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7.3.4 A classified area shall not extend beyond a floor, wall, roof, or other solid partition that has no openings within the classified area.

7.3.5 The designation of classes, divisions, and zones shall be as defined in Chapter 5 of *NFPA 70, National Electrical Code.*

7.3.6 The area classifications listed in Table 7.3.3 are based on the premise that all applicable requirements of this code have been met; If this is not the case, the authority having jurisdiction shall have the authority to classify the extent of the area.

7.3.7* Where the provisions of 7.3.1 through 7.3.6 require the installation of electrical equipment suitable for Class I, Division 1 or 2, or Zone 1 or 2 locations, ordinary electrical equipment, including switchgear, shall be permitted to be used if installed in a room or enclosure that is maintained under positive pressure with respect to the classified area.

7.3.7.1 Ventilation make-up air shall be taken from an uncontaminated source.

7.4 Application of Area Classification. (Reserved)

Chapter 8 Reserved

Chapter 9 Storage of Liquids in Containers — General Requirements

9.1 Scope.

9.1.1 This chapter shall apply to the storage of flammable and combustible liquids in:

(1) Drums or other containers that do not exceed 119 gal (450 L) individual capacity
(2) Portable tanks that do not exceed 660 gal (2500 L) individual capacity
(3) Intermediate bulk containers that do not exceed 793 gal (3000 L)

9.1.2 This chapter shall also apply to limited transfer of liquids incidental thereto.

9.1.3 This chapter shall also apply to overpack drums when used for temporary containment of containers that do not exceed 60 gal (230 L) capacity. Such overpack containers shall be treated as containers as defined in 3.3.12.

9.1.4 This chapter shall not apply to the following:

(1) Containers, intermediate bulk containers, and portable tanks that are used in operations areas, as covered by Chapter 17
(2) Liquids in the fuel tanks of motor vehicles, aircraft, boats, or portable or stationary engines
(3) Beverages where packaged in individual containers that do not exceed 1.3 gal (5 L) capacity
(4) Medicines, foodstuffs, cosmetics, and other consumer products that contain not more than 50 percent by volume of water-miscible flammable or combustible liquids, with the remainder of the product consisting of components that do not burn and where packaged in individual containers that do not exceed 1.3 gal (5 L) capacity
(5) Liquids that have no fire point when tested in accordance with ASTM D 92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester*, up to the boiling point of the liquid or up to a temperature at which the liquid shows an obvious physical change
(6) Liquids with a flash point greater than 95°F (35°C) in a water-miscible solution or water-miscible dispersion with a water and noncombustible solids content of more than 80 percent by weight, and which does not sustain combustion when tested in accordance with "Method of Testing for Sustained Combustibility," in accordance with 49 CFR 173, Appendix H, or the UN publication *Recommendations on the Transport of Dangerous Goods*
(7) Distilled spirits and wines in wooden barrels or casks

9.2 Definitions Specific to Chapter 9. (Reserved)

9.3 General Requirements.

9.3.1 The general requirements of this chapter shall be applicable to the storage of liquids in liquid storage areas as covered in Chapters 10 through 14, regardless of the quantities being stored.

Exception: Where more stringent requirements are set forth in Chapters 10 through 14, those requirements shall take precedence.

9.3.2 For the purposes of Chapters 9 through 16, unstable liquids shall be treated as Class IA liquids.

9.3.3 Means of egress shall meet applicable requirements of NFPA *101, Life Safety Code.*

9.3.3.1 Storage of liquids shall not physically obstruct a means of egress.

9.3.4 For the purposes of this chapter and Chapters 10, 12, and 16, *protected storage* shall mean storage installed after January 1, 1997 that is protected in accordance with Chapter 16. All other storage shall be considered to be unprotected storage unless an alternative means of protection has been approved by the authority having jurisdiction. *(See 16.3.5 and Section 16.9.)*

9.3.5 Wood of at least 1 in. (25 mm) nominal thickness shall be permitted to be used for shelving, racks, dunnage, scuffboards, floor overlay, and similar installations.

9.3.6 Class I liquids shall not be permitted to be stored in basements as defined in 3.3.4.

9.3.7 Class II and Class IIIA liquids shall be permitted to be stored in basements as defined in 3.3.4, provided the basement is protected in accordance with Chapter 16.

