

NFPA® 30A

Code for Motor Fuel Dispensing Facilities and Repair Garages

2024 Edition



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NFPA® 30A

Code for

Motor Fuel Dispensing Facilities and Repair Garages

2024 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 and acted on by the NFPA membership during the 2023 NFPA Technical Meeting held June 22. It was issued by the Standards Council on August 25, 2023, with an effective date of September 14, 2023, and supersedes all previous editions.

This edition of NFPA 30A was approved as an American National Standard on September 14, 2023.

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 1987 edition recognized unattended self-service fueling. The 1990 edition was prepared by the new Technical Committee on Automotive and Marine Service Stations and incorporated requirements for lubrication-only service facilities. The 1993 edition allowed aboveground fuel storage tanks at retail motor fuel dispensing facilities.

Significant revisions for the 1996 edition included a new chapter on marine motor fuel dispensing facilities, a new section on low-melting-point piping materials, and an increase in the maximum allowable aboveground fuel storage for Class II liquids (i.e., diesel fuel) at fleet refueling operations.

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

Major updates to the 2000 edition included revisions to minimum separation distances for aboveground storage tanks and establishing requirements for protected aboveground tanks, tanks and piping corrosion protection, and piping systems installation and testing. A new chapter established requirements for CNG, liquefied natural gas (LNG), and liquefied petroleum gas (LP-Gas).

The 2003 edition added 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.

For the 2008 edition all the technical specifications for tanks were removed and replaced by references to NFPA 30, *Flammable and Combustible Liquids Code*.

Significant changes to the 2012 edition included new requirements to address inspection, maintenance, and repair of fuel dispensing equipment, leak detection equipment, and secondary containment equipment. Extensive revisions were made to Chapter 8, *Electrical Installations*, which included adding a new area classification table with Zone system criteria, revising the drawing depicting the extent of area classification around fuel dispensing units, and adding a new diagram depicting the extent of area classification around tank-mounted fuel dispensing units.

Revisions for the 2015 edition clarified the code's scope statement, indicating that it applies to repair garages but not to aircraft fueling. Chapter 12 was revised to correlate the code with the source codes for the various alternative fuels (hydrogen, CNG, LNG, and LP-Gas).

Significant changes to the 2018 edition included a revision of the scope statement and the addition of a new chapter to include on-demand mobile fueling. In addition, a revision was made to change single-poppet type emergency shutoff valves to double-poppet-type emergency shutoff valves for pressurized liquid dispensing devices. The revisions also included adding requirements for leak detection devices to restrict or shut off fuel flow in remote/submersible pumps and for the mechanical or electrical isolation of fluid handling systems — other than fuel — when the emergency shutoff device is actuated. Major repair garages servicing hydrogen-fueled vehicles were required to meet the provisions of NFPA 2, *Hydrogen Technologies Code*. Additional requirements included sprinkler protection provisions for an entire building containing major repair garage operations and vapor removal at the ceiling level for areas where vehicles using lighter-than-air fuels are repaired. A new requirement prohibiting the storage or placement of merchandise within 6 m (20 ft) of any fuel dispenser was added.

Major changes to the 2021 edition included the revision of Chapters 7, 8, and 9 to include new requirements for repair garages and areas where CNG and LNG vehicles are serviced. These new and revised requirements covered the areas of building construction, electrical area classification, repair area classification for CNG and LNG vehicles, flammable gas detection, and purge ventilation. Requirements for mobile fueling on public streets were added to Chapter 14. Fire extinguisher requirements in Chapter 9 were revised to align with NFPA 10, *Standard for Portable Fire Extinguishers*, and to accommodate new provisions for alternate vehicle fuel protection.

For the 2024 edition requirements for mobile refueling in parking garages and fleet vehicle facility operation were introduced. A new chapter on mobile marine refueling was added. Tank overfill requirements were revised to make them consistent with federal rules.

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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.

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2024 Edition

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

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Information on referenced and extracted 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.

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, or where both gaseous fuel storage and dispensing equipment are at least 15 m (50 ft) from any other motor fuel storage or dispensing equipment of different chemical composition.

1.1.4 This code shall not apply to aircraft fueling.

N 1.1.5* This code shall not apply to mobile fueling operations involving liquefied petroleum gas (LP-Gas).

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.

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.

