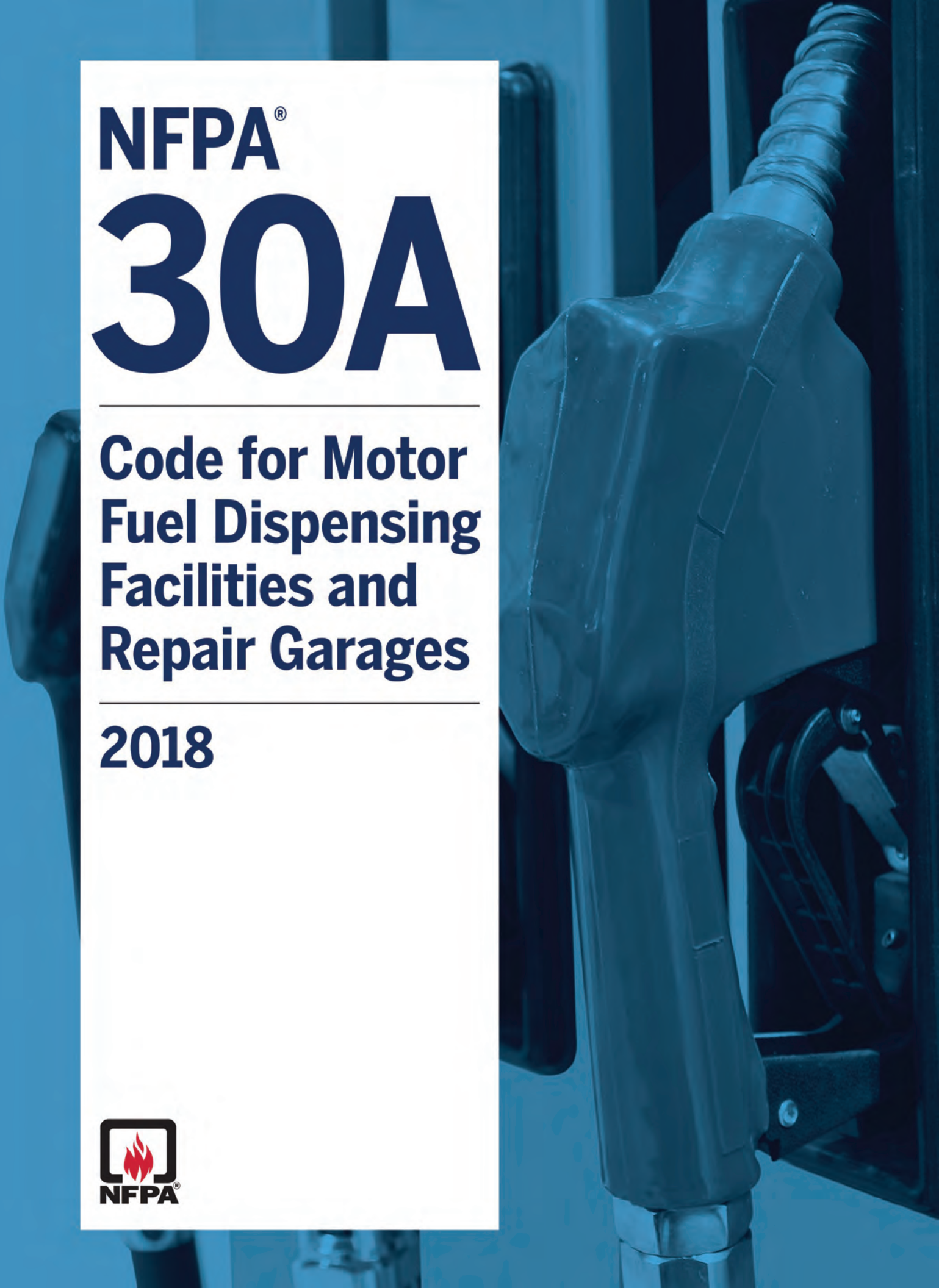

NFPA® 30A

Code for Motor Fuel Dispensing Facilities and Repair Garages

2018

NFPA®

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NFPA® 30A

Code for

Motor Fuel Dispensing Facilities and Repair Garages

2018 Edition

This edition of NFPA 30A, *Code for Motor Fuel Dispensing Facilities and Repair Garages*, was prepared by the Technical Committee on Automotive and Marine Service Stations. It was issued by the Standards Council on August 1, 2017, with an effective date of August 21, 2017, and supersedes all previous editions.

This document has been amended by one or more Tentative Interim Amendments (TIAs) and/or Errata. See "Codes & Standards" at www.nfpa.org for more information.

This edition of NFPA 30A was approved as an American National Standard on August 21, 2017.

Origin and Development of NFPA 30A

This code originated as Chapter 7 of NFPA 30, *Flammable and Combustible Liquids Code,* and was developed by the Technical Committee on Flammable and Combustible Liquids to provide more detailed requirements for vehicle fueling and to anticipate the need to address self-service fueling and alternative fuels. It was first adopted in 1984. The second edition, adopted in 1987, recognized unattended self-service fueling, and a third edition, adopted in 1990 and prepared by the (new) Technical Committee on Automotive and Marine Service Stations, incorporated requirements for lubrication-only service facilities. The fourth edition, adopted in 1993, incorporated several major amendments, the most important of which allowed aboveground fuel storage tanks at retail motor fuel dispensing facilities, based on a Tentative Interim Amendment to the 1990 edition.

The 1996 (fifth) edition of NFPA 30A incorporated the following major amendments:

(1) An increase in the maximum allowable aboveground fuel storage for Class II liquids (i.e., diesel fuel) at fleet refueling operations to 75,700 L (20,000 gal) per tank, with a maximum aggregate capacity of 302,800 L (80,000 gal)
(2) A new chapter that provided comprehensive fire safety requirements for marine motor fuel dispensing facilities, including fuel dispensing practices
(3) More specific requirements for installation and function of the emergency shear valve at the base of the fuel dispenser
(4) A new section on low-melting-point piping materials

After the adoption of the 1996 edition of NFPA 30A, the Technical Committee on Automotive and Marine Service Stations was given responsibility for NFPA 88B, *Standard for Repair Garages,* and was also charged with developing fire safety requirements for alternative fuels, such as compressed natural gas (CNG), when these fuels are dispensed along with liquid fuels. With respect to repair garages, the Technical Committee decided to integrate the technical requirements of NFPA 88B into NFPA 30A.

The 2000 (sixth) edition of NFPA 30A incorporated the following major amendments:

(1) A change in the title of the document to *Code for Motor Fuel Dispensing Facilities and Repair Garages* to more accurately reflect its scope
(2) A complete editorial review to enhance readability and to replace ambiguous text
(3) Revisions to the minimum separation distances for aboveground storage tanks, including minimum separation distances for protected aboveground tanks and tanks in vaults
(4) Addition of basic requirements for protected aboveground tanks
(5) Corrosion protection requirements for tanks and piping
(6) New and more detailed requirements for installation and testing of piping systems, including secondary containment piping
(7) Revisions to the requirements for emergency power disconnects for fuel dispensing systems
(8) Incorporation of requirements for repair garages from NFPA 88B
(9) Addition of a new chapter that set requirements for compressed natural gas (CNG), liquefied natural gas (LNG), and liquefied petroleum gas (LP-Gas)

The 2003 (seventh) edition of NFPA 30A contained one major revision and several less significant changes. The major revision was the addition of a new chapter, Chapter 13, Farms and Remote Sites, which incorporated the requirements of NFPA 395, *Standard for the Storage of Flammable and Combustible Liquids at Farms and Isolated Sites*, which had been withdrawn in 2002. Other changes included a revision of the definition of fire-resistant tanks in Chapter 3, a change in scope to reflect the incorporation of requirements from NFPA 395, and the addition of material from TIA No. 733 containing requirements and annex material warning people of electrostatic and other hazards that occur during dispensing operations.

The 2008 (eighth) edition of NFPA 30A contained minor revisions. All technical specifications for tanks were removed and replaced by references to NFPA 30, *Flammable and Combustible Liquids Code*. References to NFPA 52, *Vehicular Gaseous Fuel Systems Code*, were inserted into Chapter 12 to address storage and dispensing of hydrogen at facilities that dispense gaseous liquid fuels.

The 2012 (ninth) edition of NFPA 30A incorporated the following major amendments:

(1) Definitions for *combustible liquid* and *flammable liquid* have been revised to correlate with NFPA 30, *Flammable and Combustible Liquids Code*, and relocated to their proper location in Chapter 3.
(2) Erroneous cross-references to specific paragraphs in NFPA 30, *Flammable and Combustible Liquids Code,* were corrected.
(3) New Subsection 6.3.6, Inspections, was added to address inspection, maintenance, and repairs of fuel dispensing equipment, leak detection equipment, and secondary containment equipment.
(4) New Paragraph 6.6.1.1 was added to require that any modification of the dispensing nozzle be either listed or approved by the manufacturer of the nozzle.
(5) Subsection 6.6.1 was corrected to require that dispensing nozzles have a latch-open device.
(6) New Paragraph 7.4.7.4 was added to require that the circuits of gas detection systems, where required for repair garages, be monitored for integrity in accordance with *NFPA 72®, National Fire Alarm and Signaling Code*.
(7) Chapter 8, Electrical Installations, was extensively revised to incorporate a new area classification table that included criteria for the Zone system for area classification, a revised drawing depicting the extent of area classification around fuel dispensing units, and a new diagram depicting the extent of area classification around tank-mounted fuel dispensing units.
(8) Section 12.5, Specific Requirements for LP-Gas Dispensing Devices, was revised to eliminate a conflict with NFPA 58, *Liquefied Petroleum Gas Code*.

The 2015 (tenth) edition of NFPA 30A incorporated the following major amendments:

(1) The Scope statement was clarified and further revised to state that the code applies to repair garages regardless of the type of fuel present and that the code does not apply to aircraft fueling.
(2) In Chapter 6, references to ANSI/UL 842, *Standard for Valves for Flammable Fluids*, and ANSI/UL 2586, *Standard for Hose Nozzle Valves*, were added, where necessary.
(3) Corrections were made to cross-references in Table 8.3.2.
(4) Chapter 12 was amended to resolve inconsistencies between this code and the source codes for the various alternative fuels (hydrogen, compressed natural gas, liquefied natural gas, and liquefied petroleum gas).

This 2018 (eleventh) edition of NFPA 30A incorporates the following major amendments:

(1) The Scope statement (1.1.1) has been amended to state that the code now addresses "on-demand mobile fueling."
(2) Subsection 4.3.2 has been amended to clarify that aboveground storage tanks installed within the scope of the code must comply with all applicable provisions of Chapter 4 of the code, not just those of Subsection 4.3.2.
(3) A new Paragraph 4.3.6.7 has been added to require that all appurtenances to aboveground storage tanks be installed and calibrated in accordance with manufacturers' instructions.
(4) Subsection 6.3.9 has been amended to require a double-poppet-type emergency shutoff valve instead of the single-poppet type.
(5) In Subsection 6.4.2, the provision that the leak detection device must provide an audible or visible indication of a leak has been replaced with the provision that the leak detection device restrict or shut flow of fuel if a leak is detected.
(6) Section 6.7 has been amended to require mechanical or electrical isolation of fluid handling systems other than fuel when the emergency shutoff device is actuated. Section 6.7 has also been amended to require clear identification of the emergency shutoff devices.
(7) New Subsections 7.1.1 and 7.1.2 have been added to specify that major repair garages that repair hydrogen-fueled vehicles must also meet the provisions of NFPA 2, *Hydrogen Technologies Code*.
(8) Subsections 7.3.1, 7.3.3, 7.4.1, 7.4.3, and 7.4.5.3 have been amended to reference the locally adopted building code to address municipalities or areas where NFPA *101*®, *Life Safety Code*®, is not adopted.
(9) Subsection 7.4.6 has been amended to clarify that the sprinkler protection provisions apply to the entire building wherein the repair garage is located.
(10) Subsection 7.4.7 has been amended to include a reference to NFPA 2, *Hydrogen Technologies Code*, with respect to gas detection systems.
(11) Subsection 7.5.4 has been amended to require gas and vapor removal at the ceiling level for areas where vehicles using lighter-than-air fuels are repaired.
(12) A second exception has been added to Subsection 8.3.2 that limits the classified area around shop-fabricated secondary containment–type tanks.
(13) Subsection 9.2.2 and its subordinate paragraphs have been revised to state that no separation is required between a delivery vehicle and the fill connection to an underground tank and to clarify the separation distances between the delivery vehicle and the fill connections of the various types of aboveground tanks.
(14) A new Paragraph 9.2.5.5 has been added that prohibits storage or placement of merchandise within 6 m (20 ft) of any fuel dispenser.
(15) Subsection 9.7.5 has been amended to restrict applicability to those fuel tanks holding liquid fuels.
(16) Subsections 12.2.3 and 12.2.4 have been amended to recognize the use of dispensing devices and hose assemblies that are not listed but are deemed acceptable to the authority having jurisdiction.
(17) Paragraph 13.2.3.6 has been amended to extend the 12 m (40 ft) separation to property lines as well as to important buildings.
(18) A new Chapter 14 has been added to address the subject of on-demand mobile fueling.
(19) Annex A.1.2 has been amended to state that it is the intent of the code to apply to non-registered vehicles as well as registered vehicles.

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NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on safeguarding against the fire and explosion hazards associated with the general storage, handling, and dispensing of flammable and combustible liquids at automotive and marine service stations, farms, and isolated construction sites and with related activities such as dispensing gaseous fuels. This Committee shall also have primary responsibility for documents on construction, control of fire hazards, ventilations, fire protection, and maintenance of repair garages.

Contents

NFPA 30A

Code for

Motor Fuel Dispensing Facilities and Repair Garages

2018 Edition

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in mandatory sections of the document are given in Chapter 2 and those for extracts in informational sections are given in Annex D. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text shall be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex D.

Chapter 1 Administration

1.1* Scope.

1.1.1 This code shall apply to motor fuel dispensing facilities, motor fuel dispensing at farms and isolated construction sites, and on-demand mobile fueling.

1.1.2 This code shall apply to motor vehicle repair garages.

Δ **1.1.3*** This code shall not apply to those motor fuel dispensing facilities where only liquefied petroleum gas (LP-Gas), liquefied natural gas (LNG), compressed natural gas (CNG), or hydrogen is dispensed as motor fuel.

1.1.4 This code shall not apply to aircraft fueling.

1.2* Purpose. The purpose of this document shall be to provide reasonable safeguards for dispensing liquid and gaseous motor fuels into the fuel tanks of automotive vehicles and marine craft.

1.3 Application. (Reserved)

1.4 Retroactivity. The provisions of this code reflect a consensus of what is necessary to provide an acceptable degree of protection from the hazards addressed in this code at the time the code was issued.

1.4.1 Unless otherwise specified, the provisions of this code shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the code. Where specified, the provisions of this code shall be retroactive.

1.4.2 In those cases where the authority having jurisdiction determines that the existing situation presents an unacceptable degree of risk, the authority having jurisdiction shall be permitted to apply retroactively any portions of this code deemed appropriate.

1.4.3 The retroactive requirements of this code shall be permitted to be modified if their application clearly would be impractical in the judgment of the authority having jurisdiction, and only where it is clearly evident that a reasonable degree of safety is provided.

1.5 Equivalency. Nothing in this code is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this code.

1.5.1 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the authority having jurisdiction.

Δ **1.6 Enforcement.** This code shall be administered and enforced by the authority having jurisdiction designated by the governing authority. *(See Annex C for sample wording for enabling legislation.)*

1.7* Classification of Liquids. Any liquid within the scope of this code and subject to the requirements of this code shall be known generally as either a flammable liquid or a combustible liquid and shall be defined and classified in accordance with 3.3.9.

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this code and shall be considered part of the requirements of this document.

Δ **2.2 NFPA Publications.** National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 2, *Hydrogen Technologies Code,* 2016 edition.

NFPA 10, *Standard for Portable Fire Extinguishers,* 2018 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2016 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems,* 2016 edition.

NFPA 30, *Flammable and Combustible Liquids Code,* 2018 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment,* 2016 edition.

NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials,* 2016 edition.

NFPA 51, *Standard for the Design and Installation of Oxygen–Fuel Gas Systems for Welding, Cutting, and Allied Processes,* 2018 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work,* 2014 edition.

NFPA 52, *Vehicular Natural Gas Fuel Systems Code,* 2016 edition.

NFPA 54, *National Fuel Gas Code,* 2018 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code,* 2016 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2017 edition.

NFPA 70®, National Electrical Code®, 2017 edition.

NFPA 72®, National Fire Alarm and Signaling Code, 2016 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives,* 2016 edition.

NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment,* 2014 edition.

NFPA 85, *Boiler and Combustion Systems Hazards Code,* 2015 edition.

NFPA 86, *Standard for Ovens and Furnaces,* 2015 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems,* 2018 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids,* 2015 edition.

NFPA *101®, Life Safety Code®,* 2018 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel–Burning Appliances,* 2016 edition.

NFPA 220, *Standard on Types of Building Construction,* 2018 edition.

NFPA 253, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source,* 2015 edition.

NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair,* 2015 edition.

NFPA 385, *Standard for Tank Vehicles for Flammable and Combustible Liquids,* 2017 edition.

2.3 Other Publications.

2.3.1 API Publications. American Petroleum Institute, 1220 L Street, NW, Washington, DC 20005-4070.

API 607, *Fire Test For Quarter-Turn Valves And Valves Equipped With Nonmetallic Seats*, 6th edition, 2010.

2.3.2 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM D5, *Standard Test Method for Penetration of Bituminous Materials*, 2013.

ASTM D56, *Standard Test Method for Flash Point by Tag Closed Cup Tester,* 2005, reapproved 2010.

ASTM D93, *Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester*, 2015a.

ASTM D323, *Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method)*, 2015a.

ASTM D3278, *Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus*, 1996, reapproved 2011.

ASTM D3828, *Standard Test Methods for Flash Point of Liquids by Small Scale Closed Cup Tester,* 2012a.

ASTM D4359, *Standard Test for Determining Whether a Material in a Liquid or a Solid*, 1990, reapproved 2012.

Δ **2.3.3 UL Publications.** Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 25, *Meters for Flammable and Combustible Liquids and LP-Gas*, 2016.

UL 79, *Power-Operated Pumps for Petroleum Dispensing Products,* 2016.

UL 87, *Power-Operated Dispensing Devices for Petroleum Products,* 2001, revised 2008.

ANSI/UL 842, *Valves for Flammable Fluids*, 2007, 10th edition, 2015.

ANSI/UL 2080, *Fire Resistant Tanks for Flammable and Combustible Liquids*, 2000.

ANSI/UL 2085, *Protected Aboveground Tanks for Flammable and Combustible Liquids*, 1997, revised 2010.

UL 2245, *Below-Grade Vaults for Flammable Liquid Storage Tanks*, 2006.

ANSI/UL 2586, *Hose Nozzle Valves*, 1st edition, 2011, revised 2014.

2.3.4 Other Publications.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2003.

2.4 References for Extracts in Mandatory Sections.

NFPA 30, *Flammable and Combustible Liquids Code,* 2018 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter shall apply to the terms used in this code. Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used. *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3* Code. A standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes and standards.

3.2.4 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.5* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.3 General Definitions.

3.3.1 Basement. For the purposes of this code, any story of a building wholly or partly below grade that is not considered the first story above grade.

3.3.2 Bulk Plant or Terminal. That portion of a property where liquids are received by tank vessel, pipeline, 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.

3.3.3 Closed Container. A container as herein defined, so sealed by means of a lid or other device that neither liquid nor vapor will escape from it at ordinary temperatures. [**30,** 2018]

3.3.4 Combustible Liquid. See 3.3.9.1.

3.3.5* Container. Any vessel of 119 gal (450 L) or less capacity used for transporting or storing liquids. [**30,** 2018]

3.3.6* Dispensing Device, Overhead Type. A dispensing device that consists of one or more individual units intended for installation in conjunction with each other, mounted above a dispensing area typically within the service station canopy structure, and characterized by the use of an overhead hose reel.