9.3.8 Class IIIB liquids shall be permitted to be stored in basements as defined in 3.3.4.

9.3.9 Where containers, intermediate bulk containers, or portable tanks are stacked, they shall be stacked so that stability is maintained and excessive stress on container walls is prevented.

9.3.9.1 Portable tanks and intermediate bulk containers stored more than one high shall be designed to stack securely, without the use of dunnage.

9.3.9.2 Materials-handling equipment shall be capable of handling containers, portable tanks, and intermediate bulk containers that are stored at all storage levels.

9.3.9.3* Power-operated industrial trucks used to move Class I liquids shall be selected, operated, and maintained in accordance with NFPA 505, *Fire Safety Standard for Powered Industrial*

Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations.

9.3.10 Containers, intermediate bulk containers, and portable tanks in unprotected liquid storage areas shall not be stored closer than 36 in. (915 mm) to the nearest beam, chord, girder, or other roof or ceiling member.

9.3.11 Liquids used for building maintenance, painting, or other similar infrequent maintenance purposes shall be permitted to be stored in closed containers outside of storage cabinets or inside liquid storage areas, if limited to an amount that does not exceed a 10-day supply at anticipated rates of use.

9.3.12 Storage, handling, and use of Class II and Class III liquids heated at or above their flash point shall follow the requirements for Class I liquids, unless an engineering evaluation conducted in accordance with Chapter 6 justifies following the requirements for some other liquid class. *(See 6.4.1.2 and A.6.4.1.2.)*

9.4 Acceptable Containers.

9.4.1* Only the following approved containers, intermediate bulk containers, and portable tanks shall be used for Class I, Class II, and Class IIIA liquids:

(1) Metal containers, metal intermediate bulk containers, and metal portable tanks meeting the requirements of and containing products authorized by the U.S. Department of Transportation Hazardous Materials Regulations in Title 49, Code of Federal Regulations, Parts 100–199, or by Part 6 of the UN *Recommendations on the Transport of Dangerous Goods*

(2) Plastic or metal containers meeting the requirements of and used for petroleum products within the scope of one or more of the following specifications:
   (a) ASTM F 852, *Standard Specification for Portable Gasoline Containers for Consumer Use*
   (b) ASTM F 976, *Standard Specification for Portable Kerosine and Diesel Containers for Consumer Use*
   (c) ANSI/UL 1313, *Standard for Nonmetallic Safety Cans for Petroleum Products*
   (d) ANSI/UL 30, *Standard for Metal Safety Cans*
   (e) ANSI/UL 1314, *Standard for Special Purpose Metal Containers*
   (f) FM Global *Approval Standard for Safety Containers and Filling, Supply, and Disposal Containers* — Class Number 6051 and 6052

(3) Plastic containers that meet requirements set by and contain products authorized by the following:
   (a) The U.S. Department of Transportation Hazardous Materials Regulations in Title 49, Code of Federal Regulations, Parts 100–199, or by Part 6 of the UN publication, *Recommendations on the Transport of Dangerous Goods*
   (b) Items 256 or 258 of the *National Motor Freight Classification* (NMFC) for liquids that are not classified as hazardous by the U.S. Department of Transportation Hazardous Materials Regulations in Title 49, Code of Federal Regulations, Parts 100–199, or by Part 6 of the UN publication *Recommendations on the Transport of Dangerous Goods*

(4) Fiber drums that meet the following:
   (a) Requirements of Items 294 and 296 of the *National Motor Freight Classification* (NMFC) or of Rule 51 of the *Uniform Freight Classification* (UFC), for Types 2A, 3A, 3B-H, 3B-L, or 4A
   (b) Requirements of, and containing liquid products authorized by, either the U.S. Department of Transportation Hazardous Materials Regulations in Title 49, Code of Federal Regulations, Chapter I, or by the U.S. Department of Transportation exemption

(5)*Rigid nonmetallic intermediate bulk containers that meet requirements set by and contain products authorized by the following:
   (a) The U.S. Department of Transportation Hazardous Materials Regulations in Title 49, Code of Federal Regulations, Parts 100–199, or by Part 6 of the UN publication, *Recommendations on the Transport of Dangerous Goods,* for Classes 31H1, 31H2, and 31HZ1
   (b) The *National Motor Freight Classification* (NMFC), or the International Safe Transit Association for liquids that are not classified as hazardous by the U.S. Department of Transportation Hazardous Materials Regulations in Title 49, Code of Federal Regulations, Parts 100–199, or by Part 6 of the UN publication *Recommendations on the Transport of Dangerous Goods*

(6) Glass containers up to the capacity limits stated in Table 9.4.3 and in accordance with U.S. Department of Transportation Hazardous Materials Regulations in Title 49, Code of Federal Regulations, Parts 100–199

9.4.1.1 For protected storage, rigid nonmetallic intermediate bulk containers, as described in 9.4.1(5), shall be subjected to a standard fire test that demonstrates acceptable inside storage fire performance and shall be listed and labeled.