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

NFPA 2, *Hydrogen Technologies Code*, 2023 edition.

NFPA 10, *Standard for Portable Fire Extinguishers*, 2022 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 2022 edition.

NFPA 14, *Standard for the Installation of Standpipe and Hose Systems*, 2024 edition.

NFPA 30, *Flammable and Combustible Liquids Code*, 2024 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment*, 2020 edition.

NFPA 33, *Standard for Spray Application Using Flammable or Combustible Materials*, 2021 edition.

NFPA 51, *Standard for the Design and Installation of Oxygen-Fuel Gas Systems for Welding, Cutting, and Allied Processes*, 2023 edition.

NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, 2024 edition.

NFPA 52, *Vehicular Natural Gas Fuel Systems Code*, 2023 edition.

NFPA 54, *National Fuel Gas Code*, 2024 edition.

NFPA 55, *Compressed Gases and Cryogenic Fluids Code*, 2023 edition.

NFPA 58, *Liquefied Petroleum Gas Code*, 2024 edition.

NFPA 70®, *National Electrical Code®*, 2023 edition.

NFPA 72®, *National Fire Alarm and Signaling Code®*, 2022 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2022 edition.

NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment*, 2019 edition.

NFPA 85, *Boiler and Combustion Systems Hazards Code*, 2023 edition.

NFPA 86, *Standard for Ovens and Furnaces*, 2023 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, 2024 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Particulate Solids*, 2020 edition.

NFPA 101®, *Life Safety Code®*, 2024 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, 2024 edition.

NFPA 220, *Standard on Types of Building Construction*, 2024 edition.

NFPA 253, *Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source*, 2023 edition.

NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair*, 2020 edition.

NFPA 385, *Standard for Tank Vehicles for Flammable and Combustible Liquids*, 2022 edition.

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, 2023 edition.

2.3 Other Publications.

2.3.1 API Publications. American Petroleum Institute, 200 Massachusetts Avenue, NW, Suite 1100, Washington, DC 20001-5571.

API 607, *Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats*, 7th edition, 2016.

2.3.2 ASME Publications. American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016-5990.

ASME B31.3, *Process Piping*, 2019.

Boiler and Pressure Vessel Code, 2021.

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

ASTM D5/D5M, *Standard Test Method for Penetration of Bituminous Materials*, 2020.

ASTM D56, *Standard Test Method for Flash Point by Tag Closed Cup Tester*, 2021.

ASTM D93, *Standard Test Methods for Flash Point by Pensky-Martens Closed Cup Tester*, 2020.

ASTM D323, *Standard Method of Test for Vapor Pressure of Petroleum Products (Reid Method)*, 2020a.

ASTM D3278, *Standard Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus*, 2021.

ASTM D3828, *Standard Test Methods for Flash Point of Liquids by Small Scale Closed Cup Tester*, 2016a (reapproved 2021).

ASTM D4359, *Standard Test for Determining Whether a Material Is a Liquid or a Solid*, 2020.

2.3.4 CSA Group Publications. CSA Group, 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada.

CSA B51, *Boiler, Pressure Vessel, and Pressure Piping Code*, 2019.

CSA B401, *Vehicle Maintenance Facilities Code*, 2018.

CSA SPE-2.1 SERIES 18, *Best practices for defueling, decommissioning, and disposal of compressed natural gas vehicle fuel containers and liquefied natural gas vehicle fuel tanks*, 2018.

CSA SPE-2.2.1, *Best practices for CNG vehicle system leak inspection*, 2020.

2.3.5 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 79A, *Power-Operated Pumps for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*, 2015 (2020).

UL 87, *Power-Operated Dispensing Devices for Petroleum Products*, 2016.

UL 87A, *Power-Operated Dispensing Devices for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*, 2015 (2019).

UL 330A, *Outline of Investigation 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)*, 2019 (2020).

UL 567A, *Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*, 2015 (2019).

CAN/UL/ULC 842, *Valves for Flammable and Combustible Liquids*, 2020.

UL 842A, *Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*, 2015 (2019).

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

UL 2085, *Protected Aboveground Tanks for Flammable and Combustible Liquids*, 1997 (2010).

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

CAN/UL/ULC 2586, *Hose Nozzle Valves for Flammable and Combustible Liquids*, 2021.

UL 2586A, *Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*, 2015 (2019).