3.3.7 Flammable Liquid. See 3.3.9.2.

3.3.8 Gas. A material that has a vapor pressure greater than 300 kPa absolute (43.5 psia) at 50°C (122°F) or is completely gaseous at 20°C (68°F) at a standard pressure of 101.3 kPa absolute (14.7 psia).

3.3.9* Liquid. Any material that (1) has a fluidity greater than that of 300 penetration asphalt when tested in accordance with ASTM D5, *Standard Method of Test for Penetration of Bituminous Materials*, or (2) is a viscous substance for which a specific melting point cannot be determined but that is determined to be a liquid in accordance with ASTM D4359, *Standard Test for Determining Whether a Material is a Liquid or a Solid.* [**30,** 2018]

3.3.9.1* *Combustible Liquid.* Any liquid that has a closed-cup flash point at or above 100°F (37.8°C), as determined by the test procedures and apparatus set forth in 3.4.3. Combustible liquids are classified according to 3.4.2.2. [**30,** 2018]

3.3.9.2* *Flammable Liquid.* Any liquid that has a closed-cup flash point below 100°F (37.8°C), as determined by the test procedures and apparatus set forth in 3.4.3, and a Reid vapor pressure that does not exceed an absolute pressure of 40 psi (276 kPa) at 100°F (37.8°C), as determined by ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method).* Flammable liquids are classified according to 3.4.2.1. [**30,** 2018]

3.3.10 Low Melting Point Materials. Ductile materials such as aluminum, copper, and brass, nonductile materials such as cast iron, and rigid and nonrigid polymeric materials such as plastic and fiberglass-reinforced plastic that soften on exposure to fire and that are partially or completely consumed by fire.

3.3.11 Motor Fuel Dispensing Facility. That portion of a property where motor fuels are stored and dispensed from fixed equipment into the fuel tanks of motor vehicles or marine craft or into approved containers, including all equipment used in connection therewith.

3.3.11.1 *Attended Self-Service Motor Fuel Dispensing Facility.* A motor fuel dispensing facility that has an attendant or employee on duty whenever the facility is open for business. The attendant or employee on duty does not typically dispense motor fuels into fuel tanks or containers. The customer or vehicle operator usually conducts the dispensing.

3.3.11.2 *Fleet Vehicle Motor Fuel Dispensing Facility.* A motor fuel dispensing facility at a commercial, industrial, governmental, or manufacturing property where motor fuels are dispensed into the fuel tanks of motor vehicles that are used in connection with the business or operation of that property by persons within the employ of such business or operation.

3.3.11.3 *Full-Service Motor Fuel Dispensing Facility.* A motor fuel dispensing facility that has one or more attendants or supervisors on duty to dispense motor fuels into fuel tanks or containers whenever the facility is open for business.

3.3.11.4 *Marine Motor Fuel Dispensing Facility.* A motor fuel dispensing facility at or adjacent to shore, a pier, a wharf, or a floating dock where motor fuels are dispensed into the fuel tanks of marine craft.

3.3.11.5* *Motor Fuel Dispensing Facility Located Inside a Building.* That portion of a motor fuel dispensing facility located within the perimeter of a building or building structure that also contains other occupancies.

3.3.11.6 *Unattended Self-Service Motor Fuel Dispensing Facility.* A motor fuel dispensing facility that has no attendant or employee on duty. The customer or vehicle operator conducts the dispensing operation. This includes coin, currency, membership card, and credit card dispensing operations.

3.3.12 Repair Garages.

3.3.12.1 ***Major Repair Garage.*** A building or portions of a building where major repairs, such as engine overhauls, painting, body and fender work, and repairs that require draining of the motor vehicle fuel tank are performed on motor vehicles, including associated floor space used for offices, parking, or showrooms.

3.3.12.2 ***Minor Repair Garage.*** A building or portions of a building used for lubrication, inspection, and minor automotive maintenance work, such as engine tune-ups, replacement of parts, fluid changes (e.g., oil, antifreeze, transmission fluid, brake fluid, air conditioning refrigerants, etc.), brake system repairs, tire rotation, and similar routine maintenance work, including associated floor space used for offices, parking, or showrooms.

3.3.13 Safety Can. A listed container of not more than 5.3 gal (20 L) capacity having a spring-closing lid and spout cover, and so designed that it will safely relieve internal pressure when subjected to fire exposure.

3.3.14 Submersible Pump. A pump that is located inside a storage tank and positioned near the bottom of the tank, below the liquid level.

3.3.15 Tanks.

3.3.15.1 ***Aboveground Storage Tank.*** A horizontal or vertical tank that is listed and intended for fixed installation, without backfill, above or below grade and is used within the scope of its approval or listing.

3.3.15.2 ***Fire-Resistant Tank.*** An atmospheric aboveground storage tank with thermal insulation that has been evaluated for resistance to physical damage and for limiting the heat transferred to the primary tank when exposed to a hydrocarbon fuel fire and is listed in accordance with UL 2080, *Standard for Fire Resistant Tanks for Flammable and Combustible Liquids*, or an equivalent test procedure. [**30:**22.2.1]

3.3.15.3* ***Protected Aboveground Tank.*** An atmospheric aboveground storage tank with integral secondary containment and thermal insulation that has been evaluated for resistance to physical damage and for limiting the heat transferred to the primary tank when exposed to a hydrocarbon pool fire and is listed in accordance with ANSI/UL 2085, *Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids*, or an equivalent test procedure. [**30:**22.2.3]

3.3.16 Vapor Processing Equipment. Those components of a vapor processing system designed to process vapors or liquids captured during transfer or filling operations. [**30,** 2018]

3.3.17* Vapor Processing System. A system designed to capture and process vapors displaced during transfer or filling operations by use of mechanical or chemical means. [**30,** 2018]

3.3.18* Vapor Recovery System. A system designed to capture and retain, without processing, vapors displaced during transfer or filling operations. [**30,** 2018]

3.4 Definition and Classification of Liquids.

3.4.1 Scope.

3.4.1.1 This section shall establish a uniform system of defining and classifying flammable and combustible liquids for the purpose of proper application of this code. [**30:**4.1.1]

3.4.1.2 The definitions and classifications of this section shall apply to any liquid within the scope of and subject to the requirements of this code. [**30:**4.1.2]

3.4.2 Classification of Liquids. Any flammable liquid, as defined in 3.3.9.2, or combustible liquid, as defined in 3.3.9.1, that is within the scope of this code and subject to the requirements of this code shall be classified in accordance with this section.

3.4.2.1 Flammable liquids, as defined in 3.3.9.2, shall be classified as Class I liquids and shall be further subclassified in accordance with the following: (1) Class IA Liquid — Any liquid that has a flash point below 73°F (22.8°C) and a boiling point below 100°F (37.8°C); (2) Class IB Liquid — Any liquid that has a flash point below 73°F (22.8°C) and a boiling point at or above 100°F (37.8°C); (3) Class IC Liquid — Any liquid that has a flash point at or above 73°F (22.8°C), but below 100°F (37.8°C). [**30:**4.3.1]

3.4.2.2 Combustible liquids, as defined in 3.3.9.1, shall be classified in accordance with the following: (1) Class II Liquid — Any liquid that has a flash point at or above 100°F (37.8°C) and below 140°F (60°C); (2) Class III Liquid — Any liquid that has a flash point at or above 140°F (60°C): (a) Class IIIA Liquid — Any liquid that has a flash point at or above 140°F (60°C), but below 200°F (93°C); (b) Class IIIB Liquid — Any liquid that has a flash point at or above 200°F (93°C). [**30:**4.3.2]

3.4.3 Determination of Flash Point. The flash point of a liquid shall be determined according to the methods specified in 3.4.3.1 through 3.4.3.4. [**30:**4.4]

3.4.3.1 Except as specified in 3.4.3.1.1, the flash point of a liquid having a viscosity below 5.5 centiStokes at 104°F (40°C) or below 9.5 centiStokes at 77°F (25°C) shall be determined in accordance with ASTM D56, *Standard Test Method for Flash Point by Tag Closed Cup Tester.* [**30:**4.4.1]

3.4.3.1.1 Cut-back asphalts, liquids that tend to form a surface film, and liquids that contain suspended solids shall not be tested in accordance with ASTM D56, even if they otherwise meet the viscosity criteria. Such liquids shall be tested in accordance with 3.4.3.2. [**30:**4.4.1.1]

3.4.3.2 The flash point of a liquid having a viscosity of 5.5 centiStokes or more at 104°F (40°C) or 9.5 centiStokes or more at 77°F (25°C) or a flash point of 200°F (93.4°C) or higher shall be determined in accordance with ASTM D93, *Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester.* [**30:**4.4.2]

3.4.3.3 As an alternative, ASTM D3278, *Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus*, shall be permitted to be used for paints, enamels, lacquers, varnishes, and related products and their components that have flash points between 32°F (0°C) and 230°F (110°C) and viscosities below 150 Stokes at 77°F (25°C). [**30:**4.4.3]

3.4.3.4 As an alternative, ASTM D3828, *Standard Test Methods for Flash Point by Small Scale Closed Cup Tester*, shall be permitted to be used for materials other than those for which ASTM D3278 is specifically required. [**30:**4.4.4]

Chapter 4 Storage of Liquids

4.1 Scope. This chapter shall apply to the storage of liquid fuels and to the storage of related materials, such as lubricating oils and greases, cleaning solvents, and windshield washer solvents.

4.2* General Requirements.

4.2.1 Liquids shall be stored in the following:

(1) Approved closed containers that do not exceed 227 L (60 gal) capacity and are located outside buildings
(2) Tanks or approved closed containers located inside motor fuel dispensing facilities or repair garages
(3) Aboveground tanks, underground tanks, and containers in accordance with the requirements of Section 4.3
(4) Tanks supplying marine service stations in accordance with Section 11.2

4.2.2 A motor fuel dispensing facility located at a bulk plant shall be separated from areas in which bulk plant operations are conducted by a fence or other approved barrier. Dispensing devices at the motor fuel dispensing facility shall not be supplied by aboveground tanks located in the bulk plant. Storage tanks at motor fuel dispensing facilities shall not be connected by piping to aboveground tanks located in the bulk plant.

4.2.3 Class I liquids shall not be stored or handled in a building that has a basement or pit into which ignitible vapors can travel, unless the basement or pit is provided with ventilation that will prevent the accumulation of vapors. The ventilation system shall be capable of providing at least 0.3 m^3/min of exhaust per m^2 of floor area (1 cfm per ft^2), but not less than 4 m^3/min (150 ft^3/min).

Δ **4.2.4** Where tanks are at an elevation that produces a gravity head on the dispensing device, the tank outlet shall be equipped with a device, such as a normally closed solenoid valve, positioned adjacent to and downstream from the valve specified in 22.13.1 of NFPA 30, that is installed and adjusted so that liquid cannot flow by gravity from the tank if the piping or hose fails when the dispenser is not in use.

4.3 Storage of Liquids.

Δ **4.3.1 Underground Tanks.** Underground storage tanks shall meet all applicable requirements of Chapters 21 and 23 of NFPA 30.

Δ **4.3.2* Aboveground Storage Tanks.** Except as modified by the provisions of this chapter, aboveground storage tanks shall meet all applicable requirements of Chapters 21 and 22 of NFPA 30.

Δ **4.3.2.1** The use of aboveground storage tanks at motor fuel dispensing facilities, fleet vehicle motor fuel dispensing facilities, and marine motor fuel dispensing facilities shall be permitted when installed in accordance with the requirements of this subsection and with all applicable requirements of Chapters 21, 22, and 27 of NFPA 30 and , for tanks other than tanks in vaults, when the specific installation has been approved by the authority having jurisdiction.

4.3.2.2 Tanks designed and built for underground use shall not be installed for aboveground use.

4.3.2.3 Tanks storing liquid motor fuels at an individual site shall be limited to a maximum individual capacity of 45,400 L (12,000 gal) and aggregate capacity of 181,700 L (48,000 gal) unless such tanks are installed in vaults complying with 4.3.3, in which case the maximum individual capacity shall be permitted to be 57,000 L (15,000 gal).

4.3.2.4 Tanks shall be located in accordance with Table 4.3.2.4.

4.3.2.5 The maximum individual tank capacity of 45,400 L (12,000 gal), where indicated in Table 4.3.2.4, shall be permitted to be increased to 75,700 L (20,000 gal) for Class II and Class III liquids at a fleet vehicle motor fuel dispensing facility and an aggregate capacity of 304,000 L (80,000 gal).

4.3.2.6 At fleet vehicle motor fuel dispensing facilities, no minimum separation shall be required between the dispensing device and a tank in a vault, a protected aboveground tank, or a fire-resistant tank.

Δ **4.3.2.7** The provisions of this subsection shall not prohibit the dispensing of liquid motor fuels in the open from a fuel dispensing system supplied by an existing aboveground tank, not to exceed 22,710 L (6000 gal), located at commercial, industrial, government, or manufacturing establishments, and intended for fueling vehicles used in connection with their business. Such dispensing shall be permitted provided the following conditions are met:

(1) An inspection of the premises and operations has been made and approval has been granted by the authority having jurisdiction.
(2) The tank is safeguarded against collision, spillage, and overfill to the satisfaction of the authority having jurisdiction.
(3) The tank system is listed or approved for such aboveground use.
(4) The tank complies with requirements for emergency relief venting, the tank and dispensing system meet the electrical classification requirements of this code, and the tank complies with the provisions of 4.2.4.
(5) The tank storage complies with Chapter 22 of NFPA 30.

Δ **4.3.2.8** Aboveground tanks shall be provided with spill control that meets the requirements of 21.7.1 and Section 22.11 of NFPA 30. Tank fill connections shall be provided with a noncombustible spill containment device.

Exception: Tanks installed in vaults that meet the requirements of 4.3.3 need not meet this requirement.

4.3.3 Vaults for Aboveground Tanks.

4.3.3.1 Scope. Subsection 4.3.3 shall apply to installation of aboveground tanks in vaults and design and installation of such vaults.

4.3.3.2 General. Aboveground tanks shall be permitted to be installed in vaults that meet the requirements of 4.3.3. Except as modified by the provisions of 4.3.3, vaults shall meet all other applicable provisions of this code. Vaults shall be constructed and listed in accordance with UL 2245, *Standard for Below-Grade Vaults for Flammable Liquid Storage Tanks*. Vaults shall be permitted to be either above or below grade.

Δ Table 4.3.2.4 Minimum Separation Requirements for Aboveground Tanks

Tank Type	Individual Tank Capacity (gal)[a]	Minimum Distance (ft)				
		From the Nearest Important Building on the Same Property	From Nearest Fuel Dispensing Device[b]	From Lot Line That Is or Can Be Built Upon[c]	From the Nearest Side of Any Public Way	Between Tanks
Tanks in vaults[d]	0–15,000	0	0	0	0	Separate compartments required for each tank
Protected aboveground tanks	Less than or equal to 6,000	5	0	15	5	3
	6,001–12,000	15	0	25	15	3
Fire-resistant tanks	0–12,000	25	25	50	25	3
Other tanks meeting the requirements of NFPA 30	0–12,000	50	50	100	50	3

For SI units, 1 ft = 0.30 m; 1 gal = 3.8 L.
[a]See 4.3.2.3 and 4.3.2.5.
[b]See 4.3.2.6.
[c]Including the opposite side of a public way.
[d]The separation distances given for vaults are measured from the outer perimeter of the vault.

4.3.3.3* Construction and Installation of Storage Tank Vaults. [**30:**25.5]

4.3.3.3.1 Construction Requirements. Vaults shall be designed and constructed in accordance with 4.3.3.3.1.1 through 4.3.3.3.1.4. [**30:**25.5.1]

4.3.3.3.1.1 The top of an abovegrade vault that contains a tank storing Class I liquid or Class II or Class III liquid stored at a temperature at or above its flash point shall be constructed of noncombustible material and shall be designed to be weaker than the walls of the vault to ensure that the thrust of any explosion occurring inside the vault is directed upward before destructive internal pressure develops within the vault.

4.3.3.3.1.2 The top of an at-grade or belowgrade vault that contains a tank storing Class I liquid or Class II or Class III liquid stored at a temperature at or above its flash point shall be designed to relieve or contain the force of any explosion occurring inside the vault.

4.3.3.3.1.3 Adjacent vaults shall be permitted to share a common wall. [**30:**25.5.1.3]

4.3.3.3.1.4 Where required, the vault shall be wind and earthquake resistant, in accordance with recognized engineering standards. [**30:**25.5.1.4]

4.3.3.3.2 Installation Requirements. Storage tank vaults shall be installed in accordance with the requirements of 4.3.3.3.2.1 and 4.3.3.3.2.2. [**30:**25.5.2]

4.3.3.3.2.1 Each vault and its tank shall be anchored to resist uplifting by groundwater or flooding, including when the tank is empty. [**30:**25.5.2.1]

4.3.3.3.2.2 Vaults that are not resistant to damage from the impact of a motor vehicle shall be protected by collision barriers. [**30:**25.5.2.2]

4.3.3.4 Tank Selection and Arrangement.

4.3.3.4.1 Tanks shall be listed for aboveground use.

4.3.3.4.2 Each tank shall be in its own vault and shall be completely enclosed by the vault. [**30:**25.3.1.5]

4.3.3.4.3 Sufficient clearance between the tank and the vault shall be provided to allow for visual inspection and maintenance of the tank and its appurtenances. [**30:**25.3.1.6]

4.3.3.4.4 Backfill shall not be permitted around the tank. [**30:**25.3.1.7]

4.3.3.5 Tank Appurtenances.

Δ 4.3.3.5.1 Vent pipes that are provided for normal tank venting shall terminate outside the vault and at least 3.6 m (12 ft) above ground level and shall meet the requirements of 27.8.1 of NFPA 30.

4.3.3.5.2 Emergency vents shall be vaportight and shall be permitted to discharge inside the vault. Long-bolt manhole covers shall not be permitted for this purpose.

4.3.3.5.3 An approved means of overfill protection shall be provided for tanks. The use of ball float valves shall be prohibited.

Δ 4.3.3.5.4 Fill connections for vaults installed inside buildings shall comply with 22.13.4 of NFPA 30.