9.4.1.2 Medicines, beverages, foodstuffs, cosmetics, and other common consumer products, where packaged according to commonly accepted practices for retail sales, shall be exempt from the requirements of 9.4.1 and 9.4.3.

9.4.2 Each portable tank or intermediate bulk container 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 a gauge pressure of 10 psi (70 kPa) or 30 percent of the bursting pressure of the portable tank, whichever is greater.

9.4.2.1 The total venting capacity shall be not less than that specified in 22.7.3.2 or 22.7.3.4.

9.4.2.2 At least one pressure-actuated vent having a minimum capacity of 6000 ft^3 (170 m^3) of free air per hour at an absolute pressure of 14.7 psi (101 kPa) and 60°F (15.6°C) shall be used. The vent shall be set to open at not less than a gauge pressure of 5 psi (35 kPa).

9.4.2.3 If fusible vents are used, they shall be actuated by elements that operate at a temperature not exceeding 300°F (150°C). Where plugging of a pressure-actuated vent can occur, such as when used for paints, drying oils, and similar materials, fusible plugs or venting devices that soften to failure at a maximum of 300°F (150°C) under fire exposure shall be permitted to be used for the entire emergency venting requirement.

9.4.3 The maximum allowable size of a container, intermediate bulk container, or metal portable tank for Class I, Class II, and Class IIIA liquids shall not exceed that specified in Table 9.4.3.

Exception: As provided for in Section 9.1, 9.4.3.1, 9.4.3.2, and 9.4.3.3.

9.4.3.1 Class IB and Class IC water-miscible liquids shall be permitted to be stored in plastic containers up to 60 gal (230 L) in size, if stored and protected in accordance with 16.5.2.7.

Table 9.4.3 Maximum Allowable Size — Containers, Intermediate Bulk Containers (IBCs), and Portable Tanks

Container Type	Flammable Liquids			Combustible Liquids	
	Class IA	Class IB	Class IC	Class II	Class IIIA
Glass	1 pt (0.5 L)	1 qt (1 L)	1.3 gal (5 L)	1.3 gal (5 L)	5.3 gal (20 L)
Metal (other than drums) or approved plastic	1.3 gal (5 L)	5.3 gal (20 L)	5.3 gal (20 L)	5.3 gal (20 L)	5.3 gal (20 L)
Safety cans	2.6 gal (10 L)	5.3 gal (20 L)	5.3 gal (20 L)	5.3 gal (20 L)	5.3 gal (20 L)
Metal drum (e.g., UN 1A1/1A2)	119 gal (450 L)	119 gal (450 L)	119 gal (450 L)	119 gal (450 L)	119 gal (450 L)
Approved metal portable tanks and IBCs	793 gal (3000 L)	793 gal (3000 L)	793 gal (3000 L)	793 gal (3000 L)	793 gal (3000 L)
Rigid plastic IBCs (UN 31H1 or 31H2) and composite IBCs with rigid inner receptacle (UN31HZ1)	NP	NP	NP	793 gal (3000 L)	793 gal (3000 L)
Composite IBCs with flexible inner receptacle (UN31HZ2) and DOT/UN-approved flexible IBCs	NP	NP	NP	NP	NP
Non-bulk Bag-in-Box	NP	NP	NP	NP	NP
Polyethylene UN1H1 and UN1H2, or as authorized by DOT exemption	1.3 gal (5 L)	5.3 gal (20 L)*	5.3 gal (20 L)*	119 gal (450 L)	119 gal (450 L)
Fiber drum NMFC or UFC Type 2A; Types 3A, 3B-H, or 3B-L; or Type 4A	NP	NP	NP	119 gal (450 L)	119 gal (450 L)

NP: Not permitted for the container categories so classified unless a fire protection system is provided that is developed in accordance with 16.3.6 and is approved for the specific container and protection against static electricity is provided.
*See 9.4.3.1.