2.3.6 U.S. Government Publications. U.S. Government Publishing Office, 732 North Capitol Street, NW, Washington, DC 20401.

Title 49, Code of Federal Regulations, Part 571.108, “Lamps, Reflective Devices, and Associated Equipment.”

2.3.7 Other Publications.

Merriam-Webster’s Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2020.

2.4 References for Extracts in Mandatory Sections.

NFPA 30, *Flammable and Combustible Liquids Code*, 2021 edition.

NFPA 70®, *National Electrical Code®*, 2023 edition.

NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems*, 2023 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, 2021]

3.3.4 Combustible Liquid. See 3.3.9.1.

3.3.5* Container. A vessel of 450 L (119 gal) or less capacity used for transporting or storing liquids, excluding intermediate bulk containers. [30, 2021]

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 (Physical State). Any material that (1) has a fluidity greater than that of 300 penetration asphalt when tested in accordance with ASTM D5/D5M, *Standard Test Method 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, 2021]

3.3.9.1* Combustible Liquid. An ignitable liquid that is classified as a Class II or Class III liquid. (See 3.4.2.2 and 3.4.2.3.) [30, 2021]

3.3.9.2* Flammable Liquid. An ignitable liquid that is classified as a Class I liquid. (See 3.4.2.1.) [30, 2021]

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 is not a fleet vehicle motor fuel dispensing facility and 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, welding or grinding, and repairs that require draining or emptying 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 the associated floor space used for offices, parking, or showrooms.

3.3.12.3 CNG/LNG Vehicle Major Repair Area. A space within a repair garage where major repairs are performed on CNG and LNG vehicles.

3.3.12.4 CNG/LNG Vehicle Minor Repair Area. A space within a repair garage where only minor repairs are performed on CNG and LNG vehicles.

3.3.13 Safety Can. A listed container of not more than 20 L (5.3 gal) 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, *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 UL 2085, *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, 2021]

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, 2021]

3.3.18* Vapor Recovery System. A system designed to capture and retain, without processing, vapors displaced during transfer or filling operations. [30, 2021]

3.4 Definition and Classification of Liquids.

3.4.1 Scope. This chapter shall establish a uniform system of classifying ignitable (flammable or combustible) liquids for proper application of this code. [30:4.1]

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 Class I Liquids.

- ▲ **3.4.2.1.1** A liquid with a closed-cup flash point below 37.8°C (100°F) shall be designated as a Class I liquid (i.e., flammable liquid), 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 276 kPa (40 psi) at 37.8°C (100°F), as determined by ASTM D323, *Standard Test Method for Vapor Pressure of Petroleum Products (Reid Method)*. [30:4.2.1.1]

3.4.2.1.2 Class I liquids shall be further subclassified in accordance with the following: (1) *Class IA Liquid*. A liquid that has a flash point below 22.8°C (73°F) and a boiling point below 37.8°C (100°F); (2) *Class IB Liquid*. A liquid that has a flash point below 22.8°C (73°F) and a boiling point at or above 37.8°C (100°F); (3) *Class IC Liquid*. A liquid that has a flash point at or above 22.8°C (73°F), but below 37.8°C (100°F). [30:4.2.1.2]

- Δ **3.4.2.2 Class II Liquids.** A liquid with a closed-cup flash point at or above 37.8°C (100°F) but below 60°C (140°F) shall be designated as a Class II liquid (i.e., combustible liquid), as determined by the test procedures and apparatus set forth in 3.4.3. [30:4.2.2]

3.4.2.3 Class III Liquids.

- Δ **3.4.2.3.1** A liquid with a closed-cup flash point at or above 60°C (140°F) shall be designated as a Class III liquid (i.e., combustible liquid), as determined by the test procedures and apparatus set forth in 3.4.3. [30:4.2.3.1]

3.4.2.3.2 Class III liquids shall be further subclassified in accordance with the following: (1) *Class IIIA Liquid*. A liquid that has a flash point at or above 60°C (140°F), but below 93°C (200°F); (2) *Class IIIB Liquid*. A liquid that has a flash point at or above 93°C (200°F). [30:4.2.3.2]