4.3.3.6 Ventilation Systems for Storage Tank Vaults. [**30:**25.10]

4.3.3.6.1 Vaults that contain tanks storing Class I liquids shall be ventilated at a rate of not less than 1 cfm/ft^2 of floor area (0.3 m^3/min/m^2), but not less than 150 cfm (4 m^3/min). [**30:**25.10.1]

4.3.3.6.2 Such ventilation shall operate continuously or shall be designed to operate upon activation of a vapor and liquid detection system. [**30:**25.10.2]

4.3.3.6.3 Failure of the exhaust airflow shall automatically shut down the dispensing system. [**30:**25.10.3]

4.3.3.6.4 The exhaust system shall be designed to provide air movement across all parts of the vault floor. [**30:**25.10.4]

4.3.3.6.5 Supply and exhaust ducts shall extend to within 3 in. (75 mm), but not more than 12 in. (300 mm) of the floor. [**30:**25.10.5]

Δ **4.3.3.6.6** The exhaust system shall be installed in accordance with the provisions of NFPA 91. [**30:**25.10.6]

4.3.3.7 Vapor and Liquid Detection Systems.

4.3.3.7.1 Each vault shall be provided with an approved vapor and liquid detection system that is equipped with on-site audible and visual warning devices with battery back-up. [**30:**25.15.1]

4.3.3.7.2 The vapor detection system shall sound an alarm when the system detects vapors that reach or exceed 25 percent of the lower flammable limit of the liquid stored. [**30:**25.15.2]

4.3.3.7.3 Vapor detectors shall be located no higher than 12 in. (300 mm) above the lowest point in the vault. [**30:**25.15.3]

4.3.3.7.4 The liquid detection system shall sound an alarm upon detection of any liquid, including water. [**30:**25.15.4]

4.3.3.7.5 Liquid detectors shall be located in accordance with the manufacturer's instructions. [**30:**25.15.5]

4.3.3.7.6 Activation of either the vapor detection system or the liquid detection system shall cause a signal to be sounded at an approved, constantly attended location within the facility serving the tanks or at an approved location. [**30:**25.15.6]

Δ **4.3.3.8** In lieu of the separation distance requirements given in Section 22.4 of NFPA 30, separation distances between the vault and any of the following shall be permitted to be reduced to 0 ft (0 m), as measured from the outer perimeter of the vault wall:

(1) Any property line that is or can be built upon
(2) The near and far sides of a public way
(3) The nearest important building on the same property

[**30:**25.4]

4.3.3.9 Vaults and their required equipment shall be maintained in accordance with the requirements of 4.3.3. [**30:**25.16]

Δ **4.3.4 Fire-Resistant Tanks.** Fire-resistant tanks shall be tested and listed in accordance with UL 2080, *Standard for Fire Resistant Tanks for Flammable and Combustible Liquids.* Fire-resistant tanks shall also meet both of the following requirements:

(1) The construction that provides the required fire-resistive protection shall reduce the heat transferred to the primary tank in order to limit the temperature of the primary tank to an average maximum rise of 800°F (430°C) and a single point maximum rise of 1000°F (540°C) and to prevent release of liquid, failure of the primary tank, failure of the supporting structure, and impairment of venting for a period of not less than 2 hours when tested using the fire exposure specified in UL 2080.
(2) Reduction in sizing of the emergency vents in accordance with 22.7.3.5 of NFPA 30 shall not be permitted.

4.3.5 Protected Tanks. Protected aboveground tanks shall be tested and listed in accordance with ANSI/UL 2085, *Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids.* [**30:**22.10.1]

Δ **4.3.5.1** Protected tanks shall also meet both of the following requirements:

(1) The construction that provides the required fire-resistive protection shall reduce the heat transferred to the primary tank in order to limit the temperature of the primary tank to an average maximum rise of 260°F (144°C) and a single point maximum rise of 400°F (204°C) and to prevent release of liquid, failure of the primary tank, failure of the supporting structure, and impairment of venting for a period of not less than 2 hours when tested using the fire exposure specified in ANSI/UL 2085. [**30:**22.10.2]
(2) Reduction in sizing of the emergency vents in accordance with 22.7.3.5 of NFPA 30 shall not be permitted. [**30:**22.10.2]

4.3.6 Additional Requirements for All Aboveground Tanks.

4.3.6.1 All openings shall be located above the maximum liquid level.

4.3.6.2 Means shall be provided for determining the liquid level in each tank, and this means shall be accessible to the delivery operator.

4.3.6.3 Means shall be provided to sound an audible alarm when the liquid level in the tank reaches 90 percent of capacity. Means shall also be provided either to automatically stop the flow of liquid into the tank when the liquid level in the tank reaches 98 percent capacity or to restrict the flow of liquid into the tank to a maximum flow rate of 9.5 L/min (2.5 gpm) when the liquid in the tank reaches 95 percent capacity. These provisions shall not restrict or interfere with the operation of either the normal vent or the emergency vent.

4.3.6.4 Means shall be provided to prevent the release of liquid by siphon flow.

4.3.6.5 Shutoff and check valves shall be equipped with a pressure-relieving device that will relieve the pressure generated by thermal expansion back to the tank.

4.3.6.6 Fuel shall not be dispensed from the tank by either gravity flow or pressurization of the tank.

N **4.3.6.7** Storage tank appurtenances shall be installed and calibrated in accordance with the manufacturer's instructions, published industry practices, or equivalent methods approved by the AHJ.

4.3.7 Physical Protection for All Outside Aboveground Tanks.

4.3.7.1 Tanks that are not enclosed in vaults shall be enclosed with a chain link fence at least 1.8 m (6 ft) high. The fence shall be separated from the tanks by at least 3 m (10 ft) and shall have a gate that is secured against unauthorized entry.

Exception: Tanks are not required to be enclosed with a fence if the property on which the tanks are located has a perimeter security fence.

4.3.7.2* Guard posts or other approved means shall be provided to protect tanks that are subject to vehicular damage. When guard posts are installed, the following design shall be acceptable:

(1) They shall be constructed of steel not less than 100 mm (4 in.) in diameter and shall be filled with concrete.
(2) They shall be spaced not more than 1.2 m (4 ft) on center.
(3) They shall be set not less than 0.9 m (3 ft) deep in a concrete footing of not less than 380 mm (15 in.) diameter.

Δ **4.3.8* Corrosion Protection.** Any portion of a tank or its piping that is in contact with the soil shall have properly engineered, installed, and maintained corrosion protection that meets the requirements of 21.4.5 of NFPA 30.

4.3.9 Storage of Liquids Inside Buildings. Storage of flammable and combustible liquids in motor fuel dispensing facility buildings and in repair garage buildings shall meet the requirements of this subsection.

4.3.9.1 Class I, II, and IIIA Liquids in Tanks Not Exceeding 454 L (120 Gal) Capacity and in Containers.

4.3.9.1.1 The aggregate quantity of Class I liquids stored in a tank that does not exceed 454 L (120 gal) capacity and in containers shall not exceed 454 L (120 gal). Liquids in storage shall be maintained in tanks or in approved containers that are closed or are fitted with an approved dispensing device that meets the requirements of 9.2.4.1.

4.3.9.1.2 Except as permitted under 4.3.9.1.3, the aggregate quantity of Class II and Class IIIA liquids stored in a tank that does not exceed 454 L (120 gal) capacity and in containers shall not exceed 908 L (240 gal). The quantity for each class shall not exceed 454 L (120 gal). Liquids in storage shall be maintained in tanks or in approved containers that are closed or are fitted with an approved dispensing device that meets the requirements of 9.2.4.1.

4.3.9.1.3 Where there are no Class I liquids stored, the aggregate quantities of Class II liquids shall not exceed 908 L (240 gal).

4.3.9.2 Class I, II, and IIIA Liquids in Tanks Exceeding 454 L (120 Gal) Capacity. Where installation of a tank that exceeds 454 L (120 gal) capacity in accordance with 4.3.2 is not practical because of building or property limitations, the tank shall be permitted to be installed in a building if it is enclosed as described in 4.3.3 and if the installation is specifically approved by the authority having jurisdiction.

Δ **4.3.9.3 Class IIIB Liquids.** The quantity of Class IIIB liquids in storage shall not be limited. Class IIIB liquids shall be permitted to be stored in and dispensed from tanks and containers that meet the requirements of Chapter 9 and Chapters 21 through 23 of NFPA 30, as applicable. Tanks storing Class IIIB liquids inside buildings shall be permitted to be located at, below, or above grade. Adequate drainage shall be provided. Tanks and containers that contain only crankcase drainings shall be considered as containing Class IIIB liquids.

Δ **4.3.10 Temporary Storage of Liquid Fuels.** Aboveground tanks used for dispensing of motor fuels shall not be required to be permanently installed when located on premises not normally accessible to the public, provided that all of the following requirements are met:

(1) Approval of the authority having jurisdiction shall be required prior to bringing the tank to a site in the jurisdiction. In reviewing a proposed installation, the condition of the tank, the site where the tank will be located, installation and testing procedures, and operational procedures shall be evaluated prior to approval.
(2) The approval shall include a definite time limit after which the tank shall be removed from the site and relocated to an approved location.
(3) The tank shall comply with Section 4.3 and all other applicable provisions of this code and NFPA 30.
(4) A tank containing liquid shall not be moved unless it has been specifically investigated and approved for movement while full or partially full.

Chapter 5 Piping for Liquids

5.1 Scope. This chapter shall apply to piping systems consisting of pipe, tubing, flanges, bolting, gaskets, valves, fittings, flexible connectors, the pressure-containing parts of other components such as expansion joints and strainers, and devices that serve such purposes as mixing, separating, snubbing, distributing, metering, controlling flow, or secondary containment of liquids and associated vapors.

5.2 General Requirements for All Piping Systems.

Δ **5.2.1** The design, fabrication, assembly, test, and inspection of the piping system shall meet the requirements of Chapter 27 of NFPA 30.

Exception No. 1: Where dispensing is from a floating structure or pier, approved oil-resistant flexible hose shall be permitted to be used between shore piping and the piping on the floating structure or pier and between separate sections of the floating structure to accommodate changes in water level or shoreline, provided that the hose is either resistant to or shielded from damage by fire.

Exception No. 2: Low melting point rigid piping shall be permitted to be used between underground shore piping and a floating structure or pier and on the floating structure or pier itself, provided that the piping is protected from physical damage and stresses arising from impact, settlement, vibration, expansion, contraction, or tidal action and provided that the hose is either resistant to or shielded from damage by fire exposure.

5.2.2 Piping shall be located so that it is protected from physical damage. Piping that passes through a dike wall shall be designed to prevent excessive stresses that could result from settlement or fire exposure.

5.2.3 Any portion of a piping system that is in contact with the soil shall be protected from corrosion in accordance with good engineering practice.

5.2.4 All piping inside buildings but outside the motor fuel dispensing area shall be enclosed within a horizontal chase or a vertical shaft used only for this piping. Vertical shafts and hori-

zontal chases shall be constructed of materials having a fire resistance rating of not less than 2 hours.

5.2.5 Each fill pipe shall be identified by color code or other marking to identify the product for which it is used. The color code or marking shall be maintained in legible condition throughout the life of the installation.

5.2.6 Shutoff and check valves shall be equipped with a pressure-relieving device that will relieve any pressure generated by thermal expansion of the contained liquid back to the storage tank.

5.2.7 Piping components made of low melting point materials shall be permitted to be used without backfill with the following sumps:

(1) Belowgrade underground tank sumps that are fitted with a cover
(2) Belowgrade piping connection sumps that are fitted with a cover
(3) Containment sumps, under the following conditions:
    (a) The sump is monitored to detect any leaks.
    (b) Any leaks can be controlled.
    (c) The components are either resistant to or shielded from damage by fire exposure.
(4) Containment sumps, provided the piping components can successfully pass the test procedures described in API 607, *Fire Test for Soft-Seated Quarter-Turn Valves*

5.3 Installation of Piping Systems. Piping shall be installed in accordance with the manufacturers' instructions.

5.3.1 Bends. The bending radius for piping and tubing that is bent shall not be less than recommended by the manufacturer.

5.3.2 Flexible Connections.

5.3.2.1 Flexible piping connections shall be provided at the following points in the piping system:

(1) Where liquid, vapor return, and vent piping connect to underground tanks
(2) At the base of any vent riser
(3) Where required to relieve stress at points where the piping changes direction

5.3.2.2 Acceptable means for providing flexibility in piping systems shall include the following:

(1) Listed flexible connectors that are approved for the purpose
(2) Piping that is inherently flexible and is approved for the purpose
(3) Other means acceptable to the piping manufacturer

5.3.3 Fiberglass-Reinforced Plastic Piping. Fiberglass-reinforced plastic (FRP) piping shall not be required to have flexible joints if both of the following conditions exist:

(1) The piping does not exceed 100 mm (4 in.) in diameter.
(2) The piping has a straight run of not less than 1.2 m (4 ft) on one side of the connection when the connection results in a change of direction.

5.4 Testing.

Δ **5.4.1 General.** All piping and secondary containment piping shall be tested before being covered, enclosed, or placed in service in accordance with the requirements of Section 27.7 of NFPA 30.

5.4.2* Secondary Containment Piping. In addition to the test required in 5.4.1, secondary containment–type piping shall have the interstitial space (annulus) tested hydrostatically or with air pressure at minimum gauge pressure of 34.5 kPa (5 psi) or shall be tested in accordance with the listing or the manufacturer's instructions. The pressure source shall be closed from the system being tested to ensure that the test is being conducted on a closed system.

5.4.3 Maintenance Testing. Existing piping shall be tested in accordance with 5.4.1 when the authority having jurisdiction 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.

5.4.4 Leak Detection. On remote pressure pumping systems, each pump shall have installed, on the discharge side, a listed leak detection device that will provide an audible indication, a visible indication, or will restrict or shut off the flow of product if the piping and dispensing devices are not liquidtight.

5.5 Detector Maintenance. Each leak-detecting device shall be checked and tested at least annually according to the manufacturer's specifications to ensure proper installation and operation.

5.6 Vent Piping.

Δ **5.6.1** Vent piping shall meet the requirements of Section 27.8 of NFPA 30.

5.6.2 Vent pipes for all tanks storing Class I liquids shall discharge only in an upward direction in order to disperse vapors and shall terminate at least 3.6 m (12 ft) above grade.

5.6.3 Tank vents that are installed within or attached to a canopy shall extend a minimum of 1.5 m (5 ft) above the highest projection of the canopy.

5.7 Vapor Recovery Piping. A vapor return pipe inside the dispenser housing shall have a shear section or flexible connector so that the liquid emergency shutoff valve will function as described in 6.3.9.

Chapter 6 Fuel Dispensing Systems

6.1 Scope. This chapter shall apply to the system and components that dispense fuel into the tanks of motor vehicles and marine craft.

6.2 General Requirements.

6.2.1 Dispensing devices installed outside at motor fuel dispensing stations shall be located as follows:

(1) 3 m (10 ft) or more from property lines
(2) 3 m (10 ft) or more from buildings, other than canopies, having combustible exterior wall surfaces or buildings having noncombustible exterior wall surfaces that are not a part of a 1 hr fire-resistive assembly
(3) Such that all parts of the vehicle being served will be on the premises of the service station
(4) Such that the nozzle, when the hose is fully extended, will not reach within 1.5 m (5 ft) of building openings

6.2.2 Liquids shall not be dispensed by applying pressure to drums, barrels, and similar containers. Listed pumps taking

suction through the top of the container or listed self-closing faucets shall be used.

6.2.3* Fuel dispensing systems, including dispensers, hoses, nozzles, breakaway fittings, swivels, flexible connectors, dispenser emergency shutoff valves, vapor recovery systems, and pumps that are used for alcohol-blended motor fuels shall be listed or approved for the specific purpose.

6.3 Requirements for Dispensing Devices.

6.3.1 Class I and Class II liquids shall be transferred from tanks by means of fixed pumps designed and equipped to allow control of the flow and prevent leakage or accidental discharge.

6.3.2 Dispensing devices for Class I and Class II liquids shall be listed.

6.3.2.1 Existing listed or labeled dispensing devices shall be permitted to be modified provided that the modifications made are "Listed by Report" by an approved testing laboratory or as otherwise approved by the authority having jurisdiction. Modification proposals shall contain a description of the component parts used in the modification and the recommended methods of installation on specific dispensing devices. Modification proposals shall be made available to the authority having jurisdiction upon request.

6.3.3 A control shall be provided that will permit the pump to operate only when a dispensing nozzle is removed from its bracket or normal position with respect to the dispensing device and the switch on this dispensing device is manually actuated. This control shall also stop the pump when all nozzles have been returned to their brackets or to their normal nondispensing position.

6.3.4 Dispensing devices shall be mounted on a concrete island or shall otherwise be protected against collision damage by means acceptable to the authority having jurisdiction. Dispensing devices shall be securely bolted in place. If located indoors, dispensing devices shall also be located in a position where they cannot be struck by a vehicle that is out of control descending a ramp or other slope. Dispensing devices shall be installed in accordance with the manufacturer's instructions.

6.3.5 Dispensing devices used to fill portable containers with home heating fuels shall be located at least 6 m (20 ft) from any dispensing devices for motor fuels.

6.3.6 Inspections. Dispensing equipment shall be periodically inspected by a person who is knowledgeable in the operation of the equipment to verify that it is in proper working order and is not leaking.

6.3.6.1* Exterior Inspection. A visual inspection of the fuel dispenser and its associated hanging hardware (hose nozzle valve, hose, breakaway valve, and hose swivel) shall be conducted at least weekly and shall be documented. Documentation shall be available for review by the authority having jurisdiction upon request.

6.3.6.2* Internal Dispenser Cabinet Inspection. An inspection of the fuel dispensing equipment that is located inside the dispenser cabinet shall be conducted. The interior of the fuel dispenser cabinet shall be inspected for signs of leaks, damage, corrosion, or weathering, with particular attention to the sump area and joints and castings of fluid handling components. The inspection shall be conducted at least monthly and shall be documented. Documentation shall be available for review by the authority having jurisdiction upon request.

6.3.6.3 Maintenance. When maintenance to dispensing devices is necessary and such maintenance is capable of causing accidental release or ignition of liquid, the following precautions shall be taken before such maintenance is begun:

(1) Only persons knowledgeable in performing the required maintenance shall perform the work.
(2) All electrical power to the dispensing devices, to the pump serving the dispensing devices, and to all associated control circuits shall be shut off at the main electrical disconnect panel.
(3) The emergency shutoff valve at the dispenser, if installed, shall be closed.
(4) All vehicular traffic and unauthorized persons shall be prevented from coming within 6 m (20 ft) of the dispensing device.

6.3.7 Motor vehicle traffic patterns at motor fuel dispensing facilities shall be designed to inhibit movement of vehicles that are not being fueled from passing through the dispensing area.

6.3.8 At unattended self-serve motor fuel dispensing facilities, coin– and currency–type devices shall be permitted only with the approval of the authority having jurisdiction.

6.3.9 Where liquid is supplied to the dispensing device under pressure, a listed, rigidly anchored, double-poppet type emergency shutoff valve incorporating a fusible link or other thermally actuated device, designed to close automatically in the event of severe impact or fire exposure, shall be installed in the supply line at the base of each individual island-type dispenser or at the inlet of each overhead dispensing device. The emergency shutoff valve shall be installed in accordance with the manufacturer's instructions. The emergency shutoff valve shall not incorporate a slip-joint feature.

Exception: As provided for in 6.3.10.

6.3.9.1 The automatic-closing feature of this valve shall be tested at the time of installation and at least once a year thereafter by manually tripping the hold-open linkage. Records of such tests shall be kept at the premises or shall be made available for inspection by the authority having jurisdiction within 24 hours of a verbal or written request.

6.3.10 Where a suction-type dispensing system includes a booster pump or where a suction-type dispensing system is supplied by a tank in a manner that produces a gravity head on the dispensing device, a vacuum-actuated shutoff valve with a shear section or equivalent-type valve, listed and labeled in accordance with UL 842, *Standard for Valves for Flammable Fluids*, shall be installed directly under the dispensing device.

6.4 Requirements for Remote/Submersible Pumps. This section shall apply to systems for dispensing Class I and Class II liquids where the liquids are transferred from storage to individual or multiple dispensing devices by pumps located other than at the dispensing devices.

6.4.1 Pumps shall be listed and shall be designed or equipped so that no part of the system will be subjected to pressures above its allowable working pressure.

6.4.2 Each pump shall have installed on the discharge side a listed leak detection device that will provide an audible indication, a visible indication, or will restrict or shut off the flow of

product if the piping or a dispenser is leaking. Each leak-detecting device shall be checked and tested at least annually according to the manufacturer's specifications to ensure proper installation and operation.

Exception: A leak detection device shall not be required if all piping is visible.

6.4.3 Pumps installed above grade outside of buildings shall be located not less than 3 m (10 ft) from lines of adjoining property that can be built upon and not less than 1.5 m (5 ft) from any building opening. Where an outside pump location is impractical, pumps shall be permitted to be installed inside buildings as provided for dispensers in 6.3.4 or in sumps as provided in 6.4.4. Pumps shall be anchored and protected against physical damage.

6.4.4 Sumps for subsurface pumps or piping manifolds of submersible pumps shall withstand the external forces to which they can be subjected without damage to the pump, tank, or piping. The sump shall be no larger than necessary for inspection and maintenance and shall be provided with a fitted cover.