9.4.3.2 Class IA and Class IB liquids shall be permitted to be stored in glass containers of not more than 1.3 gal (5 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 can cause excessive corrosion of a metal container.

9.4.3.3 Leaking or damaged containers up to 60 gal (230 L) capacity shall be permitted to be stored temporarily in accordance with this chapter and Chapters 10 through 12, provided they are enclosed in overpack containers.

9.4.3.3.1 To be considered protected storage as defined in 9.3.4 and in accordance with Chapter 16, an overpack container shall be constructed of the same material as the leaking or damaged container.

9.4.3.3.2 Metal overpack containers shall be considered non-relieving style containers.

9.5* Flammable Liquids Storage Cabinets.

9.5.1 The volume of Class I, Class II, and Class IIIA liquids stored in an individual storage cabinet shall not exceed 120 gal (460 L).

9.5.2 The total aggregate volume of Class I, Class II, and Class IIIA liquids in a group of storage cabinets shall not exceed the maximum allowable quantity of flammable and combustible liquids per control area based on the occupancy where the cabinets are located.

9.5.3 Storage cabinets that meet at least one of the following sets of requirements shall be acceptable for storage of liquids:

(1) Storage cabinets designed and constructed to limit the internal temperature at the center of the cabinet and 1 in. (25 mm) from the top of the cabinet to not more than 325°F (163°C), when subjected to a 10-minute fire test that simulates the fire exposure of the standard time–temperature curve specified in ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, shall be acceptable. All joints and seams shall remain tight and the door shall remain securely closed during the test.

(2) Metal storage cabinets constructed in the following manner shall be acceptable:
   (a) The bottom, top, door, and sides of the cabinet shall be at least No. 18 gauge sheet steel and shall be double-walled, with 1½ in. (38 mm) air space.
   (b) Joints shall be riveted, welded, or made tight by some equally effective means.
   (c) The door shall be provided with a three-point latch arrangement, and the door sill shall be raised at least 2 in. (50 mm) above the bottom of the cabinet to retain spilled liquid within the cabinet.

(3) Wooden cabinets constructed in the following manner shall be acceptable:
   (a) The bottom, sides, and top shall be constructed of exterior grade plywood that is at least 1 in. (25 mm) thick and of a type that will not break down or delaminate under fire conditions.
   (b) All joints shall be rabbetted and shall be fastened in two directions with wood screws.

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(c) Where more than one door is used, there shall be a rabbetted overlap of not less than 1 in. (25 mm).
(d) Doors shall be equipped with a means of latching, and hinges shall be constructed and mounted in such a manner as to not lose their holding capacity when subjected to fire exposure.
(e) A raised sill or pan capable of containing a 2 in. (50 mm) depth of liquid shall be provided at the bottom of the cabinet to retain spilled liquid within the cabinet.

(4) Listed storage cabinets that have been constructed and tested in accordance with 9.5.3(1) shall be acceptable.

9.5.4* Storage cabinets shall not be required by this code to be ventilated for fire protection purposes.

9.5.4.1 If a storage cabinet is not ventilated, the vent openings shall be sealed with the bungs supplied with the cabinet or with bungs specified by the cabinet manufacturer.

9.5.4.2* If a storage cabinet is ventilated for any reason, the vent openings shall be ducted directly to a safe location outdoors or to a treatment device designed to control volatile organic compounds (VOCs) and ignitible vapors in such a manner that will not compromise the specified performance of the cabinet and in a manner that is acceptable to the authority having jurisdiction.

9.5.5* Storage cabinets shall be marked as follows:

WARNING:
FLAMMABLE
KEEP FIRE AWAY

9.5.5.1 The minimum letter height for FLAMMABLE (signal word) shall be 2.0 in. (50 mm) and the minimum letter height for KEEP FIRE AWAY (message) shall be 1.0 in. (25 mm).

9.5.5.2 All letters shall be uppercase and in contrasting color to the background.

9.5.5.3 The marking shall be located on the upper portion of the cabinet's front door(s) or frame.

9.5.5.4 Use of other languages, the international symbol for "flammable" (a flame in a triangle), the international symbol for "keep fire away" (a burning match in "no" circle) shall be permitted.

9.6 Maximum Allowable Quantities (MAQs) per Control Area.

9.6.1 General Occupancy Limits. The maximum allowable quantities (MAQs) of liquids allowed in each control area shall not exceed the amounts specified in Table 9.6.1.

