxylin) in excess of 25 pounds (11.3 kg) is handled or stored shall be heated by low-pressure steam or hot-water radiators.