3.4.3 Determination of Flash Point (FP). 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]

- Δ **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 40°C (104°F) or below 9.5 centiStokes at 25°C (77°F) 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, *Standard Test Method for Flash Point by Tag Closed Cup Tester*, even if they otherwise meet the viscosity criteria. [30:4.4.1.1]

3.4.3.1.2 Such liquids as stated in 3.4.3.1.1 shall be tested in accordance with 3.4.3.2. [30:4.4.1.2]

3.4.3.2 The flash point of a liquid having a viscosity of 5.5 centiStokes or more at 40°C (104°F) or 9.5 centiStokes or more at 25°C (77°F) or a flash point of 93.4°C (200°F) 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 0°C (32°F) and 110°C (230°F) and viscosities below 150 Stokes at 25°C (77°F). [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 ignitable 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 m³/min of exhaust per m² of floor area (1 cfm per ft²), but not less than 4 m³/min (150 ft³/min).

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.

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

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.

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.

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.

4.3.2.8 Spill Control.

4.3.2.8.1 Aboveground tanks not installed in vaults shall be provided with spill control that meets the requirements of 21.7.1 and Section 22.11 of NFPA 30.

4.3.2.8.2 Tank fill connections shall be provided with a noncombustible spill containment device.

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, *Below-Grade Vaults for Flammable Liquid Storage Tanks*. Vaults shall be permitted to be either above or below grade.

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.

^aSee 4.3.2.3 and 4.3.2.5.

^bSee 4.3.2.6.

^cIncluding the opposite side of a public way.

^dThe 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.

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.

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]

Δ 4.3.3.6.1 Vaults that contain tanks storing Class I liquids [FP < 37.8°C (100°F)] shall be ventilated at a rate of not less than 0.3 m³/min/m² of floor area (1 cfm/ft²), but not less than 4 m³/min (150 cfm). [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]

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

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 backup. [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]

Δ 4.3.3.7.3 Vapor detectors shall be located no higher than 300 mm (12 in.) 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]

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 m (0 ft), 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]

4.3.4 Fire-Resistant Tanks. Fire-resistant tanks shall be tested and listed in accordance with UL 2080, *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 UL 2085, *Protected Aboveground Tanks for Flammable and Combustible Liquids*. [30:22.10.1]

Δ **4.3.5.1** Protected aboveground 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 144°C (260°F) and a single point maximum rise of 204°C (400°F) and to prevent release of ignitable (flammable or combustible) 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 2085.
- (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.

Δ **4.3.6.3**

N **4.3.6.3.1** Means shall be provided to sound an audible alarm when the liquid level in the tank reaches no more than 90 percent of capacity.

N **4.3.6.3.2** Means shall be provided to automatically stop the flow of liquid into the tank when the liquid level in the tank reaches no more than 95 percent capacity.

N **4.3.6.3.3** Tanks storing Class IIIB liquids with deliveries less than 95 L (25 gal) at one time shall not be required to comply with 4.3.6.3.1 and 4.3.6.3.2.

N **4.3.6.3.4** 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.

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 Security.

4.3.7.1.1 Tanks that are not enclosed in vaults shall be enclosed by a perimeter property security fence or a separate chain link fence, at least 1.8 m (6 ft) high, or provided with equivalent security provisions approved by the authority having jurisdiction.

4.3.7.1.2 The perimeter property security fence or separate chain link fence shall be separated from the tanks by at least 3 m (10 ft).

4.3.7.1.3 Gates in perimeter property security fences shall be secured against unauthorized entry.

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.

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.

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.

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.

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

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 horizontal 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 Quarter-turn Valves and Valves Equipped with Nonmetallic Seats*.

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

5.4 Testing.

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.

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 for the specific purpose and in accordance with the following:

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

- (2) UL 87A, *Power-Operated Dispensing Devices for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*
- (3) UL 330A, *Outline of Investigation 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)*
- (4) UL 567A, *Emergency Breakaway Fittings, Swivel Connectors and Pipe-Connection Fittings for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*
- (5) UL 842A, *Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*
- (6) UL 2586A, *Hose Nozzle Valves for Gasoline and Gasoline/Ethanol Blends with Nominal Ethanol Concentrations up to 85 Percent (E0–E85)*

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.

6.3.9.1 The emergency shutoff valve shall be installed in accordance with the manufacturer's instructions.

6.3.9.2 The emergency shutoff valve shall not incorporate a slip-joint feature.

6.3.9.3 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 CAN/UL/ULC 842, Valves for Flammable and Combustible Liquids, 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 Leak Detection.