Exception: As modified by 9.6.2 and Chapters 10 through 14.

9.6.2 Special Occupancy Limits.

9.6.2.1 For the following occupancies, the MAQs per control area shall not exceed the amounts specified in Table 9.6.2.1:

(1) Assembly
(2) Ambulatory health care
(3) Business
(4) Day care
(5) Detention and correctional
(6) Educational
(7) Health care
(8) Residential

Table 9.6.1 MAQ of Flammable and Combustible Liquids per Control Area

	Liquid Class(es)	Quantity gal	Quantity L	Notes
Flammable liquids	IA	30	115	1, 2
	IB and IC	120	460	1, 2
	IA, IB, IC combined	120	460	1, 2, 3
Combustible liquids	II	120	460	1, 2
	IIIA	330	1,265	1, 2
	IIIB	13,200	50,600	1, 2, 4

Notes:
(1) Quantities are permitted to be increased 100 percent where stored in approved flammable liquids storage cabinets or in safety cans in accordance with the fire code. Where Note 2 also applies, the increase for both notes is permitted to be applied accumulatively.
(2) Quantities are permitted to be increased 100 percent in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*. Where Note 1 also applies, the increase for both notes is permitted to be applied accumulatively.
(3) Containing not more than the maximum allowable quantity per control area of Class IA, Class IB, or Class IC flammable liquids, individually.
(4) Quantities are not limited in a building equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, and designed in accordance with the protection criteria contained in Chapter 16 of this code.
Source: NFPA 5000, Table 34.1.3.1

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Table 9.6.2.1 MAQs — Special Occupancy Limits

Liquid Class(es)	Quantity gal	Quantity L
I and II	10	38
IIIA	60	227
IIIB	120	454

IN STORAGE CABINET NOT EXCEED 180 GALLONS

9.6.2.2 For the occupancies specified in 9.6.2.1, storage in excess of 10 gal (38 L) of Class I and Class II liquids combined or in excess of 60 gal (227 L) of Class IIIA liquids shall be permitted where stored in flammable liquids storage cabinets and where the total aggregate quantity does not exceed 180 gal (680 L).

9.6.2.3 Fuel in the tanks of operating mobile equipment shall be permitted to exceed the quantities specified in Table 9.6.1, where the equipment is operated in accordance with the fire code.

9.6.2.4 For ambulatory health care, day care, educational, and health care occupancies, the MAQ for Class IIIB liquids shall be permitted to be increased 100 percent if the building is protected throughout with an automatic sprinkler system installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems.*

9.7 Control Areas.

9.7.1 For the purpose of this code, a control area shall be a space within a building where quantities of liquids that do not exceed the maximum quantities allowed by Table 9.6.1 or Table 9.6.2.1 are stored.

9.7.2 Control areas shall be separated from each other by fire barriers in accordance with Table 9.7.2. [**5000:**34.2.5.1.1]

Table 9.7.2 Design and Number of Control Areas

Floor Level	Maximum Allowable Quantity per Control Area (percent)*	Number of Control Areas per Floor	Fire Resistance Rating for Fire Barriers (hr)†
Above grade plane			
>9	5	1	2
7–9	5	2	2
4–6	12.5	2	2
3	50	2	1
2	75	3	1
1	100	4	1
Below grade plane			
1	75	3	1
2	50	2	1
Lower than 2	NA	NA	NA

NA: Not allowed.

*Percentages represent the maximum allowable quantities per control area shown in Table 9.6.1, with all of the increases permitted in the footnotes of that table.

†Fire barriers are required to include floors and walls, as necessary, to provide a complete separation from other control areas.

[**5000:** Table 34.2.5.1.1]

9.7.3 Control areas located below grade that are considered basements, as defined in 3.3.4, shall not be utilized for the storage of Class I liquids.

9.8 Classification of Occupancies That Exceed the Maximum Allowable Quantities of Liquids per Control Area.

9.8.1* Occupancy Classifications. Buildings and portions of buildings where liquids are stored shall be classified as Protection Level 2 or Protection Level 3, as established in this section, when the MAQs per control area are exceeded.

9.8.1.1 Protection Level 2. Buildings and portions thereof storing quantities of liquids that are considered as High-Hazard Level 2 liquids and that exceed the maximum allowable quantities per control area shall be classified as Protection Level 2 occupancies.