6.5 Requirements for Dispensing Hose.

6.5.1 Listed hose assemblies shall be used to dispense fuel. Hose length at automotive motor fuel dispensing facilities shall not exceed 5.5 m (18 ft). Where hose length at marine motor fuel dispensing facilities exceeds 5.5 m (18 ft), the hose shall be secured so as to protect it from damage.

6.5.2 A listed emergency breakaway device designed to retain liquid on both sides of the breakaway point shall be installed on each hose dispensing Class I and II liquids. Such devices shall be installed and maintained in accordance with the manufacturer's instructions.

6.5.3 Where hose are attached to a hose-retrieving mechanism, the listed emergency breakaway device shall be installed between the point of attachment of the hose-retrieving mechanism to the hose and the hose nozzle valve.

Exception: Such devices shall not be required at marine motor fuel dispensing facilities.

6.6 Requirements for Fuel Delivery Nozzles.

6.6.1 An automatic closing–type hose nozzle valve, with a latch-open device and listed and labeled in accordance with ANSI/UL 842, *Standard for Valves for Flammable Fluids*; or ANSI/UL 2586, *Standard for Hose Nozzle Valves*, shall be provided on island-type dispensing devices used to dispense Class I or Class II liquids.

6.6.1.1 Any modification of the dispensing nozzle shall be listed or approved by the manufacturer of the nozzle.

6.6.2* At any installation where an automatic closing–type dispensing nozzle is used, the nozzle valve shall include a feature that causes or requires the closing of the hose nozzle valve before product flow can be resumed or before the hose nozzle valve can be replaced in its normal position in the dispenser.

6.6.3 Overhead-type dispensing devices 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 a latch-open device shall be permitted to be used if the hose nozzle valve will close automatically in the event the valve is released from a fill opening or upon impact.

6.6.4 Dispensing nozzles used at marine motor fuel dispensing facilities shall be of the listed automatic closing–type hose nozzle valve without a latch-open device.

6.7 Emergency Electrical Disconnects. Fuel dispensing systems shall be provided with one or more clearly identified emergency shutoff devices or electrical disconnects. Such devices or disconnects shall be installed in approved locations but not less than 6 m (20 ft) or more than 30 m (100 ft) from the fuel dispensing devices that they serve. Emergency shutoff devices or electrical disconnects shall disconnect power to all dispensing devices; to all remote pumps serving the dispensing devices; to all associated power, control, and signal circuits; and to all other electrical equipment in the hazardous (classified) locations surrounding the fuel dispensing devices and shall mechanically or electrically isolate other fluid transfer systems serving the fuel dispensing area. When more than one emergency shutoff device or electrical disconnect is provided, all devices shall be interconnected. Resetting from an emergency shutoff condition shall require manual intervention and the manner of resetting shall be approved by the authority having jurisdiction.

Exception: Intrinsically safe electrical equipment need not meet this requirement.

6.7.1 At attended motor fuel dispensing facilities, the devices or disconnects shall be readily accessible to the attendant and labeled with an approved sign stating "EMERGENCY FUEL SHUTOFF" or equivalent language.

6.7.2 At unattended motor fuel dispensing facilities, the devices or disconnects shall be readily accessible to patrons and at least one additional device or disconnect shall be readily accessible to each group of dispensing devices on an individual island. The device(s) or disconnect(s) shall be labeled with an approved sign stating "EMERGENCY FUEL SHUTOFF" or equivalent language

6.8 Vapor Recovery Systems.

6.8.1 Dispensing devices that incorporate vapor recovery shall be listed.

6.8.2 Hose nozzle valves used on vapor recovery systems shall be listed for the purpose.

6.8.3 Means shall be provided in the vapor return path from each dispensing outlet to prevent the discharge of vapors when the hose nozzle valve is in its normal nondispensing position.

Chapter 7 Building Construction Requirements

7.1* Scope. This chapter shall apply to the construction of buildings and portions of buildings that are motor fuel dispensing facilities or repair garages.

N **7.1.1** Major repair garages that also repair vehicles powered by hydrogen shall meet the requirements of both NFPA 2 and this code.

N **7.1.2** Major repair garages that only repair vehicles powered by hydrogen shall meet the requirements of NFPA 2.

7.2 General Requirements. (Reserved)

7.3 Motor Fuel Dispensing Facilities.

7.3.1 Occupancy Classification. The occupancy classification of a motor fuel dispensing facility that is located inside a building or structure shall be a special purpose industrial occupancy as defined in NFPA *101* or as determined in accordance with the adopted building code.

7.3.2 General Construction Requirements. (Reserved)

7.3.3 Means of Egress. In a motor fuel dispensing facility that is located inside a building or structure, the required number, location, and construction of means of egress shall meet all applicable requirements for special purpose industrial occupancies, as set forth in NFPA *101* or as determined in accordance with the adopted building code.

7.3.4 Drainage. Where Class I or Class II liquids are dispensed, provisions shall be made to prevent spilled liquids from flowing into the interior of buildings. Such provisions shall be made by grading driveways, raising door sills, or other equally effective means.

7.3.5 Fixed Fire Protection.

7.3.5.1* For an unattended, self-serve, motor fuel dispensing facility, additional fire protection shall be provided where required by the authority having jurisdiction.

7.3.5.2 Where required, an automatic fire suppression system shall be installed in accordance with the appropriate NFPA standard, manufacturer's instructions, and the listing requirements of the systems.

7.3.6 Fuel Dispensing Areas Inside Buildings.

7.3.6.1 The fuel dispensing area shall be separated from all other portions of the building by walls, partitions, floors, and floor–ceiling assemblies having a fire resistance rating of not less than 2 hours.

Δ **7.3.6.2** Interior finish shall be of noncombustible materials or of approved limited-combustible materials, as defined in NFPA 220.

Δ **7.3.6.3** Door and window openings in fire-rated interior walls shall be provided with listed fire doors having a fire protection rating of not less than 1½ hours. Doors shall be self-closing. They shall be permitted to remain open during normal operations if they are designed to close automatically in a fire emergency by means of listed closure devices. Fire doors shall be installed in accordance with NFPA 80. They shall be kept unobstructed at all times.

7.3.6.4 Openings for ducts in fire-rated interior partitions and walls shall be protected by listed fire dampers. Openings for ducts in fire-rated floor or floor–ceiling assemblies shall be protected with enclosed shafts. Enclosure of shafts shall be with wall or partition assemblies having a fire resistance rating of not less than 2 hours. Openings for ducts into enclosed shafts shall be protected with listed fire dampers.

7.3.6.5 The fuel dispensing area shall be located at street level, with no dispenser located more than 15 m (50 ft) from the vehicle exit to, or entrance from, the outside of the building.

7.3.6.6 The fuel dispensing area shall be limited to that required to serve not more than four vehicles at one time.

Exception: At a fleet vehicle motor fuel dispensing facility inside a building, where only Class II and Class III liquids are dispensed, the number of vehicles serviced at any one time shall be permitted to be increased to 12.

Δ **7.3.6.7*** A mechanical exhaust system that serves only the fuel dispensing area shall be provided. This system shall meet all of the following requirements:

(1) The system shall be interlocked with the dispensing system so that airflow is established before any dispensing device can operate. Failure of airflow shall automatically shut down the dispensing system.
(2) The exhaust system shall be designed to provide air movement across all portions of the floor of the fuel dispensing area and to prevent the flowing of ignitible vapors beyond the dispensing area.
(3) Exhaust inlet ducts shall not be less than 76 mm (3 in.) or more than 305 mm (12 in.) above the floor. Exhaust ducts shall not be located in floors or penetrate the floor of the dispensing area. Exhaust ducts shall discharge to a safe location outside the building.
(4) The exhaust system shall provide ventilation at a rate of not less than 0.3 $m^3/min/m^2$ (1 $ft^3/min/ft^2$) of floor area, based on the fuel dispensing area.
(5) The exhaust system shall meet all applicable requirements of NFPA 91.

Exception: The provisions of 7.3.6.7 shall not apply to a fuel dispensing area located inside a building if two or more sides of the dispensing area are open to the building exterior.

7.3.6.8 The floor of the dispensing area shall be liquidtight. Where Class I liquids are dispensed, provisions shall be made to prevent spilled liquids from flowing out of the fuel dispensing area and into other areas of the building by means of curbs, scuppers, special drainage systems, or other means acceptable to the authority having jurisdiction.

7.3.6.9* Oil drainage systems shall be equipped with approved oil/water traps or separators if they connect to public sewers or discharge into public waterways.

7.4 Repair Garages.

7.4.1 Occupancy Classification. The occupancy classification of a repair garage shall be a special purpose industrial occupancy as defined in NFPA *101* or as determined in accordance with the adopted building code.

Δ **7.4.2 General Construction Requirements.** In major repair garages, where CNG-fueled vehicles, hydrogen-fueled vehicles, LNG-fueled vehicles, or LP-Gas-fueled vehicles are repaired, all applicable requirements of NFPA 2, NFPA 52, or NFPA 58, whichever is applicable, shall be met.

7.4.3 Means of Egress. In a repair garage, the required number, location, and construction of means of egress shall meet all applicable requirements for special purpose industrial occupancies, as set forth in NFPA *101* or as determined in accordance with the adopted building code.

7.4.4 Drainage. In areas of repair garages used for repair or servicing of vehicles, floor assemblies shall be constructed of noncombustible materials or, if combustible materials are used in the assembly, they shall be surfaced with approved, nonabsorbent, noncombustible material, except as indicated in 7.4.4.1.

N **7.4.4.1** Slip-resistant, nonabsorbent, interior floor finishes having a critical radiant flux not more than 0.45 W/cm^2 (9.87 Btu/in.^{2}), as determined by NFPA 253, shall be permitted.

7.4.4.2 Floors shall be liquidtight to prevent the leakage or seepage of liquids and shall be sloped to facilitate the movement of water, fuel, or other liquids to floor drains.

7.4.4.3 In areas of repair garages where vehicles are serviced, any floor drains shall be properly trapped and shall discharge through an oil/water separator to the sewer or to an outside vented sump.

7.4.5 Pits, Belowgrade Work Areas, and Subfloor Work Areas.

7.4.5.1 Pits, belowgrade work areas, and subfloor work areas used for lubrication, inspection, and minor automotive maintenance work shall comply with the provisions of this chapter, in addition to other applicable requirements of this code.

7.4.5.2 Walls, floors, and structural supports shall be constructed of masonry, concrete, steel, or other approved noncombustible materials.

7.4.5.3 In pits, belowgrade work areas, and subfloor work areas, the required number, location, and construction of means of egress shall meet the requirements for special purpose industrial occupancies in Chapter 40 of NFPA *101* or as determined in accordance with the adopted building code.

7.4.5.4 Pits, belowgrade work areas, and subfloor work areas shall be provided with exhaust ventilation at a rate of not less than 0.3 m^3/min/m^2 (1 ft^3/min/ft^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 0.3 m (12 in.) of the floor.

Δ **7.4.6 Fixed Fire Protection.** Automatic sprinkler protection installed in accordance with the requirements of NFPA 13 shall be provided throughout all buildings containing major repair garages, as herein defined, when any one of the following conditions exist:

(1) The building housing the major repair garage is two or more stories, including basements, and the aggregate area of the major repair garage exceeds 930 m^2 (10,000 ft^2).
(2) The major repair garage is one story and exceeds 1115 m^2 (12,000 ft^2).
(3) The major repair garage is servicing vehicles parked in the basement of the building.

7.4.7 Gas Detection System. Repair garages used for repair of vehicle engine fuel systems fueled by nonodorized gases shall be provided with an approved flammable gas detection system. Gas detection systems in repair garages for hydrogen vehicles shall be in accordance with NFPA 2.

7.4.7.1 System Design. The flammable gas detection system shall be calibrated to the types of fuels or gases used by vehicles to be repaired. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL). Gas detection shall also be provided in lubrication or chassis repair pits of repair garages used for repairing nonodorized LNG/CNG-fueled vehicles.

7.4.7.2 Operation. Activation of the gas detection system shall result in all of the following:

(1) Initiation of distinct audible and visual alarm signals in the repair garage
(2) Deactivation of all heating systems located in the repair garage
(3) Activation of the mechanical ventilation system, when the system is interlocked with gas detection

7.4.7.3 Failure of the Gas Detection System. Failure of the gas detection system shall result in the deactivation of the heating system and activation of the mechanical ventilation system and, where the ventilation system is interlocked with gas detection, shall cause a trouble signal to sound in an approved location.

Δ **7.4.7.4 System Integrity.** The circuits of the detection system required by 7.4.7 shall be monitored for integrity in accordance with *NFPA 72*.

7.5* Heating, Ventilating, and Air Conditioning.

Δ **7.5.1*** Forced air heating, air-conditioning, and ventilating systems serving a fuel dispensing area inside a building or a repair garage shall not be interconnected with any such systems serving other occupancies in the building. Such systems shall be installed in accordance with NFPA 90A.

7.5.2 Return air openings in areas of repair garages used for the repair or servicing of vehicles or in a fuel dispensing area shall be not less than 455 mm (18 in.) above floor level measured to the bottom of the openings.

7.5.3 Combined ventilation and heating systems shall not recirculate air from areas that are below grade level.

7.5.4* Exhaust duct openings shall be located so that they effectively remove vapor accumulations at floor level from all parts of the floor area. Where lighter-than-air gaseous fuel vehicles are repaired, exhaust duct openings shall be located so that they effectively remove vapor accumulations at the ceiling level.

7.6 Heat-Producing Appliances.

7.6.1 Heat-producing appliances shall be installed in accordance with the requirements of Section 7.6. They shall be permitted to be installed in the conventional manner except as provided in Section 7.6.

7.6.2 Heat-producing appliances shall be of an approved type. Solid fuel stoves, improvised furnaces, salamanders, or space heaters shall not be permitted in areas of repair garages used for repairing or servicing of vehicles or in a fuel dispensing area.

Exception No. 1: Unit heaters, when installed in accordance with this chapter, need not meet this requirement.

Exception No. 2: Heat-producing equipment for any lubrication room or service room where there is no dispensing or transferring of Class I or Class II liquids or LP-Gas, when installed in accordance with this chapter, need not meet this requirement.

7.6.3 Heat-producing appliances shall be permitted to be installed in a special room that is separated from areas that are classified as Division 1 or Division 2, in accordance with Chapter 8, by walls that are constructed to prevent the transmission of vapors, that have a fire resistance rating of at least 1 hour, and that have no openings in the walls that lead to a classified area within 2.4 m (8 ft) of the floor. Specific small openings through the wall, such as for piping and electrical conduit, shall be permitted, provided the gaps and voids are filled with a

fire-resistant material to resist transmission of vapors. All air for combustion purposes shall be taken from outside the building. This room shall not be used for storage of combustible materials, except for fuel storage as permitted by the standards referenced in 7.6.9.

7.6.4 Heat-producing appliances using gas or oil fuel shall be permitted to be installed in a lubrication or service room where there is no dispensing or transferring of Class I liquids, including the open draining of automotive gasoline tanks, provided the bottom of the combustion chamber is at least 455 mm (18 in.) above the floor and the appliances are protected from physical damage.

7.6.5 Heat-producing appliances using gas or oil fuel listed for use in garages shall be permitted to be installed in lubrication rooms, service rooms, or fuel dispensing areas where Class I liquids are dispensed or transferred, provided the equipment is installed at least 2.4 m (8 ft) above the floor.

7.6.6* Where major repairs are conducted on lighter-than-air-fueled vehicles, open flame heaters or heating equipment with exposed surfaces having a temperature in excess of 399°C (750°F) shall not be permitted in areas subject to ignitible concentrations of gas.

7.6.7 Electrical heat-producing appliances shall meet the requirements of Chapter 8.

7.6.8 Fuels used shall be of the type and quality specified by the manufacturer of the heating appliance. Crankcase drainings shall not be used in oil-fired appliances, unless the appliances are specifically approved for such use.

Δ **7.6.9** Heat-producing appliances shall be installed to meet the requirements of NFPA 31, NFPA 54, NFPA 82, NFPA 90A, and NFPA 211, as applicable, except as hereinafter specifically provided.

7.7* Dynamic Automotive Emissions Testing Equipment. Equipment for the testing of vehicle emissions shall be approved or listed for its intended use and shall comply with the electrical classification for the area in which the equipment is installed.

Chapter 8 Electrical Installations

8.1 Scope. This chapter shall apply to the installation of electrical wiring and electrical utilization equipment in areas where liquids are stored, handled, or dispensed.

Δ **8.2 General Requirements.** Electrical wiring and electrical utilization equipment shall be of a type specified by and shall be installed in accordance with *NFPA 70*. Electrical wiring and electrical utilization equipment shall be approved for the locations in which they are installed.

8.2.1* In major repair garages where CNG vehicles are repaired or stored, the area within 455 mm (18 in.) of the ceiling shall be designated a Class I, Division 2 hazardous (classified) location.

Exception: In major repair garages, where ventilation equal to not less than four air changes per hour is provided, this requirement shall not apply.

8.3 Installation in Classified Locations.

Δ **8.3.1** Where Class I liquids are stored, handled, or dispensed, electrical wiring and electrical utilization equipment shall be designed and installed in accordance with the requirements for Class I, Division 1 or Division 2 classified locations, as set forth in 8.3.2 and in *NFPA 70*.

Exception: The storage, handling, and dispensing of methyl alcohol–based windshield washer fluids shall not cause an area to be designated as a hazardous (classified) location.

8.3.2* Table 8.3.2 shall be used to delineate and classify areas for the purposes of installing electrical wiring and electrical utilization equipment where Class I liquids are stored, handled, or dispensed. *[See also Figure 8.3.2(a) and Figure 8.3.2(b).]*

Exception No. 1: The extent of the classified area around a vacuum-assist blower shall be permitted to be reduced if the blower is specifically listed for such reduced distances.

Exception No. 2: For shop-fabricated, secondary containment tanks used for the storing of Class I motor fuels, the extent of the Class I, Division 2 location shall be limited to 450 mm (18 in.) from the tank shell.