6.4.2.1 Where all discharge piping is not visible, each pump shall have installed on the discharge side a listed leak detection device that will provide an audible indication or a visible indication or that will restrict or shut off the flow of product if the piping or a dispenser is leaking.

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

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.

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 CAN/UL/ULC 842, Valves for Flammable and Combustible Liquids; or CAN/UL/ULC 2586, Hose Nozzle Valves for Flammable and Combustible Liquids, 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 Automatic Closing Valve.

6.6.3.1 Overhead-type dispensing devices shall be provided with a listed, automatic closing-type hose nozzle valve without a latch-open device.

6.6.3.2 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.

6.7.1 Fuel dispensing systems shall be provided with one or more clearly identified emergency shutoff devices or electrical disconnects.

Δ 6.7.2 At least one emergency shutoff device or electrical disconnect shall be installed in approved locations not less than 6 m (20 ft) or more than 30 m (100 ft) from the fuel dispensing devices that they serve.

N 6.7.3 Additional shutoff devices or electrical disconnects shall be permitted to be located less than 6 m (20 ft) or greater than 30 m (100 ft) from an individual dispenser.

Δ 6.7.4 Emergency shutoff devices or electrical disconnects shall disconnect power to all dispensing devices not supplied by circuits that are identified to be intrinsically safe; to all remote pumps serving the dispensing devices; to all associated power, control, and signal circuits; to all other electrical equipment in the hazardous (classified) locations; and to electrical receptacles over or adjacent to the hazardous (classified) locations.

6.7.5 Emergency shutoff devices or electrical disconnects shall mechanically or electrically isolate other fluid transfer systems serving the fuel dispensing area.

6.7.6 Intrinsically safe electrical equipment shall not be required to be disconnected by the emergency shutoff device or the electrical disconnect.

6.7.7 When more than one emergency shutoff device or electrical disconnect is provided, all devices shall be interconnected.

6.7.8 Resetting from an emergency shutoff condition shall require manual intervention.

6.7.9 The manner of resetting shall be approved.

6.7.10 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.

6.7.11 Unattended Motor Fuel Dispensing Facilities.

6.7.11.1 At unattended motor fuel dispensing facilities, the devices or disconnects shall be readily accessible to patrons.

6.7.11.2 At least one additional device or disconnect shall be readily accessible to each group of dispensing devices on an individual island.

6.7.11.3 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.

7.1.1 Major repair garages that also repair vehicles powered by hydrogen shall meet the requirements of both NFPA 2 and NFPA 30A.

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

7.1.3 Garages for major and minor repairs of CNG and LNG vehicles shall meet the requirements of Section 7.8.

7.1.4 Repair garages that repair vehicles powered by LP-Gas shall meet the requirements of NFPA 58.

7.1.5 Repair garages and repair areas that have more than one type of fuel present shall comply with the applicable provisions of this code for each type of fuel present.

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.

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

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 Number of Vehicles Simultaneously Served.

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

7.3.6.6.2 Where only Class II and Class III liquids are dispensed at fleet vehicle motor fuel dispensing facilities, the number of vehicles serviced at any one time shall be permitted to be increased to 12.

7.3.6.7* Mechanical Exhaust System.

7.3.6.7.1 A mechanical exhaust system that serves only the fuel dispensing area shall be provided when two or more sides of the dispensing area are not open to the building exterior.

7.3.6.7.2 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 ignitable 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 m³/min/m² (1 ft³/min/ft²) of floor area, based on the fuel dispensing area.
- (5) The exhaust system shall meet all applicable requirements of NFPA 91.

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. This section shall cover repair garages where CNG and LNG vehicles are not present.

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.

7.4.2 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.

7.4.3 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 7.4.3.1.

7.4.3.1 Slip-resistant, nonabsorbent, interior floor finishes having a critical radiant flux not less than 0.45 W/cm² (9.87 Btu/in.²-hr), as determined by NFPA 253, shall be permitted.

7.4.3.2 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.

7.4.3.3 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.

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

7.4.4.1 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.

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

7.4.4.3 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.