9.8.1.2 Protection Level 3. Buildings and portions thereof storing quantities of liquids that are considered as High-Hazard Level 3 liquids and that exceed the maximum allowable quantities per control area shall be classified as Protection Level 3 occupancies.

9.8.2* Requirements for Specific Occupancies. Liquids stored in Protection Level 2 or Protection Level 3 occupancies shall meet the applicable requirements for storage in a liquid storage room or liquid warehouse as defined in this code and in *NFPA 5000, Building Construction and Safety Code.*

9.9 Construction Requirements.

9.9.1 Storage areas shall be constructed to meet the fire resistance ratings specified in Table 9.9.1. Construction assemblies shall comply with the test specifications given in ASTM E 119, *Standard Test Methods for Fire Tests of Building Construction and Materials.*

Table 9.9.1 Fire Resistance Ratings for Liquid Storage Areas

	Fire Resistance Rating (hr)		
Type of Storage Area	Interior Walls[a], Ceilings, Intermediate Floors	Roofs	Exterior Walls
Liquid storage room			
Floor area ≤ 150 ft²	1	—	—
Floor area > 150 ft², but ≤ 500 ft²	2	—	—
Liquid warehouse[b,c,g]	4[d]	—	2[e], 4[f]

For SI units, 1 ft² = 0.09 m².

[a]Between liquid storage areas and any adjacent areas not dedicated to liquid storage.

[b]Fire resistance ratings for liquid warehouses storing only Class IIIB liquids, which are not heated above their flash point, are permitted to be reduced to 2 hours.

[c]Fire resistance ratings for liquid warehouses protected in accordance with Chapter 16 are permitted to be reduced to 2 hours.

[d]This shall be a fire wall as defined in NFPA 221, *Standard for Fire Walls and Fire Barrier Walls.*

[e]For exposing walls that are located more than 10 ft (3 m) but less than 50 ft (15 m) from an important building or line of adjoining property that can be built upon.

[f]For exposing walls that are located 10 ft (3 m) or less from an important building or line of adjoining property that can be built upon.

[g]For accessory use areas in protected liquid warehouses, such as offices and restrooms, whose combined area is less than 10 percent of the area of the warehouse, no fire resistance rating shall be required for the interior walls and ceilings.

9.9.2 Openings in interior walls to adjacent rooms or buildings and openings in exterior walls with fire resistance ratings shall be provided with normally closed, listed fire doors with fire protection ratings that correspond to the fire resistance rating of the wall as specified in Table 9.9.2.

Table 9.9.2 Protection Ratings for Fire Doors

Fire Resistance Rating of Wall as Required by Table 9.9.1 (hr)	Fire Protection Rating of Door (hr)
1	¾
2	1½
4	3*

*One fire door required on each side of interior openings for attached liquid warehouses.

9.9.2.1 Such doors shall be permitted to be arranged to stay open during material-handling operations if the doors are designed to close automatically in a fire emergency by provision of listed closure devices.

9.9.2.2 Fire doors shall be installed in accordance with NFPA 80, *Standard for Fire Doors and Other Opening Protectives.*

9.9.3 Exterior walls shall be constructed to provide ready access for fire-fighting operations by means of access openings, windows, or lightweight, noncombustible wall panels.

Exception: This requirement does not apply to liquid storage rooms totally enclosed within a building.

9.10 Fire Protection.

9.10.1 Protected Storage. Fire protection requirements for protected storage shall meet the requirements of 9.10.2 and Chapter 16. CHAPTER 16

9.10.2 Manual Fire Protection.

9.10.2.1 Portable fire extinguishers shall be provided in accordance with NFPA 10, *Standard for Portable Fire Extinguishers,* and this code.

9.10.2.2 Portable fire extinguishers shall meet the following requirements:

(1) At least one portable fire extinguisher having a capability of not less than 40:B shall be located outside of, but not more than 10 ft (3 m) from, the door opening into a liquid storage area.
(2) At least one portable fire extinguisher having a capability of not less than 40:B shall be located within 30 ft (9 m) of any Class I or Class II liquids located outside of a liquid storage area.

Exception: An acceptable alternative is at least one portable fire extinguisher having a capacity of 80:B located within 50 ft (15 m) of such a storage area.