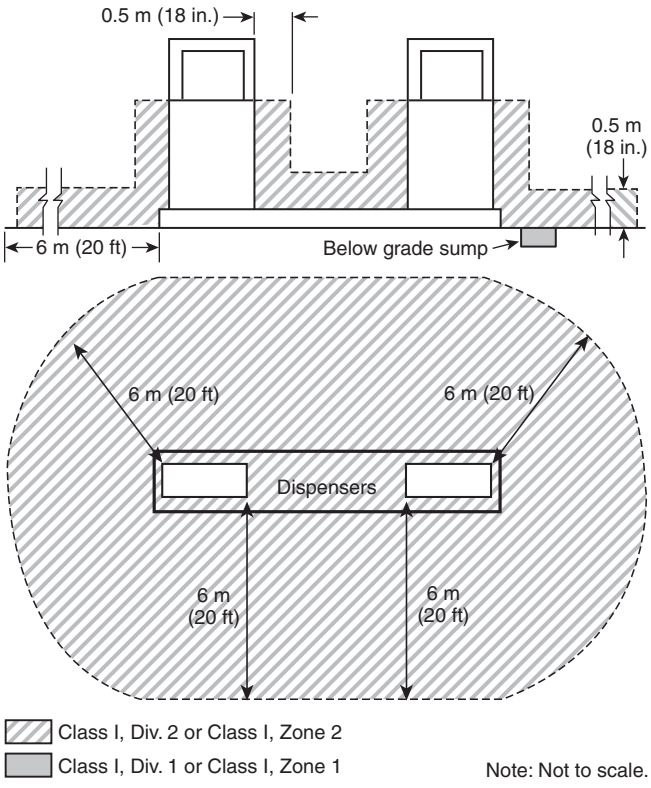
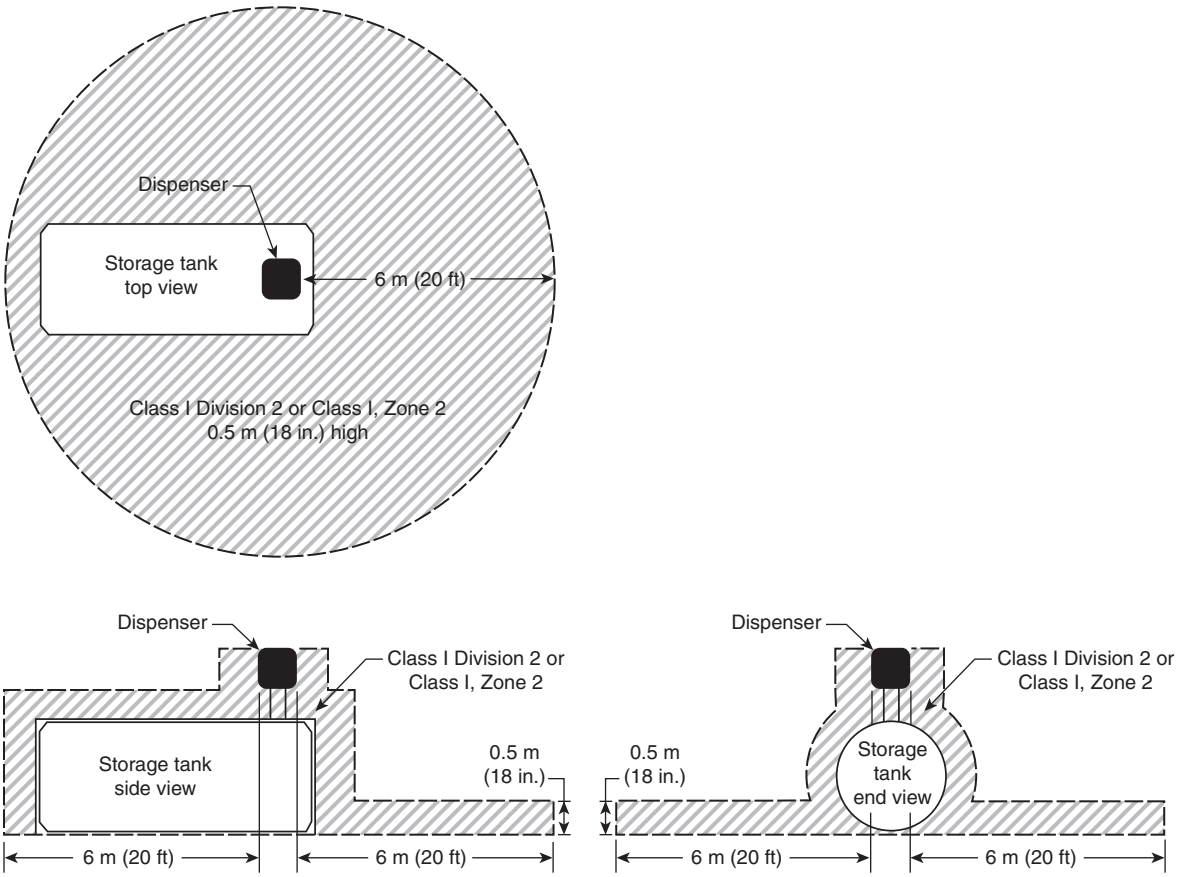


FIGURE 8.3.2(a) Classified Areas Adjacent to Dispensers.



Note: Not to scale.

FIGURE 8.3.2(b) Classified Areas Adjacent to Dispenser Mounted on Aboveground Storage Tank.

N **Table 8.3.2 Class I Locations — Motor Fuel Dispensing Facilities**

Location	Class I		Extent of Classified Location[a]
	Division (Group D)	Zone (Group IIA)	
Dispensing device (except overhead type)[b,c]			
Under dispenser containment	1	1	Entire space within and under dispenser pit or containment
Dispenser	2	2	Within 450 mm (18 in.) of dispenser enclosure or that portion of dispenser enclosure containing liquid handling components, extending horizontally in all directions and down to grade level
Outdoor	2	2	Up to 450 mm (18 in.) above grade level, extending 6 m (20 ft) horizontally in all directions from dispenser enclosure
Indoor			
With mechanical ventilation	2	2	Up to 450 mm (18 in.) above floor level, extending 6 m (20 ft) horizontally in all directions from dispenser enclosure
With gravity ventilation	2	2	Up to 450 mm (18 in.) above floor level, extending 7.5 m (25 ft) horizontally in all directions from dispenser enclosure
Dispensing device (overhead type[d])	1	1	Space within dispenser enclosure and all electrical equipment integral with dispensing hose or nozzle
	2	2	Within 450 mm (18 in.) of dispenser enclosure, extending horizontally in all directions and down to grade level
	2	2	Up to 450 mm (18 in.) above grade level, extending 6 m (20 ft) horizontally in all directions from a point vertically below edge of dispenser enclosure
Repair garage, major[e] (where Class I liquids or gaseous fuels are transferred or dispensed[f]) *(see 3.3.12.1 and 8.3.1)*	1	1	Entire space within any pit, belowgrade work area, or subfloor work area that is not ventilated
	2	2	Entire space within any pit, belowgrade work area, or subfloor work area that is provided with ventilation of at least 0.3 m^3/min/m^2 (1 ft^3/min/ft^2) of floor area, with suction taken from a point within 300 mm (12 in.) of floor level *(see 7.4.5.4)*
	2	2	Up to 450 mm (18 in.) above floor level of the room, except as noted below, for entire floor area
	Unclassified	Unclassified	Up to 450 mm (18 in.) above floor level of the room where room is provided with ventilation of at least 0.3 m^3/min/m^2 (1 ft^3/min/ft^2) of floor area, with suction taken from a point within 300 mm (12 in.) of floor level
	2	2	Within 0.9 m (3 ft) of any fill or dispensing point, extending in all directions
Specific areas adjacent to classified locations	Unclassified	Unclassified	Areas adjacent to classified locations where flammable vapors are not likely to be released, such as stock rooms, switchboard rooms, and other similar locations, where mechanically ventilated at a rate of four or more air changes per hour or designed with positive air pressure or where effectively cut off by walls or partitions
Repair garage, minor[e] (where Class I liquids or gaseous fuels are not transferred or dispensed[f]) *(see 3.3.12.2 and 8.3.1)*	2	2	Entire space within any pit, belowgrade work area, or subfloor work area that is not ventilated
	2	2	Up to 450 mm (18 in.) above floor level, extending 0.9 m (3 ft) horizontally in all directions from opening to any pit, belowgrade work area, or subfloor work area that is not ventilated
	Unclassified	Unclassified	Entire space within any pit, belowgrade work area, or subfloor work area that is provided with ventilation of at least 0.3 m^3/min/m^2 (1 ft^3/min/ft^2) of floor area, with suction taken from a point within 300 mm (12 in.) of floor level *(see 7.4.5.4)*
Specific areas adjacent to classified locations	Unclassified	Unclassified	Areas adjacent to classified locations where flammable vapors are not likely to be released, such as stock rooms, switchboard rooms, and other similar locations, where mechanically ventilated at a rate of four or more air changes per hour or designed with positive air pressure, or where effectively cut off by walls or partitions

(continues)

N **Table 8.3.2** *Continued*

Location	Class I		Extent of Classified Location[a]
	Division (Group D)	Zone (Group IIA)	
Repair garage, major[e]	2	2	Within 450 mm (18 in.) of ceiling, except as noted below
(where lighter-than-air gaseous fueled[g] vehicles are repaired or stored) *(see 3.3.12.1)*	Unclassified	Unclassified	Within 450 mm (18 in.) of ceiling where ventilation of at least 0.3 $m^3/min/m^2$ (1 $ft^3/min/ft^2$) of floor area, with suction taken from a point within 450 mm (18 in.) of the highest point in the ceiling
Specific areas adjacent to classified locations	Unclassified	Unclassified	Areas adjacent to classified locations where flammable vapors are not likely to be released, such as stock rooms, switchboard rooms, and other similar locations, where mechanically ventilated at a rate of four or more air changes per hour or designed with positive air pressure, or where effectively cut off by walls or partitions
Remote pump			
Outdoor	1	1	Entire space within any pit or box below grade level, any part of which is within 3 m (10 ft) horizontally from any edge of pump
	2	2	Within 900 mm (3 ft) of any edge of pump, extending horizontally in all directions
	2	2	Up to 450 m (18 in.) above grade level, extending 3 m (10 ft) horizontally in all directions from any edge of pump
Indoor	1	1	Entire space within any pit
	2	2	Within 1.5 m (5 ft) of any edge of pump, extending in all directions
	2	2	Up to 900 mm (3 ft) above floor level, extending 7.5 m (25 ft) horizontally in all directions from any edge of pump
Sales, storage, rest rooms	Unclassified	Unclassified	Except as noted below
(including structures [such as the attendant's kiosk] on or adjacent to dispensers)	1	1	Entire volume, if there is any opening to room within the extent of a Division 1 or Zone 1 location
	2	2	Entire volume, if there is any opening to room within the extent of a Division 2 or Zone 2 location
Tank, aboveground			
Inside tank	1	0	Entire inside volume
Shell, ends, roof, dike area	1	1	Entire space within dike, where dike height exceeds distance from tank shell to inside of dike wall for more than 50 percent of tank circumference
	2	2	Entire space within dike, where dike height does not exceed distance from tank shell to inside of dike wall for more than 50 percent of tank circumference
	2	2	Within 3 m (10 ft) of shell, ends, or roof of tank
Vent	1	1	Within 1.5 m (5 ft) of open end of vent, extending in all directions
	2	2	Between 1.5 m and 3 m (5 ft and 10 ft) from open end of vent, extending in all directions
Tank, aboveground, shop-fabricated, secondary containment tank used for the storage of Class I motor fuels			
Inside tank	1	0	Entire inside volume
Shell, ends, roof	2	2	Within 450 mm (18 in.) of shell, ends, or roof of tank
Vent	1	1	Within 1.5 m (5 ft) of open end of vent, extending in all directions
	2	2	Between 1.5 m and 3 m (5 ft and 10 ft) from open end of vent, extending in all directions
Tank, underground			
Inside tank	1	0	Entire inside volume
Fill opening	1	1	Entire space within any pit or box below grade level, any part of which is within a Division 1 or Division 2 classified location or within a Zone 1 or Zone 2 classified location

(continues)

N Table 8.3.2 *Continued*

Location	Class I Division (Group D)	Class I Zone (Group IIA)	Extent of Classified Location[a]
	2	2	Up to 450 mm (18 in.) above grade level, extending 1.5 m (5 ft) horizontally in all directions from any tight-fill connection and extending 3 m (10 ft) horizontally in all directions from any loose-fill connection
Vent	1	1	Within 1.5 m (5 ft) of open end of vent, extending in all directions
	2	2	Between 1.5 m and 3 m (5 ft and 10 ft) from open end of vent, extending in all directions
Vapor processing system			
Pits	1	1	Entire space within any pit or box below grade level, any part of which: (1) is within a Division 1 or Division 2 classified location; (2) is within a Zone 1 or Zone 2 classified location; (3) houses any equipment used to transfer or process vapors
Equipment in protective enclosures	2	2	Entire space within enclosure
Equipment *not* within protective enclosure	2	2	Within 450 mm (18 in.) of equipment containing flammable vapors or liquid, extending horizontally in all directions and down to grade level
	2	2	Up to 450 m (18 in.) above grade level within 3 m (10 ft) horizontally of the vapor processing equipment
Equipment enclosure	1	1	Entire space within enclosure, if flammable vapor or liquid is present under normal operating conditions
	2	2	Entire space within enclosure, if flammable vapor or liquid is *not* present under normal operating conditions
Vacuum assist blower	2	2	Within 450 mm (18 in.) of blower, extending horizontally in all directions and down to grade level
	2	2	Up to 450 mm (18 in.) above grade level, extending 3 m (10 ft) horizontally in all directions
Vault	1	1	Entire interior space, if Class I liquids are stored within

[a]For marine application, *grade level* means the surface of a pier, extending down to water level.
[b]Refer to Figures 8.3.2(a) and 8.3.2(b) for illustrations of classified locations around dispensing devices.
[c]Area classification inside the dispenser enclosure is covered in UL 87, *Standard for Power-Operated Dispensing Devices for Petroleum Products*.
[d]Ceiling-mounted hose reel.
[e]The terms *repair garage, major* and *repair garage, minor* are intended to correlate with Article 511.3 of *NFPA 70*. For the purposes of application of this table, these terms do not include associated floor space used for offices, parking, or showrooms.
[f]Includes draining of Class I liquids from vehicles.
[g]Includes fuels such as hydrogen and natural gas, but not LPG.

8.3.3 A designated classified area, as specified in Table 8.3.2, shall not extend beyond a floor, wall, roof, or other solid partition that has no openings.

8.3.4 The area classifications given in Table 8.3.2 shall be based on the premise that the installation meets the applicable requirements of this code in all respects. Should this not be the case, the authority having jurisdiction shall be permitted to determine the extent of the classified area.

8.3.5 All electrical wiring and electrical utilization equipment that are integral with the dispensing hose or dispensing nozzle shall be approved for use in Class I, Division 1 classified locations.

8.3.6 The storage, handling, and dispensing of Class II or Class III liquids shall not cause an area to be designated as a hazardous (classified) location.

8.4 Emergency Electrical Disconnects. Emergency electrical disconnects shall be installed at the locations required by Section 6.7.

8.5 Specific Requirements for Marine Fuel Facilities.

8.5.1 Where excessive stray currents are encountered, piping handling Class I and Class II liquids shall be electrically isolated from the shore piping.

8.5.2* Pipelines on piers shall be bonded and grounded. Bonding and grounding connections on all pipelines shall be located on the pier side of hose riser insulating flanges, if used, and shall be accessible for inspection.

8.5.3 The fuel delivery nozzle shall be put into contact with the vessel fill pipe before the flow of fuel commences, and this bonding contact shall be continuously maintained until fuel flow has stopped, to avoid the possibility of electrostatic discharge.

Chapter 9 Operational Requirements

9.1 Scope. This chapter shall apply to those requirements that relate to the operation of motor fuel dispensing facilities and fuel dispensing systems.

9.2 Basic Requirements.

9.2.1* Inventory Control. Accurate daily inventory records shall be maintained and reconciled for all liquid fuel storage tanks for indication of possible leakage from tanks or piping. The records shall be kept on the premises or shall be made available to the authority having jurisdiction for inspection within 24 hours of a written or verbal request. The records shall include, as a minimum and by product, daily reconciliation between sales, use, receipts, and inventory on hand. If there is more than one storage system serving an individual pump or dispensing device for any product, the reconciliation shall be maintained separately for each system.

9.2.2 Tank Filling and Bulk Delivery.

9.2.2.1 Delivery operations shall meet all applicable requirements of NFPA 385 and the requirements of 9.2.2.2 through 9.2.2.6.

N **9.2.2.2** No separation shall be required between the delivery vehicle and the fill connection of an underground storage tank.

9.2.2.3 The delivery vehicle shall be separated from any aboveground tank in accordance with Table 9.2.2.3.

N **9.2.2.3.1** Separation distances shall be imposed by the use of curbing, guard posts, or other approved methods.

N **9.2.2.3.2*** Means shall be provided to prevent an accidental release originating from the delivery vehicle from flowing under the aboveground tank.

9.2.2.4 The delivery vehicle shall be located so that all parts of the vehicle are on the premises when delivery is made.

Exception: This requirement shall not apply to existing fuel dispensing facilities and fuel dispensing facilities inside buildings.

9.2.2.5 Tank filling shall not begin until the delivery operator has determined that the tank has sufficient available capacity (i.e., ullage).

9.2.2.6 Tanks shall be filled through a liquidtight connection.

9.2.2.6.1 Where an aboveground tank is filled by means of fixed piping, either a check valve and shutoff valve with a quick-connect coupling or a check valve with a dry-break coupling shall be installed in the piping at a point where connection and disconnection is made between the tank and the delivery vehicle. This device shall be protected from tampering and physical damage.

9.2.2.6.2 Underground tanks and tanks in belowgrade vaults shall be filled through a liquidtight connection within a spill container.

9.2.3 Dispensing into Containers.

9.2.3.1* Class I or Class II liquids shall not be dispensed into portable containers unless the container is constructed of metal or is approved by the authority having jurisdiction, has a tight closure, and is fitted with a spout or so designed that the contents can be poured without spilling. The hose nozzle valve shall be manually held open during the dispensing operation.

9.2.3.2 No sale or purchase of any Class I, Class II, or Class III liquids shall be made in containers unless such containers are clearly marked with the name of the product contained therein.

9.2.3.3 Portable containers of 45 L (12 gal) capacity or less shall not be filled while they are in or on a motor vehicle or marine craft.

9.2.4 Dispensing from a Tank That Does Not Exceed 454 L (120 Gal) and from Containers Inside Buildings. Dispensing of flammable and combustible liquids from a tank not exceeding 454 L (120 gal) capacity and from containers in a motor fuel dispensing facility or in a repair garage building shall meet the requirements of 9.2.4.1 and 9.2.4.2. *(See 4.3.9 for storage quantity limitations.)*

9.2.4.1 Not more than one container of Class I liquid shall be permitted to be provided with a dispensing pump inside a building at any one time. The number of tanks or containers of Class II or Class IIIA liquids fitted for dispensing at any one time shall not be limited, except as provided for in 4.3.9.2. The number of tanks or containers of Class IIIB liquids fitted for dispensing at any one time shall not be limited.

9.2.4.2 Class I, Class II, and Class IIIA liquids shall not be dispensed by applying pressure to tanks or containers. Listed pumps that take suction through the top of the tank or container or listed self-closing faucets shall be used.

9.2.5 Basic Fire Control.

9.2.5.1 Sources of Ignition. Smoking materials, including matches and lighters, shall not be used within 6 m (20 ft) of

N **Table 9.2.2.3 Minimum Separation Distances Between Delivery Vehicles and Aboveground Tanks**

Aboveground Tank Type	Separation Distance Between Delivery Vehicle and Aboveground Tank (ft)
Protected aboveground tanks	0
Tanks in abovegrade vaults (measured from vault wall)	0
Tanks filled by gravity	0
Fire-resistant tanks	15
Other tanks meeting the requirements of NFPA 30 storing Class II or Class III liquids	15
Other tanks meeting the requirements of NFPA 30 storing Class I liquids	25

areas used for fueling, servicing fuel systems of internal combustion engines, or receiving or dispensing of Class I and Class II liquids. The motors of all equipment being fueled shall be shut off during the fueling operation except for emergency generators, pumps, and so forth, where continuing operation is essential.

Δ **9.2.5.2 Fire Extinguishers.** Each motor fuel dispensing facility or repair garage shall be provided with fire extinguishers installed, inspected, and maintained as required by NFPA 10. Extinguishers for outside motor fuel dispensing areas shall be provided according to the extra (high) hazard requirements for Class B hazards, except that the maximum travel distance to an 80 B:C extinguisher shall be permitted to be 30.48 m (100 ft).

9.2.5.3 Fire Suppression Systems. Where required, automatic fire suppression systems shall be installed in accordance with the appropriate NFPA standard, manufacturers' instructions, and the listing requirements of the systems.

9.2.5.4* Signs. Warning signs shall be conspicuously posted in the dispensing area and shall incorporate the following or equivalent wording:

WARNING
It is unlawful and dangerous to dispense gasoline into unapproved containers.
No smoking.
Stop motor.
No filling of portable containers in or on a motor vehicle.
Place container on ground before filling.
Discharge your static electricity before fueling by touching a metal surface away from the nozzle.
Do not re-enter your vehicle while gasoline is pumping.
If a fire starts, **do not** remove nozzle — back away immediately.
Do not allow individuals under licensed age to use the pump.

N **9.2.5.5* Display of Materials.** The storage or placement for display or sale of products shall be prohibited within 20 ft of any fuel dispenser.