7.4.4.4 Pits, belowgrade work areas, and subfloor work areas shall be provided with exhaust ventilation at a rate of not less than $0.3 \text{ m}^3/\text{min}/\text{m}^2$ ($1 \text{ ft}^3/\text{min}/\text{ft}^2$) 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.

7.4.5 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.

7.4.6 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.

7.4.6.1 System Design.

7.4.6.1.1 The flammable gas detection system shall be calibrated to the types of fuels or gases used by the vehicles to be repaired.

7.4.6.1.2 The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL).

7.4.6.2 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

7.4.6.3 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.

7.4.6.4 System Integrity. The circuits of the detection system required by 7.4.6 shall be monitored for integrity in accordance with NFPA 72.

7.5* Heating, Ventilating, and Air Conditioning.

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 Listing and Restricted Locations.

7.6.2.1 Heat-producing appliances shall be listed for use in classified areas.

7.6.2.2 Solid fuel stoves, improvised furnaces, salamanders, and space heaters shall not be permitted in areas of repair garages used for repairing or servicing of vehicles or in a fuel dispensing area.

7.6.2.3 Heat-producing equipment in 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, shall be listed.

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 ignitable 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.

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.

7.8 Repair Garages and Repair Areas for CNG and LNG Vehicles.

7.8.1 Applicability.

7.8.1.1 This section shall apply to the construction of new buildings, existing buildings, and portions of buildings serving as repair garages and repair areas for CNG and LNG vehicles.

7.8.1.2 Major and minor repair areas, as defined in 7.8.4 for CNG and LNG vehicle repair, shall meet the requirements of Section 7.8.

7.8.2 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.

7.8.3 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.

7.8.4 Definition and Classification of Repair Areas Serving CNG and LNG Vehicle Repair.

7.8.4.1 Applicability. This section shall classify repair areas for CNG and LNG vehicles based on vehicle fuel system pressure status and permissible repair activities.

7.8.4.2 CNG Repair Area Classification. CNG vehicle repair areas shall be classified according to Table 7.8.4.2.

7.8.4.3 LNG Repair Area Classification. LNG vehicle repair areas shall be classified according to Table 7.8.4.3.

7.8.4.3.1 All vehicles upon first entering the facility shall have a tank pressure less than 65 percent of the tank maximum allowable working pressure (MAWP) as per the *ASME Boiler Pressure Vessel Code*.

7.8.4.3.2 High-pressure fuel systems shall be depressurized in accordance with the original equipment manufacturers' recommended maintenance procedures.

7.8.5 Drainage. In areas of repair garages used for repair or servicing of vehicles, floor assemblies shall be constructed of noncombustible materials or combustible materials.

7.8.5.1 If combustible materials are used in the floor assembly, they shall meet the provisions of 7.8.5.2.

7.8.5.2 Combustible materials used in the floor assembly shall be surfaced with approved, nonabsorbent, noncombustible material, except as indicated in 7.8.5.3.

7.8.5.3 Major repair garages and major repair areas serving LNG-fueled vehicles shall comply with the following:

- (1) Floor drains shall be designed with consideration for spilled LNG entering the drain.
- (2) Drains shall be designed to prevent excessive pressure buildup.
- (3) Drains shall not allow the migration of gas or liquid to adjacent areas of the facility.

7.8.5.4 Where installed, slip-resistant, nonabsorbent interior floor finishes shall have a critical radiant flux of not less than 0.45 W/cm² (9.87 Btu/in.²-hr), as determined by NFPA 253.

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

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

Table 7.8.4.2 Repair Area Classification Assignment for CNG Vehicles

Vehicle Status – Fuel System Pressure (psig) (Not to Exceed 3600 psig)	Type of Repair	Minimum Repair Area Classification
≤500	Minor ongoing repair work or unattended vehicle storage while undergoing minor repair	Minor repair area
≤500	Major ongoing repair work or unattended vehicle storage while undergoing major repair	Major repair area
>500	Ongoing major or minor repair work or unattended vehicle storage while undergoing major or minor repair	Major repair area

Table 7.8.4.3 Repair Area Classification Assignment for LNG Vehicles

Vehicle Status		Type of Vehicle Repair	Minimum Repair Area Classification
Vehicle Fuel System Pressure Status (psig)	Vehicle Fuel System Liquid Content Status (Onboard Fuel)		
<65% of tank MAWP*	Any liquid volume	Minor ongoing repair work or unattended vehicle storage while undergoing minor repair	Minor (ongoing repair work) or major repair area (unattended vehicle storage)
		Major ongoing repair work or unattended vehicle storage while undergoing major repair	Major repair

* See 7.8.4.3.1 and 7.8.4.3.2

7.8.6 Construction Requirements of CNG and LNG Repair Areas. In repair garages or areas where CNG or LNG vehicles are repaired, all the applicable requirements of NFPA 52 shall be met.