9.10.2.3 Where provided, hose connections supplied from sprinkler systems shall be installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems.*

9.10.2.4 Where provided, hose connections supplied by a standpipe system shall be installed in accordance with NFPA 14, *Standard for the Installation of Standpipe and Hose Systems.*

9.10.2.5 Where provided, hose connections shall also meet the following requirements:

(1) Hose connections shall be provided in protected general-purpose warehouses and in protected liquid warehouses.
(2) Where preconnected hose is provided, it shall be either 1½ in. (38 mm) lined fire hose or 1 in. (25 mm) hard rubber hose, using combination spray and straight stream nozzles.

9.10.2.6 Where hose connections are provided, the water supply shall be sufficient to meet the fixed fire protection demand plus a total of at least 500 gpm (1900 L/min) for inside and outside hose connections for at least 2 hours, unless otherwise specified in Chapter 16.

9.11 Emergency Control Systems. (Reserved)

9.12 Electrical Systems.

9.12.1 Electrical area classification shall not be required for liquid storage areas where all containers, intermediate bulk containers, and portable tanks are sealed and are not opened, except as provided for in 9.12.2.

9.12.2 For liquid storage rooms that are totally enclosed within the building, electrical wiring and utilization equipment for Class I liquid storage shall be Class I, Division 2 (Zone 2), and electrical wiring and utilization equipment in inside rooms used for the storage of Class II and Class III liquids shall be suitable for ordinary purpose.

Exception: Class I, Division 2 (Zone 2) requirements apply to Class II and Class III liquids when stored at temperatures above their flash points.

9.13* Containment, Drainage, and Spill Control.

9.13.1 Storage areas shall be designed and operated to prevent the discharge of liquids to public waterways, public sewers, or adjoining property, unless such discharge has been specifically approved.

9.13.1.1 Where the drainage system discharges to private or public sewers or waterways, the drainage system shall be equipped with traps and separators.

9.13.2 Where individual containers exceed 10 gal (38 L), curbs, scuppers, drains, or other suitable means shall be provided to prevent flow of liquids under emergency conditions into adjacent building areas.

9.13.3 Containment or drainage to an approved location shall be provided.

9.13.3.1 Where a drainage system is used, it shall also have sufficient capacity to carry the expected discharge of water from fire protection systems.

9.13.4 Where only Class IIIB liquids are stored, spill control, containment, and drainage shall not be required.

9.13.5 Where only unsaturated polyester resins (UPRs) containing not more than 50 percent by weight of Class IC, Class II, or Class IIIA liquid constituents are stored and are protected in accordance with 16.5.2.11, spill control, containment, and drainage shall not be required.

9.13.6 Where storage is protected in accordance with Chapter 16, spill control, containment, and drainage shall also meet the requirements of Section 16.8.

9.14 Ventilation. Liquid storage areas where dispensing is conducted shall be provided with ventilation that meets the requirements of Section 18.6.

9.15 Exhausted Enclosures. (Reserved)

9.16 Explosion Control.

9.16.1* Where Class IA liquids are stored in containers larger than 1 gal (4 L), areas shall be provided with a means of explosion control that meets the requirements of NFPA 69, *Standard on Explosion Prevention Systems.* An approved engineered damage limiting construction design shall also be permitted.

Exception: This does not apply to a liquid storage room totally enclosed within a building.

9.16.2* Where unstable liquids are stored, an approved engineered construction method that is designed to limit damage from a deflagration or detonation, depending on the liquid stored, shall be used.

9.17 Separation from Incompatible Materials.

9.17.1 Except as provided for in 9.17.3, liquids shall be separated from incompatible materials where the stored materials are

in containers having a capacity of more than 5 lb (2.268 kg) or ½ gal (1.89 L).

9.17.1.1 Separation shall be accomplished by one of the following methods:

(1) Segregating incompatible materials storage by a distance of not less than 20 ft (6.1 m)
(2) Isolating incompatible materials storage by a noncombustible partition extending not less than 18 in. (460 mm) above and to the sides of the stored materials
(3) Storing liquid materials in flammable liquids storage cabinets in accordance with Section 9.5

9.17.2 Liquids shall be separated from Level 2 and Level 3 aerosols in accordance with NFPA 30B, *Code for the Manufacture and Storage of Aerosol Products.*

9.17.3 Flammable and combustible liquids shall be separated from oxidizers by at least 25 ft (7.6 m). [**400**:15.2.12.13.1]

9.17.4 Materials that are water-reactive, as described in NFPA 704, *Standard System for the Identification of the Hazards of Materials for Emergency Response,* shall not be stored in the same control area with liquids.