9.2.6 Waste Handling.

9.2.6.1 Crankcase drainings and waste liquids shall not be dumped into sewers, into streams, or on the ground. They shall be stored in approved tanks or containers outside any building, or in tanks installed in accordance with Chapters 4 and 5, until removed from the premises.

Exception: As provided for in 4.3.9.3.

9.2.6.2 The contents of oil separators and traps of floor drainage systems shall be collected at sufficiently frequent intervals to prevent oil from being carried into sewers.

9.2.7 Housekeeping. The dispensing area and the area within any dike shall be kept free of vegetation, debris, and any other material that is not necessary to the proper operation of the motor fuel dispensing facility.

9.2.8 Fire Doors. Fire doors shall be kept unobstructed at all times. Appropriate signs and markings shall be used.

N **9.2.9 Maintenance of Aboveground Storage Tank Appurtenances.** Storage tank appurtenances shall be maintained and operated in accordance with manufacturer's instructions, published industry practices, or equivalent methods approved by the AHJ.

9.3 Operating Requirements for Full-Service Motor Fuel Dispensing Facilities. Each motor fuel dispensing facility shall have an attendant or supervisor on duty whenever the facility is open for business. The attendant or supervisor shall dispense liquids into fuel tanks or into containers, except as covered in Sections 9.4 and 9.5.

9.4 Operating Requirements for Attended Self-Service Motor Fuel Dispensing Facilities.

9.4.1 "Self-service motor fuel dispensing facility" shall mean that portion of a property where liquids used as motor fuels are stored and dispensed from fixed, approved dispensing equipment into the fuel tanks of motor vehicles by persons other than the facility attendant and shall also include, where provided, facilities for the sale of other retail products.

9.4.2 There shall be at least one attendant on duty while the self-service facility is open for business. The attendant's primary function shall be to supervise, observe, and control the dispensing of motor fuels.

9.4.3 The responsibility of the attendant shall be as follows:

(1) Prevent the dispensing of Class I liquids into portable containers not in compliance with 9.2.3.1
(2) Prevent the use of hose nozzle valve latch-open devices that do not comply with 6.6.1
(3) Control sources of ignition
(4) Immediately activate emergency controls and notify the fire department of any fire or other emergency
(5) Handle accidental spills and fire extinguishers if needed

9.4.3.1 The attendant or supervisor on duty shall be mentally and physically capable of performing the functions and assuming the responsibility prescribed in Section 9.4.

9.4.4 Operating instructions shall be conspicuously posted in the dispensing area.

9.5 Operating Requirements for Unattended Self-Service Motor Fuel Dispensing Facilities.

9.5.1 Unattended self-service facilities shall be permitted, where approved by the authority having jurisdiction.

9.5.2 Operating instructions shall be conspicuously posted in the dispensing area. The instructions shall include location of emergency controls and a requirement that the user stay outside of his/her vehicle and in view of the fueling nozzle during dispensing.

9.5.3 In addition to the warning signs specified in 9.2.5.4, emergency instructions shall be conspicuously posted in the dispenser area. The instructions shall incorporate the following or equivalent wording:

Emergency Instructions

In case of fire or spill:

(1) Use emergency stop button.

(2) Report accident by calling (*specify local fire number*).
Report location.

9.5.4 A listed, automatic closing–type hose nozzle valve with latch-open device shall be provided. The hose nozzle valve shall meet the requirements of 6.6.2.

9.5.5 A telephone or other approved, clearly identified means to notify the fire department shall be provided on the site in a location approved by the authority having jurisdiction.

9.5.6* Additional fire protection shall be provided where required by the authority having jurisdiction.

9.6 Refueling from Tank Vehicles. The dispensing of Class I and Class II liquids in the open from a tank vehicle to a motor vehicle located at commercial, industrial, governmental, or manufacturing establishments and intended for fueling vehicles used in connection with their businesses shall be permitted only if all of the requirements of 9.6.1 through 9.6.9 have been met.

9.6.1 An inspection of the premises and operations shall be made and operations shall not be conducted unless approved by the authority having jurisdiction.

Δ **9.6.2** The tank vehicle shall comply with the requirements of NFPA 385.

9.6.3 The dispensing hose shall not exceed 15 m (50 ft) in length.

9.6.4 The dispensing nozzle shall be a listed, automatic closing–type without a latch-open device.

9.6.5 Nighttime deliveries shall only be made in areas deemed adequately lighted by the authority having jurisdiction.

9.6.6 The tank vehicle flasher lights shall be in operation while dispensing operations are in progress.

9.6.7 Expansion space shall be left in each fuel tank to prevent overflow in the event of temperature increase.

N **9.6.8** A means for bonding the tank vehicle to the motor vehicle shall be provided. Such bonding means shall be employed during fueling operations.

N **9.6.9** A spill kit designed for motor vehicle fuels shall be carried on the tank vehicle and employed in case of a fuel spill.

9.7 Repair Areas.

9.7.1 General. Repairing of motor vehicles shall be restricted to areas specifically provided for such purposes.

N **9.7.1.1*** Major repair of hydrogen vehicles shall comply with NFPA 2.

9.7.2 Welding and Open Flame Operations.

Δ **9.7.2.1** Operations involving open flame or electric arcs, including fusion gas and electric welding, shall be restricted to areas specifically provided for such purposes. Cutting and welding and related fire prevention precautions shall be in accordance with the requirements of NFPA 51B.

Δ **9.7.2.2** Electric arc welding generators or transformers shall conform to *NFPA 70*. Gas fusion welding apparatus and storage of compressed gas cylinders shall be in accordance with the provisions of NFPA 51.

9.7.2.3* The grounded side of an electric welding circuit shall be attached to the part being welded.

Δ **9.7.2.4** Compressed gases shall be stored in accordance with Chapter 4 of NFPA 51.

9.7.2.5 Gas fusion welding equipment shall be periodically inspected for worn or injured hoses and defective or damaged valves, gauges, and reducing devices.

9.7.2.6 Cylinders stored outside in the open shall have valves and safety devices protected against the accumulation of ice and snow.

9.7.3 Spray Painting and Undercoating.

Δ **9.7.3.1** Spray painting shall meet the requirements of NFPA 33.

9.7.3.2 Where only a small portion of a vehicle is spray painted and no accumulations of paint residue are allowed to form, such occasional painting shall be permitted in the open in the structure if located not less than 6 m (20 ft) horizontally from all open flame devices or spark-producing electrical equipment or appliances.

9.7.3.3 Undercoating spray operations conducted in any area having adequate natural or mechanical ventilation shall be exempt from the requirements pertaining to spray finishing operations where the undercoating materials are nonflammable or where the solvents used have a flash point in excess of 37.8°C (100°F) (closed cup). There shall be no open flame devices or spark-producing electrical equipment or appliances within 6 m (20 ft) horizontally while such operations are conducted. Undercoating materials shall be dry before starting the engine of the undercoated vehicle.

Δ **9.7.3.4** Undercoating spray operations that do not meet the requirements of 9.7.3.3 shall meet all requirements of NFPA 33.

Δ **9.7.4 Drying Apparatus.** Drying and baking apparatus in connection with the spray application of flammable finishes shall conform to NFPA 33 and NFPA 86.

9.7.5 Repair of Fuel Tanks Containing Flammable or Combustible Liquids.

Δ **9.7.5.1** Prior to repair work on fuel tanks of vehicles involving flame- or heat-producing devices, the tanks shall be drained and purged, or inerted, and tested in accordance with applicable procedures outlined in NFPA 326.

9.7.5.2 In lieu of draining the fuel tank outside the building, an approved portable pump and storage tank shall be permitted to be used.

9.7.5.3 Fuel drained from vehicle tanks that is not to be disposed of shall be stored in approved safety cans or returned to standard underground storage tanks.

9.7.5.4 Fuel to be disposed of shall be stored in tanks or drums suitable for such purpose that shall be located outside of the building until removed from the premises. Such containers shall be identified as having flammable contents.

9.7.6 Parts Cleaning.

9.7.6.1 Cleaning of parts shall be performed with a nonflammable solvent.

Exception: A combustible liquid with a flash point above 37.8°C (100°F) (closed cup) shall be permitted to be used for this purpose provided adequate ventilation is supplied and no sources of ignition are present in the cleaning area.

Δ **9.7.6.2** Devices used to heat nonflammable solvents shall conform to the requirements of one or both of the following:

(1) NFPA 31
(2) NFPA 54

9.7.6.2.1 The heating devices described in 9.7.6.2 shall be installed in accordance with the requirements of Section 7.6.

9.7.6.3 A device for heating solvents that give off flammable or toxic vapors when heated shall be provided with a limit control to prevent the solvent from exceeding a temperature 10°C (50°F) below the point at which flammable or toxic vapors are released.

9.7.6.4 Direct-fired parts cleaners shall not be installed or used below grade.

9.7.7 Chassis Cleaning.

Δ **9.7.7.1** Chassis cleaning shall not be performed with liquids having flash points below 60°C (140°F) (closed cup). If steam is used, it shall be supplied from a boiler located, installed, and safeguarded in accordance with the applicable requirements for heating equipment in Section 7.6 and in NFPA 31, NFPA 54, and NFPA 85.

9.7.7.2 Steam cleaning devices shall be of an approved type.

Δ **9.7.8 Storage and Handling of Flammable and Combustible Liquids, Liquefied Petroleum Gases, and Compressed Natural Gases.** Except as otherwise provided by this code, the storage and handling of flammable and combustible liquids shall be in accordance with NFPA 30. The storage and handling of liquefied petroleum gas shall be in accordance with NFPA 58. The storage and handling of flammable compressed gas fuels shall be in accordance with NFPA 55, NFPA 52, and NFPA 2.

9.7.9 Housekeeping.

9.7.9.1 An authorized employee, an officer of the firm, or the owner shall make daily inspections of the repair garage and shall be responsible for the prompt removal or repair of any hazardous condition, including proper maintenance of equipment and safety devices and the immediate removal of accumulations of combustible materials.

9.7.9.2 Clear aisle space shall be maintained to permit ready access to and the use of fire-fighting equipment.

9.7.9.3 Floors shall be kept clean and free of oil and grease. Only approved water solutions or detergents, floor-sweeping compounds, and grease absorbents shall be used for cleaning floors.

9.7.9.4 Metal lockers shall be provided for employees' clothes.

9.7.9.5 Approved metal receptacles with self-closing covers shall be provided for the storage or disposal of oil-soaked waste or cloths.

9.7.9.6 Combustible rubbish shall be placed in covered metal receptacles until removed to a safe place for disposal. Contents of such containers shall be removed daily.

9.7.9.7 Smoking shall be prohibited except in designated areas subject to the approval of the authority having jurisdiction.

Chapter 10 Vapor Processing and Vapor Recovery Systems for Liquid Motor Fuels

10.1 Vapor Processing Systems.

10.1.1 Vapor processing system components, including hose nozzle valves, blowers, vacuum pumps, flame arresters, or systems for preventing flame propagation, controls, and vapor processing equipment shall be individually listed for their intended use.

10.1.2 Dispensing devices used with a vapor processing system shall be listed. Existing listed or labeled dispensing devices shall be permitted to be modified for use with vapor processing systems provided they are "Listed by Report" as specified in 6.3.2.1.

10.1.3 Means shall be provided in the vapor return path from each dispensing outlet to prevent the discharge of vapors when the hose nozzle valve is in its normal nondispensing position.

10.1.4 Vapor processing systems that employ blower-assist shall not be used unless the system is designed to prevent flame propagation through system piping, processing equipment, and tanks.

10.1.5 If a component is likely to contain an ignitible vapor–air mixture under operating conditions and can fail in a manner to ignite the mixture, it shall be designed to withstand an internal explosion without failure to the outside.

10.1.6 Vapor processing equipment shall be located outside of buildings. In addition, it shall be located as follows:

(1) At least 3 m (10 ft) from adjacent property lines that can be built upon
(2) At least 6 m (20 ft) from dispensing devices

Exception: As provided for in 10.1.7.

10.1.7 Where the required distance to adjacent property lines that can be built upon cannot be achieved, means shall be provided to protect the vapor processing equipment against fire exposure. Acceptable means shall include the following:

(1) Protective enclosures constructed of fire-resistant or noncombustible materials that extend at least 455 mm (18 in.) above the equipment
(2) Installation in belowgrade spaces
(3) Protection with an approved water spray system

10.1.7.1 If protective enclosures or belowgrade spaces are used, positive means shall be provided to ventilate the enclosure to prevent pocketing of ignitible vapors. In no case shall vapor processing equipment so protected be located within 1.5 m (5 ft) of adjacent property lines that can be built upon.

10.1.8 Processing equipment shall be protected against physical damage with guardrails, curbs, or fencing.

10.1.9 Electrical equipment shall meet the requirements of Chapter 8.

10.1.10 Vent pipes on vapor processing systems shall discharge only in an upward direction in order to disperse vapors and shall terminate at least 3.6 m (12 ft) above grade. The outlets shall be directed and located so that ignitible vapors will not accumulate or travel to an unsafe location or enter buildings.

10.1.11 Combustion or open flame–type devices shall not be installed in classified areas, as described in Chapter 8.

10.2 Vapor Recovery Systems.

10.2.1 Dispensing devices that incorporate vapor recovery shall be listed.

10.2.2 Hose nozzle valves used on vapor recovery systems shall be listed for the purpose.

10.2.3 Means shall be provided in the vapor return path from each dispensing outlet to prevent the discharge of vapors when the hose nozzle valve is in its normal nondispensing position.

Chapter 11 Marine Fueling

11.1 Scope.

11.1.1 This chapter shall apply to that portion of a property where liquids used as fuels are stored, handled, and dispensed from equipment located on shore or from equipment located on piers, wharves, or floating docks into the fuel tanks of marine craft, including incidental activity, except as covered elsewhere in this code or in other NFPA standards.

11.1.2 This chapter shall not apply to the following:

(1) Bulk plant or terminal loading and unloading facilities
(2) Transfer of liquids utilizing a flange-to-flange closed transfer piping system
(3) Marine motor fuel dispensing facilities where liquids used as fuels are stored and dispensed into the fuel tanks of marine craft of 272 metric tons (300 gross tons) or more

11.1.3 For the purpose of this chapter, the word *pier* shall also mean dock, floating dock, and wharf.

11.2 Storage.

11.2.1 Liquids shall be stored in tanks or containers complying with Section 4.3.

11.2.2* Tanks that supply marine motor fuel dispensing facilities shall be located on shore or on a pier of the solid-fill type. Pumps that are not integral with the dispensing device shall also be located on shore or on a pier of the solid-fill type.

Exception: Tanks shall be permitted with the approval of the authority having jurisdiction to be located on a pier, provided the installation meets all applicable requirements of Chapters 4 and 5 of this code and 21.6.2 of NFPA 30, and the quantity stored does not exceed 4164 L (1100 gal) aggregate capacity.

Δ **11.2.3** Where a tank is at an elevation that produces a gravity head on the dispensing device, the tank outlet shall be equipped with a device, such as a normally closed solenoid valve, that will prevent gravity flow from the tank to the dispenser. This device shall be located adjacent to and downstream of the outlet valve specified by 22.13.1 of NFPA 30. The device shall be installed and adjusted so that liquid cannot flow by gravity from the tank to the dispenser if the piping or hose fails when the dispenser is not in use.

11.3 Piping Systems.

11.3.1 Piping shall be installed in accordance with all applicable requirements of Chapter 5.

11.3.2 Piping systems shall be supported and protected against physical damage and stresses arising from impact, settlement, vibration, expansion, contraction, and tidal action.

11.3.3 Means shall be provided to ensure flexibility of the piping system in the event of motion of the pier. Flexible piping shall be of a type designed to withstand the forces and pressures exerted upon the piping.

11.3.4 Where dispensing is from a floating structure or pier, approved oil-resistant flexible hose shall be permitted to be used between shore piping and the piping on a floating structure or pier and between separate sections of the floating structure to accommodate changes in water level or shoreline, provided that the hose is either resistant to or shielded from damage by fire.

11.3.5 A valve to shut off the liquid supply from shore shall be provided in each pipeline at or near the approach to the pier and at the shore end of each marine pipeline adjacent to the point where each flexible hose is attached.

11.4 Fuel Dispensing System.

11.4.1 All hose shall be listed. Where hose length exceeds 5.5 m (18 ft), the hose shall be secured so as to protect it from damage.

11.4.2 Dispensing nozzles shall be of the automatic-closing type without a latch-open device.

11.4.3 Dispensing devices shall be permitted to be located on open piers, on shore, or on piers of the solid-fill type and shall be located apart from other structures so as to provide room for safe ingress to and egress from marine craft.

11.4.4 Dispensing devices shall be located so that exposure to all other operational marina or pleasure boat berthing area facilities is minimized. Where tide and weather conditions permit, liquid fuel handling shall be outside the main berthing areas. Where located inside marina or pleasure craft berthing areas, fueling facilities shall be located so that, in case of fire aboard a marine craft alongside, the danger to other craft near the facility is minimized.

11.4.5 No vessel or marine craft shall be made fast to any other vessel or marine craft occupying a berth at a fuel dispensing location during fueling operations.

11.4.6 A marine motor fuel dispensing facility located at a bulk plant shall be separated by a fence or other approved barrier from areas in which bulk plant operations are conducted. Dispensing devices shall not be supplied by aboveground tanks located in the bulk plant. Marine motor fuel dispensing facility storage tanks shall not be connected by piping to aboveground tanks located in the bulk plant.

11.4.7 Each marine motor fuel dispensing facility shall have an attendant or supervisor on duty whenever the facility is open for business. The attendant's primary function shall be to supervise, observe, and control the dispensing of liquids.

11.5 Sources of Ignition.

11.5.1 All electrical components for dispensing liquids shall be installed in accordance with Chapter 8.

Δ **11.5.2** All electrical equipment shall be installed and used in accordance with the requirements of *NFPA 70* as it applies to wet, damp, and hazardous locations.

11.5.3 Clearly identified emergency electrical disconnects that are readily accessible in case of fire or physical damage at any dispensing unit shall be provided on each marine wharf. The

disconnects shall be interlocked to shut off power to all pump motors from any individual location and shall be manually reset only from a master switch. Each such disconnect shall be identified by an approved sign stating EMERGENCY PUMP SHUTOFF in 50 mm (2 in.) red capital letters.

11.5.4 All electrical wiring for power and lighting shall be installed on the side of the wharf opposite from the liquid piping system.

11.5.5 Smoking materials, including matches and lighters, shall not be used within 6 m (20 ft) of areas used for fueling, servicing fuel systems for internal combustion engines, or receiving or dispensing of Class I liquids. Conspicuous NO SMOKING signs shall be posted within sight of the customer being served.

11.5.6 The motors of all equipment being fueled shall be shut off during the fueling operation, except for emergency generators, pumps, and so forth, where continuing operation is essential.

11.6* Bonding and Grounding.

11.6.1* Pipelines on piers shall be bonded and grounded. Bonding and grounding connections on all pipelines shall be located on the pier side of hose riser insulating flanges, if used, and shall be accessible for inspection.

11.6.2 The fuel delivery nozzle shall be put into contact with the vessel fill pipe before the flow of fuel commences and this bonding contact shall be continuously maintained until fuel flow has stopped to avoid possibility of electrostatic discharge.

11.7 Fire Control.

Δ **11.7.1** Each marine motor fuel dispensing facility shall be provided with fire extinguishers installed, inspected, and maintained as required by NFPA 10. Extinguishers for marine motor fuel dispensing areas shall be provided according to the extra (high) hazard requirements for Class B hazards, except that the maximum travel distance to an 80 B:C extinguisher shall be permitted to be 31 m (100 ft).

Δ **11.7.2** Piers that extend more than 152 m (500 ft) in travel distance from shore shall be provided with a Class III standpipe that is installed in accordance with NFPA 14.

11.7.3 Materials shall not be placed on a pier in such a manner that they obstruct access to fire-fighting equipment or important piping system control valves. Where the pier is accessible to vehicular traffic, an unobstructed roadway to the shore end of the wharf shall be maintained for access by fire-fighting apparatus.

11.8 Containers and Movable Tanks.

11.8.1 The temporary use of movable tanks in conjunction with the dispensing of liquids into the fuel tanks of marine craft on premises not normally accessible to the public shall be permitted. Such installations shall only be made with the approval of the authority having jurisdiction.

11.8.2* Class I or Class II liquids shall not be dispensed into a portable container unless the container is constructed of metal or is approved by the authority having jurisdiction, has a tight closure, and is fitted with a spout or is so designed that the contents can be dispensed without spilling.

11.8.3 Portable containers of 45 L (12 gal) capacity or less shall not be filled while they are in or on a marine craft.

11.9 Cargo Tank Fueling Facilities. The provisions of Section 11.2 shall not prohibit the dispensing of Class II liquids in the open from a tank vehicle to a marine craft located at commercial, industrial, governmental, or manufacturing establishments when the liquid is intended for fueling marine craft used in connection with those establishments' businesses if the requirements of 11.9.1 through 11.9.7 are met.

11.9.1 An inspection of the premises and operations shall be made and approval granted by the authority having jurisdiction.

Δ **11.9.2** The tank vehicle shall comply with the requirements of NFPA 385.

11.9.3 The dispensing hose shall not exceed 15 m (50 ft) in length.

11.9.4 The dispensing nozzle shall be a listed, automatic-closing type without a latch-open device.

11.9.5 Nighttime deliveries shall only be made in areas deemed adequately lighted by the authority having jurisdiction.

11.9.6 The tank vehicle flasher lights shall be in operation while dispensing.

11.9.7 Fuel expansion space shall be left in each fuel tank to prevent overflow in the event of temperature increase.

11.10 Operating Requirements.

11.10.1 The following shall be the responsibilities of the attendant:

(1) Prevent the dispensing of Class I liquids into portable containers that do not comply with 11.8.2
(2) Be familiar with the dispensing system and emergency shutoff controls
(3) Ensure that the vessel is properly moored and that all connections are made
(4) Be within 4.6 m (15 ft) of the dispensing controls during the fueling operation and maintain a direct, clear, unobstructed view of both the vessel fuel filler neck and the emergency fuel shutoff control

11.10.2 Fueling shall not be undertaken at night except under well-lighted conditions.

11.10.3 During fueling operations, smoking shall be forbidden on board the vessel or marine craft and in the dispensing area.

11.10.4 Before opening the tanks of the vessel to be fueled, the following precautions shall be taken:

(1) All engines, motors, fans, and bilge blowers shall be shut down.
(2) All open flames and smoking material shall be extinguished and all exposed heating elements shall be turned off.
(3) Galley stoves shall be extinguished.
(4) All ports, windows, doors, and hatches shall be closed.

11.10.5 After the flow of fuel has stopped, the following shall occur:

(1) The fill cap shall be tightly secured.
(2) Any spillage shall be wiped up immediately.

(3) If Class I liquid has been delivered, the entire vessel or marine craft shall remain open.
(4) Bilge blowers shall be turned on and allowed to run for at least 5 minutes before starting any engines or lighting galley fires. If bilge blowers are not available, 10 minutes of ventilation shall be required.

11.10.6 No Class I liquids shall be delivered to any vessel having its tanks located below deck unless each tank is equipped with a separate fill pipe, the receiving end of which shall be securely connected to a deck plate and fitted with a screw cap. Such pipe shall extend into the tank. Vessels receiving Class II or Class IIIA liquids shall have the receiving end of the fill pipe securely connected to a deck plate and fitted with a screw cap. Such pipe shall be permitted to connect to a manifold system that extends into each separate tank. Each tank shall be provided with a suitable vent pipe that shall extend from the tank to the outside of the coaming or enclosed rails so that the vapors will dissipate away from the vessel.

11.10.7 Owners or operators shall not offer their vessel or marine craft for fueling unless the following conditions exist:

(1) The tanks being filled are properly vented to dissipate vapors to the outside atmosphere, and the fuel systems are liquidtight and vaportight with respect to all interiors.
(2) All fuel systems are designed, installed, and maintained in compliance with the specifications of the manufacturer of the vessel or marine craft.
(3) Communication has been established between the fueling attendant and the person in control of the vessel or craft receiving the fuel so as to determine the vessel's fuel capacity, the amount of fuel on board, and the amount of fuel to be taken on board.
(4) The electrical bonding and grounding systems of the vessel or craft have been maintained in accordance with the manufacturer's specifications.

11.10.8 A sign with the following legends printed in 50 mm (2 in.) red letters on a white background shall be conspicuously posted at the dispensing area:

Before Fueling:

(1) Stop all engines and auxiliaries.

(2) Shut off all electricity, open flames, and heat sources.

(3) Check all bilges for fuel vapors.

(4) Extinguish all smoking materials.

(5) Close access fittings and openings that could allow fuel vapors to enter enclosed spaces of the vessel.

During Fueling:

(1) Maintain nozzle contact with fill pipe.

(2) Wipe up spills immediately.

(3) Avoid overfilling.

(4) Fuel filling nozzle must be attended at all times.

After Fueling:

(1) Inspect bilges for leakage and fuel odors.

(2) Ventilate until odors are removed.

Chapter 12 Additional Requirements for CNG, LNG, Hydrogen, and LPG

12.1 Scope. This chapter shall apply where CNG, LNG, compressed or liquefied hydrogen, LP-Gas, or combinations of these, are dispensed as motor vehicle fuels along with Class I or Class II liquids that are also dispensed as motor vehicle fuels.

12.2 General Requirements.

Δ **12.2.1** The installation and use of CNG and LNG systems shall meet the requirements of NFPA 52, except as modified by this chapter. The installation and use of hydrogen systems shall meet the requirements of NFPA 2, except as modified by this chapter. The installation and use of LP-Gas systems shall meet the requirements of NFPA 58, except as modified by this chapter.

12.2.2 A means shall be provided that connects to the dispenser supply piping and that prevents flow in the event that the dispenser is displaced from its mounting.

12.2.3* Dispensing devices for CNG, LNG, hydrogen, and LP-Gas shall be listed or approved.

12.2.4* Listed or approved hose assemblies shall be used to dispense fuel. Hose length at automotive motor fuel dispensing facilities shall not exceed 5.5 m (18 ft).

12.3 Fuel Storage.

Δ **12.3.1** Aboveground tanks storing CNG or LNG shall be separated from any adjacent property line that is or can be built upon, any public way, and the nearest important building on the same property by not less than the distances given in Section 8.4 of NFPA 52.

Δ **12.3.2** Aboveground tanks storing hydrogen shall be separated from any adjacent property line that is or can be built upon, any public way, and the nearest important building on the same property by not less than the distances given in NFPA 2.

Δ **12.3.3** Aboveground tanks storing LP-Gas shall be separated from any adjacent property line that is or can be built upon, any public way, and the nearest important building on the same property by not less than the distances given in Section 6.3 of NFPA 58.

Δ **12.3.4*** Aboveground tanks storing CNG, LNG, or LP-Gas shall be separated from each other by at least 6 m (20 ft) and from dispensing devices that dispense liquid or gaseous motor vehicle fuels by at least 6 m (20 ft).

Exception No. 1: This required separation shall not apply to tanks or dispensers storing or handling fuels of the same chemical composition.

Exception No. 2: When both the gaseous fuel storage and dispensing equipment are at least 15 m (50 ft) from any other aboveground motor fuel storage or dispensing equipment, the requirements of NFPA 52, or NFPA 58, whichever is applicable, shall apply.

12.3.5 Aboveground storage tanks for the storage of CNG, LNG, or LP-Gas shall be provided with physical protection in accordance with 4.3.7.

12.3.6 Horizontal separation shall not be required between aboveground tanks storing CNG, LNG, or LP-Gas and underground tanks containing Class I or Class II liquids, provided the structural limitations of the underground tanks are not exceeded.

Table 12.6.2 Electrical Equipment Classified Areas for Dispensing Devices

Dispensing Device	Extent of Classified Area	
	Class I, Division 1	Class I, Division 2
Compressed natural gas (CNG)	Entire space within the dispenser enclosure	1.5 m (5 ft) in all directions from dispenser enclosure
Liquefied natural gas (LNG)	Entire space within the dispenser enclosure	3 m (10 ft) in all directions from the dispenser enclosure
Liquefied petroleum gas (LP-Gas)	Entire space within the dispenser enclosure; 46 cm (18 in.) from the exterior surface of the dispenser enclosure to an elevation of 1.22 m (4 ft) above the base of the dispenser; the entire pit or open space beneath the dispenser and within 6 m (20 ft) horizontally from any edge of the dispenser when the pit or trench is not mechanically ventilated	Up to 46 cm (18 in.) above ground and within 6 m (20 ft) horizontally from any edge of the dispenser enclosure, including pits or trenches within this area when provided with adequate mechanical ventilation

12.4 Dispenser Installations Beneath Canopies. Where CNG or LNG dispensers are installed beneath a canopy or enclosure, either the canopy or enclosure shall be designed to prevent accumulation or entrapment of ignitible vapors or all electrical equipment installed beneath the canopy or enclosure shall be suitable for Class I, Division 2 hazardous (classified) locations.

12.5 Specific Requirements for LP-Gas Dispensing Devices.

Δ **12.5.1** Dispensing devices for LP-Gas shall meet all applicable requirements of NFPA 58.

12.5.2 Dispensing devices for LP-Gas shall be located as follows:

(1) At least 3 m (10 ft) from any dispensing device for Class I liquids
(2) At least 1.5 m (5 ft) from any dispensing device for Class I liquids where the following conditions exist:
   (a) The LP-Gas deliver nozzle and filler valve release no more than 4 cm^3 (0.1 oz) of liquid upon disconnection.
   (b) The fixed maximum liquid level gauge remains closed during the entire refueling process.

12.6 Electrical Equipment.

Δ **12.6.1** All electrical wiring and electrical utilization equipment shall be of a type specified by, and shall be installed in accordance with, *NFPA 70*.

12.6.2* Table 12.6.2 shall be used to delineate and classify areas for the purpose of installation of electrical wiring and electrical utilization equipment.

Chapter 13 Farms and Remote Sites

Δ **13.1 Scope.** This chapter shall apply to the storage of Class I flammable liquids and Class II and Class IIIA combustible liquids, as herein defined, in containers or tanks that do not exceed 4164 L (1100 gal) individual capacity at the following locations:

(1) On farms
(2) At isolated construction sites and isolated earth-moving projects, including gravel pits, quarries, and borrow pits, where, in the opinion of the authority having jurisdiction, it is not necessary to comply with the more restrictive requirements of this code and NFPA 30
(3) At any private site where temporary use makes it unnecessary, in the opinion of the authority having jurisdiction, to comply with the more restrictive requirements of this code and NFPA 30

13.2 Approved Storage.

Δ **13.2.1** Storage of liquids, as covered by this chapter, shall be permitted in either of the following:

(1) Containers that meet the requirements of Chapter 9 of NFPA 30, do not exceed 227 L (60 gal), and meet the requirements of 13.2.2
(2) Permanent aboveground storage tanks of more than 227 L (60 gal) but not more than 4158 L (1100 gal) individual capacity or capacities that meet the requirements of 13.2.3

13.2.2 Individual Containers Not Exceeding 227 L (60 gal) Capacity.

Δ **13.2.2.1** Dispensing or transfer devices that require the container to be pressurized shall meet the requirements of 18.4.4 of NFPA 30.

13.2.2.2 Electrical equipment, wiring, and classified locations shall be in compliance with Chapter 8.

13.2.2.3 Pumping devices and faucets shall be well maintained to prevent leakage.

13.2.2.4 Individual containers shall not be interconnected or manifolded and shall be kept tightly closed when not in use.

13.2.2.5 Containers used for the storage of Class I liquids shall be kept outside and at least 3 m (10 ft) from any building.

13.2.2.6 Containers shall be permitted to be stored inside a building if the building is used exclusively for the storage of Class I and Class II liquids, is located at least 3 m (10 ft) from any other building, and is provided with cross-ventilation using at least two vents, each having a net open area of at least 645 mm^2 (64 $in.^2$) and each placed at floor level. The vents shall be located opposite from each other.

13.2.3 Tanks to 4158 L (1100 gal) Capacity.

Δ **13.2.3.1** Tanks shall be of single-compartment design and meet the requirements of 21.3 and 21.4 of NFPA 30.

13.2.3.2 Tanks shall be a minimum 12 gauge plate thickness.

13.2.3.3 Each tank shall be provided with a fill opening that is equipped with a closure that is designed to be locked. The fill opening shall be separate from the vent opening.

13.2.3.4* Each tank shall be provided with a free-opening vent that shall relieve either the vacuum or the pressure that might develop during normal operation or fire exposure. The vent shall have the nominal pipe sizes listed in Table 13.2.3.4.

13.2.3.5 Vents shall be arranged to discharge so as to prevent localized overheating of, or direct flame impingement on, any part of the tank in the event that vapors from the vent are ignited.

13.2.3.6 Tanks shall be located outside and at least 12 m (40 ft) from any important building and property line. Tanks shall also be located so that any vehicle, equipment, or container that is filled directly from the tanks is at least 12 m (40 ft) from any important building.

13.2.3.7 Tanks shall be permitted to have top openings only or shall be permitted to be elevated for gravity discharge.

Δ **13.2.3.8** Each tank shall be provided with a listed emergency vent that meets the requirements of Section 22.7 of NFPA 30.

13.2.3.9 Tanks that have top openings only shall be mounted and equipped as follows:

(1)* Stationary tanks shall be mounted on concrete, steel, or masonry supports at least 150 mm (6 in.) in height so as to protect the bottom of the tank from corrosion due to contact with the ground and to maintain the tank in a stable position.
(2) Movable tanks shall be equipped with attached metal legs that rest on shoes or runners designed so that the tank is supported in a stable position and so that the tank and its supports can be moved as a single unit.

Table 13.2.3.4 Required Vent Diameter

Tank Capacity		Vent Diameter	
L	**gal**	**mm**	**in.**
Up to 1040	Up to 275	38	1½
1040 to 2500	275 to 660	51	2
2501 to 3410	661 to 900	64	2½
3411 to 4165	901 to 1100	76	3

(3) Tanks shall be equipped with a tightly and permanently attached approved pumping device having an approved hose and nozzle.
(4) Each component of dispensing systems for Class I liquids shall be listed.
(5) The dispenser nozzle and hose shall be designed so they can be padlocked to the hanger to prevent tampering.
(6) The pump discharge shall be equipped with an effective anti-siphoning device, or the discharge hose shall be equipped with an approved self-closing nozzle.
(7) Siphons or internal pressure discharge devices shall be prohibited.

13.2.3.10 Tanks elevated for gravity discharge shall be mounted and equipped as follows:

(1) Tanks shall be supported on masonry, concrete, or steel supports having adequate strength and designed to provide stability.
(2) Discharge connections shall be made to the bottom or to the end of the tank.
(3) The discharge connection shall be equipped with a valve that shall automatically close in the event of a fire by means of operation of an effective heat-actuated device. This valve shall be located adjacent to the tank shell. If this valve cannot be operated manually, an additional valve that can be manually operated shall be provided.
(4) Each component of dispensing systems for Class I liquids shall be listed.
(5) The nozzle shall be equipped so that it can be padlocked to its hanger to prevent tampering.
(6) Hose used for dispensing Class II and III liquids shall be equipped with listed self-closing nozzles.

13.2.3.11 Individual tanks shall not be interconnected or manifolded.

13.2.3.12 Tanks shall be separated from each other by not less than 0.9 m (3 ft).

13.3 Marking of Tanks and Containers. Tanks and containers shall be conspicuously marked with the name of the product contained and with the following marking:

FLAMMABLE — KEEP FIRE AND FLAME AWAY.

13.4 Fire Prevention and Control.

13.4.1 Storage areas shall be kept free of weeds and other combustible materials.

13.4.2 Open flames and smoking materials shall not be permitted in areas where Class I liquids are stored and/or dispensed.

N Chapter 14 On-Demand Mobile Fueling.

N **14.1* Scope.** This chapter shall apply to the retail practice of fueling motor vehicles of the general public while the owner's vehicle is parked and might be unattended.

N **14.1.1** This chapter shall not apply to the following:

(1) Refueling from tank vehicles at commercial, industrial, governmental, or manufacturing establishments in accordance with Section 9.6
(2) Fueling from portable containers in cases of an emergency or for personal use

N 14.1.2 The dispensing of Class I and Class II liquids from a mobile fueling vehicle or metal safety cans into the fuel tank of a motor vehicle shall be permitted only if all of the requirements of 14.2 through 14.4 have been met.

N 14.2 Approvals and Mobile Fueling Locations.

N 14.2.1 Mobile fueling operations shall not be conducted unless approved by the authority having jurisdiction and the owner of the property on which the fueling will occur. Mobile fueling operations shall occur only at approved locations.

N 14.2.2* The authority having jurisdiction shall be permitted to require a safety and emergency response plan for locations where mobile fueling is authorized. Where required, the safety and emergency response plan shall be available on each mobile fueling vehicle.

N 14.2.3* Mobile fueling vehicle operators shall possess evidence of training on proper fueling procedures and the safety and emergency response plan.

N 14.2.3.1 The vehicle operator training shall be approved by the authority having jurisdiction.

N 14.2.4 Mobile fueling shall not take place within 7.6 m (25 ft) of buildings, property lines, or combustible storage. The authority having jurisdiction is authorized to decrease separation distances for mobile fueling from metal safety cans.

N 14.2.5 An approved storm drain cover or equivalent method that will prevent any fuel from reaching the drain shall be used when mobile fueling occurs within 7.6 m (25 ft) of a storm drain.

N 14.2.6 Mobile fueling and delivery vehicle parking shall be prohibited in buildings, in covered parking structures, on public streets, and on public ways.

N 14.3 Mobile Fueling Vehicles and Equipment.

N 14.3.1* Mobile fueling vehicles shall comply with all applicable local, state, and federal requirements and shall be one of the following:

(1) A tank vehicle complying with NFPA 385 with chassis-mounted tanks that do not exceed an aggregate capacity of 4542 L (1200 gal).
(2) A vehicle with chassis-mounted tanks, each of which does not exceed 415 L (110 gal), that does not exceed an aggregate capacity of 4542 L (1200 gal).
(3) A vehicle that carries a maximum of 227 L (60 gal) of motor fuel in listed metal safety cans not to exceed 20 L (5.3 gal) in capacity.

N 14.3.2 Dispensing hose assemblies shall be listed and the hose shall not exceed 15 m (50 ft) in length.

N 14.3.3 A listed breakaway device shall be provided at the nozzle.

N 14.3.4 Dispensing nozzles shall be a listed, automatic closing–type with a latch-open device.

N 14.3.5 A listed fuel shutoff switch and a listed shutoff valve assembly shall be provided on the delivery vehicle.

N 14.3.6 The pump shall be listed to UL 79, *Power Operated Pumps for Petroleum Dispensing Products.*

N 14.3.7 The meter shall be listed to UL 25, *Meters for Flammable and Combustible Liquids and LP-Gas.*

N 14.3.8 Mobile fueling vehicles shall be provided with a fire extinguisher installed, inspected, and maintained as required by NFPA 10, with a minimum rating of 4A-80 B:C.

N 14.3.9 Mobile fueling vehicles shall be provided with a minimum 18.9 L (5 gal) spill kit designed to promptly and safely mitigate and dispose of leakage or spills.

N 14.3.10 NO SMOKING signs shall be prominently displayed on the mobile fueling vehicle.

N 14.4 Operations.

N 14.4.1 Nighttime deliveries shall only be made in areas deemed adequately lighted by the authority having jurisdiction.

N 14.4.2 The mobile fueling vehicle flasher lights shall be in operation while dispensing operations are in progress.

N 14.4.3 Safety cones or barriers shall be employed to protect the vehicle fueling area.