9.18 Dispensing, Handling, and Use of Liquids in Storage Areas.

9.18.1 Dispensing, handling, and use of liquids shall meet all applicable requirements of Chapter 18.

9.18.2 Dispensing of Class I liquids or Class II and Class III liquids at temperatures at or above their flash points shall not be permitted in storage areas that exceed 1000 ft^2 (93 m^2) in floor area unless the dispensing area is separated from the storage areas in accordance with Table 9.9.1 and meets all other requirements of Section 9.9.

9.19 Outdoor Storage of Liquids. Storage of liquids outside of buildings shall meet the requirements of Chapter 14 or Chapter 15, whichever is applicable.

Chapter 10 Storage of Liquids in Containers — Mercantile Occupancies

10.1 Scope.

10.1.1 This chapter shall apply to mercantile occupancies that handle, store, and display liquids in containers that do not exceed 119 gal (450 L) individual capacity.

10.1.2 This chapter shall also apply to limited dispensing of liquids incidental to mercantile operations.

10.1.3 This chapter shall not apply to the following:

(1) Containers, intermediate bulk containers, and portable tanks that are used in operations, as covered by Chapter 17
(2) Liquids in the fuel tanks of motor vehicles, aircraft, boats, or portable or stationary engines
(3) Beverages where packaged in individual containers that do not exceed 1.3 gal (5 L) capacity
(4) Medicines, foodstuffs, cosmetics, and other consumer products that contain not more than 50 percent by volume of water-miscible flammable or combustible liquids, with the remainder of the product consisting of components that do not burn and where packaged in individual containers that do not exceed 1.3 gal (5 L) capacity
(5) Liquids that have no fire point when tested in accordance with ASTM D 92, *Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester,* up to the boiling point of the liquid or up to a temperature at which the liquid shows an obvious physical change
(6) Liquids with a flash point greater than 95°F (35°C) in a water-miscible solution or in dispersion with a water and noncombustible solids content of more than 80 percent by weight, and which do not sustain combustion when tested in accordance with "Method of Testing for Sustained Combustibility," Title 49 Code of Federal Regulations, Part 173, Appendix H, or the UN publication *Recommendations on the Transport of Dangerous Goods*
(7) Distilled spirits and wines in wooden barrels or casks

10.2 Definitions Specific to Chapter 10. (Reserved)

10.3 General Requirements.

10.3.1 For the purposes of this chapter, unstable liquids shall be treated as Class IA liquids.

10.3.2 Maximum allowable quantities of liquids for display and storage shall comply with Table 10.7.1, based on the level of protection provided.

10.3.3 The design, construction, and capacity of containers shall comply with the applicable provisions of Section 9.4.

10.3.4 Commonly accepted packagings for medicines, beverages, foodstuffs, cosmetics, and other common consumer products shall be exempt from the requirements of 9.4.1 and 9.4.3.

10.3.5 Where utilized within a mercantile occupancy, the design, construction, and capacity of storage cabinets shall comply with the applicable provisions of Section 9.5.

10.3.6* Where utilized within a mercantile occupancy, the design, construction, and operation of a separate liquid storage room or a hazardous material storage locker used as a separate inside liquid storage area shall comply with the applicable provisions of Chapter 9.

10.4 Reserved.

10.5 Reserved.

10.6 Reserved.

10.7 Control Areas.

10.7.1 The maximum allowable quantities of liquids in each control area and in display and storage arrangements shall meet the requirements of this subsection and shall be as set forth in Table 10.7.1.

10.7.2 Existing unprotected mercantile occupancies in place prior to January 1, 1997, shall be permitted to store or display up to 7500 gal (28,400 L) of Class IB, IC, II, and IIIA liquids (any combination) in each control area.

10.8 Specific Restrictions.

10.8.1 On floors above the ground level, storage or display of Class I and Class II liquids shall be limited to 60 gal (230 L) in unprotected occupancies and 120 gal (454 L) in protected occupancies.

10.8.2 Class I and Class II liquids shall not be stored, displayed, or dispensed in basements.

10.8.3 Liquids in containers of greater than 6 gal (23 L) capacity shall not be stored or displayed in areas normally accessible to the public.