N 14.4.4 Expansion space shall be left in each motor vehicle fuel tank to prevent overflow in the event of temperature increase.

N 14.4.5* A means for bonding the mobile fueling vehicle to the motor vehicle shall be provided. Such bonding means shall be employed during fueling operations.

N 14.4.6 Sources of ignition shall be controlled in accordance with 9.2.5.1.

N 14.4.7 Mobile fueling vehicles shall be constantly attended during fueling operations.

N 14.4.8 Mobile fueling vehicles shall not obstruct emergency vehicle access roads.

N 14.4.9 Mobile fueling vehicles shall be positioned in a manner to preclude traffic from driving over the dispensing hose.

N 14.4.10 Operations Using Metal Safety Cans.

N 14.4.10.1 All metal safety cans shall be listed.

N 14.4.10.2 Metal safety cans shall be secured to the mobile fueling vehicle except when in use.

N 14.4.10.3 The authority having jurisdiction shall be permitted to require additional measures in the handling of approved metal safety cans for refueling.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1 This code is recommended for use as the basis for legal regulations. Its provisions are intended to reduce the hazards of motor fuels to a degree consistent with reasonable public safety, without undue interference with public convenience and necessity. Thus, compliance with this code does not eliminate all hazards in the use of these fuels.

See the *Flammable and Combustible Liquids Code Handbook* for additional explanatory information.

Δ A.1.1.3 See NFPA 2, NFPA 52, and NFPA 58 for requirements for facilities where only these fuels are dispensed.

A.1.2 See NFPA 302 for safety precautions while fueling at marine motor fuel dispensing facilities, and NFPA 303 for additional requirements applicable to marine motor fuel dispensing facilities. It is intended that this code apply to registered and non-registered vehicles.

Δ **A.1.7** The classification of liquids is based on flash points that have been corrected to sea level, in accordance with the relevant ASTM test procedures. At high altitudes, the actual flash points will be significantly lower than those either observed at sea level or corrected to atmospheric pressure at sea level. Allowances could be necessary for this difference in order to appropriately assess the risk.

Table A.1.7 presents a comparison of the definitions and classification of flammable and combustible liquids, as set forth in Section 1.7 of this code, with similar definitions and classification systems used by other regulatory bodies.

The Hazardous Materials Regulations of the U.S. Department of Transportation (DOT), as set forth in 49 CFR 173.120(b)(2) and 173.150(f), provide an exception whereby a flammable liquid that has a flash point between 37.8°C (100°F) and 60.5°C (141°F) and does not also meet the definition of any other DOT hazard class can be reclassified as a combustible liquid [i.e., one having a flash point above 60.5°C (141°F)] for shipment by road or rail within the United States.

A.3.2.1 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designa-

Δ **Table A.1.7 Comparative Classification of Liquids**

Agency	Agency Classification	Agency Flash Point °F	Agency Flash Point °C	NFPA Definition	NFPA Classification	NFPA Flash Point °F	NFPA Flash Point °C
ANSI Z400.1/ Z129.1	Flammable	<141	<60.5	Flammable	Class I	<100	<37.8
				Combustible	Class II	≥100 to <140	≥37.8 to <60
					Class IIIA	≥140 to <200	≥60 to <93
	Combustible	≥141 to <200	≥60.5 to <93	Combustible	Class IIIA	≥140 to <200	≥60 to <93
DOT	Flammable	<141	<60.5	Flammable	Class I	<100	<37.8
				Combustible	Class II	≥100 to <140	≥37.8 to <60
					Class IIIA	≥140 to <200	≥60 to <93
	Combustible	≥141 to <200	≥60.5 to <93	Combustible	Class IIIA	≥140 to <200	≥60 to <93
DOT HM-181 Domestic Exemption*	Flammable	<100	<37.8	Flammable	Class I	<100	<37.8
	Combustible	≥100 to <200	≥37.8 to <93	Combustible	Class II	≥100 to <140	≥37.8 to <60
					Class IIIA	≥140 to <200	≥60 to <93
UN	Flammable	<141	<60.5	Flammable	Class I	<100	<37.8
				Combustible	Class II	≥100 to <140	≥37.8 to <60
					Class IIIA	≥140 to <200	≥60 to <93
	Combustible	≥141 to <200	≥60.5 to <93	Combustible	Class II	≥100 to <140	≥37.8 to <60
					Class IIIA	≥140 to <200	≥60 to <93
OSHA	Flammable	<100	<37.8	Flammable	Class I	<100	<37.8
	Combustible†	≥100	≥37.8	Combustible	Class II	≥100 to <140	≥37.8 to <60
					Class IIIA	≥140 to <200	≥60 to <93
					Class IIIB†	≥200	≥93

*See A.4.3 of NFPA 30.
†See 29 CFR 1910.106 for Class IIIB liquid exemptions.
[**30:**Table A.4.3]

ted agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.3 Code. The decision to designate a standard as a "code" is based on such factors as the size and scope of the document, its intended use and form of adoption, and whether it contains substantial enforcement and administrative provisions.

A.3.2.5 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.5 Container. The U.S. DOT defines *non-bulk packaging* as having up to 119 gal (450 L) capacity in 49 CFR 171.8. [**30,** 2018]

A.3.3.6 Dispensing Device, Overhead Type. This definition applies to an overhead dispenser that uses a retractable hose on an overhead reel, as distinguished from the now-common dispensing device that has one or more hose outlets located in a canopy at the top of the dispensing device. The latter, also called *high-hose units* or *multi-product dispensers*, are treated by NFPA 30A as conventional dispensing devices.

A.3.3.9 Liquid. For the purposes of this code, liquefied natural gas (LNG) and liquefied petroleum gas (LP-Gas) are not considered liquids.

Δ **A.3.3.9.1 Combustible Liquid.** See Annex B for information about typical liquids found at motor fuel dispensing facilities.

Δ **A.3.3.9.2 Flammable Liquid.** For the purposes of this code, a material with a Reid Vapor Pressure greater than 2068 mm Hg absolute (40 psia) is considered to be a gas and is, therefore, not within the scope of NFPA 30A. *(See NFPA 58. See Annex B for information about typical liquids found at motor fuel dispensing facilities.)*

A.3.3.11.5 Motor Fuel Dispensing Facility Located Inside a Building. The motor fuel dispensing facility can be either enclosed or partially enclosed by the building walls, floors, ceilings, or partitions or can be open to the outside. The motor fuel dispensing area is that area required for dispensing of fuels to motor vehicles. Dispensing of fuel at manufacturing, assembly, and testing operations is not included within this definition.

A.3.3.15.3 Protected Aboveground Tank. See SwRI 93, *Testing Requirements for Protected Aboveground Flammable Liquid Fuel Storage Tanks*, for more information.

A.3.3.17 Vapor Processing System. Examples are systems using blower-assist for capturing vapors and refrigeration, absorption, and combustion systems for processing vapors.

A.3.3.18 Vapor Recovery System. Examples are balanced-pressure vapor displacement systems and vacuum-assist systems without vapor processing.

N **A.4.2** API RP 1626, *Storage and Handling of Ethanol and Gasoline-Ethanol Blends at Distribution Terminals and Filling Stations*, provides guidance in the design and selection of equipment that will promote safe storage, handling, and dispensing of ethanol blends.

Δ **A.4.3.2** PEI RP200, *Recommended Practices for Installation of Aboveground Storage Systems for Motor Vehicle Fueling*, provides information on proper installation, inspection, and maintenance of aboveground storage systems for motor vehicle fueling, including associated devices and components. The U.S. Environmental Protection Agency's regulation for Spill Prevention Control and Countermeasure (SPCC) Plans found in 40 CFR 112, provides additional requirements.

A.4.3.3.3 Some of the specifications for vault design and construction include the following:

(1) The walls and floor of the vault are to be constructed of reinforced concrete at least 6 in. (50 mm) thick.
(2) The top and floor of the vault and the tank foundation must be designed to withstand all anticipated loading, including loading from vehicular traffic, where applicable.
(3) The walls and floor of a belowgrade vault must be designed to withstand anticipated soil and hydrostatic loading.
(4) The vault must be liquidtight.
(5) The vault enclosure must have no openings except those necessary for access to, inspection of, and filling, emptying, and venting of the tank.
(6) The vault must be provided with connections to permit ventilation to dilute, disperse, and remove any vapors prior to personnel entering the vault.
(7) The vault must be provided with a means for personnel entry.
(8) The vault must be provided with an approved means to admit a fire suppression agent. [**30:** A.25.5]

A.4.3.7.2 The top of the posts should be set not less than 0.9 m (3 ft) above ground and should be located not less than 1.5 m (5 ft) from the tank. Other approved means to protect tanks subject to vehicular damage include vehicle impact resistance testing such as that prescribed in ANSI/UL 2085, *Standard for Protected Aboveground Tanks for Flammable and Combustible Liquids*, for protected aboveground tanks.

Δ **A.4.3.8** Appropriate corrosion control standards include the following:

(1) STI RP 892, *Recommended Practice for Corrosion Protection of Underground Piping Networks Associated with Liquid Storage and Dispensing Systems*
(2) NACE SP0169, *Control of External Corrosion of Underground or Submerged Metallic Piping*
(3) STI RP 1632, *Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems*

Other means of internal corrosion protection include protective coatings and linings and cathodic protection.

A.5.4.2 When testing with air, the pressure should be maintained at the initial pressure setting or within a range that can be accounted for by temperature changes held for a minimum of 1 hour.

Δ **A.6.2.3** The following can be used to determine compliance with 6.2.3:

ANSI/UL 79, *Standard for Power-Operated Pumps for Petroleum Dispensing Products*

UL 79A, *Standard for Power-Operated Pumps for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations Up to 85 Percent (E0 - E85)*

UL 87, *Standard for Power-Operated Pumps for Petroleum Dispensing Products*

UL 87A, *Standard for Power-Operated Dispensing Devices for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations Up to 85 Percent (E0-E85)*

ANSI/UL 330, *Standard for Hose and Hose Assemblies for Dispensing Flammable Liquids*

UL 330A, *Outline for Hose and Hose Assemblies for Use With Dispensing Devices Dispensing Gasoline and Gasoline/Ethanol Blends With Nominal Ethanol Concentrations Up To 85 Percent (E0 - E85)*

ANSI/UL 567, *Standard for Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Petroleum Products and LP-Gas*

UL 567A, *Standard for Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Gasoline/Ethanol Blends with Nominal Ethanol Concentrations Up to 85 Percent (E0 - E85)*

ANSI/UL 842, *Standard for Valves for Flammable Fluids*

UL 842A, *Standard for Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0 - E85)*

ANSI/UL 2586, *Standard for Hose Nozzle Valves*

UL 2586A, *Standard for Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations Up to 85 Percent (E0 - E85)*

A.6.3.6.1 Useful forms for documentation can be found in PEI/RP500-05, *Recommended Practices for Inspection and Maintenance of Motor Fuel Dispensing Equipment*, and are available at www.pei.org/rp500.

A.6.3.6.2 See A.6.3.6.1.

A.6.6.2 The flow of fuel can be stopped by dispensers used in self-serve motor fuel dispensing facilities. The nozzle can be returned to the dispenser in the latched-open position. Subsequent activation of the dispenser would then immediately release fuel from the latched-open nozzle, creating a hazardous situation.

N **A.7.1** Provisions of NFPA 2 apply to facilities that repair the components of hydrogen fuel systems. If the major repair facility only repairs hydrogen fuel systems, then only NFPA 2 will apply. If hydrogen fuel system components are not repaired or other vehicle repair activities are performed at the facility, then only NFPA 30A applies.

A.7.3.5.1 Additional fire protection considerations can include items such as fixed suppression systems, automatic fire detection, manual fire alarm stations, transmission of alarms to off-site locations, and limiting volume delivered per transaction.

A.7.3.6.7 Natural ventilation can normally be expected to dissipate any fuel vapors before they reach ignitible concentrations if at least two sides of the dispensing area are open to the building exterior.

A.7.3.6.9 Oil/water separators might not be designed to remove or separate flammable or combustible liquids other than oil.

A.7.5 The ventilation requirements contained in this section do not consider exhaust emissions from motor vehicle engines. An appropriate professional should be consulted to determine precautions necessary to protect against this health hazard.

Δ **A.7.5.1** Manual control switches for supply and exhaust ventilating systems should be located close to the entrance to the area served. In buildings protected by automatic sprinklers or fire alarm systems, it is recommended that the necessary interlocks be provided to shut down supply and exhaust fans when the sprinklers or fire alarms operate. For service facilities for CNG-fueled vehicles and LNG-fueled vehicles, see NFPA 52.

N **A.7.5.4** Lighter-than-air fuels include fuels such as hydrogen and natural gas, but not LPG.

Δ **A.7.6.6** Enclosed rooms or spaces storing CNG- or LNG-fueled vehicles should prohibit the transmission of gases to other areas of the building. Other areas outside of the enclosure, if not used for repairing or storing CNG- or LNG-fueled vehicles, can use other heating methods. Note that, according to A.1.1 of NFPA 52, CNG weighs about two-thirds as much as air and, therefore, as a gas, will rise in a room. LNG at a temperature of less than or equal to –112°C (–170°F) is heavier than ambient air [at 15°C (60°F)], but as the LNG's temperature rises, the gas becomes lighter than air. Determination of the potential for gas accumulation should be based on an engineering analysis. (Guidance for classification of hazardous locations is available in NFPA 497.)

Δ **A.7.7** Dynamic automotive emissions testing equipment located in stand-alone facilities dedicated to such equipment can qualify as being in an unclassified location and not subject to the special rules of Article 511 of *NFPA 70*. The same type of equipment, however, when installed within most repair garages, especially when located in a pit, has to be suitable for location within a Class I, Division 1 or Division 2 hazardous location as defined in 511.3(B) of *NFPA 70*.

A.8.2.1 The intent is that the electrical utilization equipment be placed below a volume located at the highest area of the building that is equal to 150 percent of the released volume of the largest CNG tank.

Δ **A.8.3.2** The equipment and installation requirements of *NFPA 70* differ from those of other international standards and equipment approved for use in areas where *NFPA 70* is not enforced might not be acceptable where *NFPA 70* is enforced. The designation and design, installation, and use of electrical equipment for classes and divisions in hazardous (classified) locations are defined in Articles 500, 501, and 504 of *NFPA 70*. The designation and design, installation, and use of electrical equipment for classes and zones in hazardous (classified) locations are defined in Article 505 of *NFPA 70*.

Δ **A.8.5.2** NFPA 77 contains information on this subject.

A.9.2.1 API RP 1621, *Recommended Practice for Bulk Liquid Stock Control at Retail Outlets,* provides information on this subject.

N **A.9.2.2.3.2** If the tank is situated in a dike, the dike wall meets this requirement. For secondary containment-type tanks, drainage, curbing, or other approved means can be used.

Δ **A.9.2.3.1** See Chapter 9 of NFPA 30 for further information.

A.9.2.5.4 The following language includes both the mandatory requirements and some optional text that could be used to comply with the requirements in 9.2.5.4:

WARNING

It is unlawful and dangerous to dispense gasoline into unapproved containers.
No smoking.
Stop motor.
No filling of portable containers in or on a motor vehicle.
Place container on ground before filling.
Discharge your static electricity before fueling by touching a metal surface away from the nozzle.
Before using pump, touch any metal on the car away from your vehicle's fuel filler with bare hand. This will discharge static electricity on your body. Failure to fully discharge may ignite gasoline vapors.
Do not re-enter your vehicle while gasoline is pumping. This can re-charge your body with static electricity. If you must re-enter your vehicle, discharge static electricity again before touching the pump nozzle.
If a fire starts, **do not** remove nozzle — back away immediately and tell attendant. If no attendant is on site, use the emergency shut-off button to stop pump.
Do not allow individuals under licensed age to use the pump.
Only persons of licensed age should use pump.
Keep children away from the pump area.
Do not allow children to use pump.

N **A.9.2.5.5** Many fuel stations display items such as wood, bagged ground cover, cartons of consumable products, and other combustibles that create vision obstructions, excessive fire load, and other hazards in and around dispensing islands and pumps.

A.9.5.6 Additional fire protection considerations can include fixed suppression systems, automatic fire detection, manual fire alarm stations, transmission of alarms to off-site locations, and limitation of the quantity of motor fuel delivered per transaction.

N **A.9.7.1.1** See A.7.1.

A.9.7.2.3 The ground wire should never be attached to the chassis if welding a fender, as the electrical resistance between the two could be sufficient to cause a fire or personal injury. The monorail and hoist should not be used as the ground side for the same reason.

A.11.2.2 Cases where the length of the supply line to dispensing devices would result in insufficient pressure for operational purposes or would increase the potential for leakage due to the increased number of fittings or exposure of the line can warrant location of the supply on the pier.

A.11.6 Where excessive stray currents are encountered, piping handling Class I and Class II liquids should be electrically isolated from the shore piping. This requirement prevents stray currents originating in the vessel's electrical system from causing an electrical arc or spark.

Δ **A.11.6.1** NFPA 77 contains information on this subject.

Δ **A.11.8.2** See Section 9.4 of NFPA 30 for further information.

N **A.12.2.3** Not all fuels have equipment that is currently listed. As technology develops, this provision will allow the authorities having jurisdiction (AHJ) the latitude to approve systems and equipment that cannot be currently listed.

N **A.12.2.4** See A.12.2.3.

A.12.3.4 The selection of the 6 m (20 ft) separation distance between storage containers of different gaseous fuels is based on long-standing requirements in NFPA 2, NFPA 52, and NFPA 58. The separation distance between containers storing gaseous fuels and liquid motor fuel dispensers is based on the maximum 18 ft length of dispenser hose attached to the liquid fuel dispenser and the potential for a liquid pool fire to affect the gaseous fuel storage containers.

Δ **A.12.6.2** The designation of classes and divisions of classified locations is defined in Article 500 of *NFPA 70*.

Δ **A.13.2.3.4** Vent sizes are based on limiting the internal pressure of the tank to a gauge pressure of 20.7 kPa (3.0 psi) [i.e., 120 percent of a gauge pressure of 17.2 kPa (2.5 psi)], which is the maximum internal pressure allowed for an atmospheric storage tank. This is based on an orifice coefficient of 0.8 and an environmental factor of 0.5. The 0.5 environmental factor recognizes the limited time that a small tank will be exposed to fire, loss of fuel by absorption into the soil, and drainage of liquid away from the tank. Calculations are based on 22.7.3 of NFPA 30.

Δ **A.13.2.3.9(1)** Timber supports are permitted in the exception to Section 22.5 of NFPA 30 and as extracted in NFPA 1.

N **A.14.1** This section addresses mobile refueling activities governed by NFPA 30A. Other local, state, and federal requirements might be applicable.

N **A.14.2.2** The safety and emergency response plan is intended to be completed, maintained, and updated by the mobile fueling operator to help ensure that fueling operations are conducted in a safe manner that is acceptable to the authority having jurisdiction. Such a plan might include some or all of the following elements:

(1) Written safety and emergency response plan that establishes policies and procedures for fire safety, spill prevention and control, personnel training, and compliance with other applicable requirements of this code.
(2) Where required by the authority having jurisdiction, a site plan for each location at which mobile fueling occurs. The site plan should be in sufficient detail to indicate all buildings, structures, lot lines, property lines, and appurtenances on site and their use or function; all uses adjacent to the lot lines of the site; fueling locations, the locations of all storm drain openings, and adjacent waterways or wetlands; information regarding slope, natural drainage, curbing, impounding, and how a spill will be retained upon the site property; and the scale of the site plan.
(3) If the authority having jurisdiction does not require site plans of approved fueling locations, the safety and emergency response plan should include guidelines for locations within the jurisdiction where mobile fueling can and cannot be provided, such as on residential streets, on school grounds, and so on.

N **A.14.2.3** In addition to any other training, education, and certifications that might be required by federal regulations and HAZCOM, the operator should also be trained on the requirements of this code.