7.8.7 Roofs and Ceilings — Major and Minor Repair Areas.

7.8.7.1 Roof and ceiling structures — and their accessories or attachments — shall be constructed to not impede the free movement of gas toward ventilation fans and gas sensor locations.

7.8.7.2* Where gas movement in roof and ceiling structures is impeded, provisions to mitigate gas holdup shall be made.

7.8.8 Walls and Partitions — Major and Minor Repair Areas.

7.8.8.1* Walls and partitions separating major repair areas from other repair spaces, including mechanical equipment rooms, shall be constructed to minimize the migration of natural gas to the other repair spaces.

7.8.8.2 Walls and partitions separating major repair areas from occupied spaces other than repair areas shall be gastight.

7.8.8.3 Walls and partitions shall have a fire resistance rating of not less than 1 hour as defined in NFPA 101 or as determined in accordance with the adopted building code.

7.8.8.4 Penetrations of gastight walls for ducts, pipes, conduits, and structural members shall be sealed to prevent migration of natural gas.

7.8.8.5 Hinged doors separating major repair areas from all other interior areas shall be in accordance with the following:

- (1) Be self-closing and equipped with seals
- (2) Not be equipped with baffles, louvers, or other penetrations

7.8.8.6 Rollup doors separating major repair areas from all other interior areas shall remain closed when not in use.

7.8.8.7 Windows located in walls or partitions separating major repair areas from other spaces shall be self-closing or non-opening.

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

Δ 7.8.9.1 Pits, belowgrade work areas, and subfloor work areas in LNG vehicle repair areas shall meet the requirements of 7.4.4.

Δ 7.8.9.2 Pits used in major repair garages for LNG vehicles shall have a continuous ventilation system as per Table 8.3.3 or a ventilation system that is initiated automatically upon the detection of a gas concentration of 25 percent of the lower flammable limit (LFL).

7.8.9.3 Pit ventilation systems shall have provisions for manual activation inside and outside of the pit.

7.8.9.4 Manual activation shall not defeat the automatic activation stipulated in 7.8.9.2.

7.8.10 Fixed Fire Protection. CNG and LNG vehicle repair areas shall meet the requirements of 7.4.5.

7.8.11 Gas Detection System. Repair areas and overnight vehicle storage areas in garages servicing CNG and LNG vehicles shall be provided with an approved flammable gas detection system.

7.8.11.1 System Design. The flammable gas detection system shall be calibrated to the types of fuels or gases used by the vehicles to be repaired.

7.8.11.1.1 The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the LFL.

7.8.11.1.2 Gas detection shall also be provided in lubrication or chassis repair pits in buildings serving LNG vehicles.

7.8.11.2* Operation. Activation of the gas detection system shall result in all of the following automatic actions:

- (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) De-energization of all spark-producing electrical systems and components and motors within 455 mm (18 in.) of the ceiling

- (4) Activation of the purge ventilation system as specified in 7.8.12.4

7.8.11.3 Failure of the Gas Detection System.

7.8.11.3.1 Failure of the gas detection system shall result in the deactivation of the heating system and the activation of the mechanical ventilation system.

7.8.11.3.2 Where the ventilation system is interlocked with gas detection, failure of the gas detection system shall cause a trouble signal to sound in an approved location.

7.8.11.4 System Integrity. The circuits of the detection system required by 7.8.9 shall be monitored for integrity.

7.8.12 Heating, Ventilating, and Air Conditioning

7.8.12.1 Heating, ventilating, and air conditioning of repair garages and repair areas for servicing CNG and LNG vehicles shall meet the requirements of 7.5.1, 7.5.2, and 7.5.3.

7.8.12.2 Exhaust duct openings shall be located so that they effectively remove vapor accumulation at floor level from all parts of the floor area.

7.8.12.3 Exhaust duct openings shall be located so that they effectively remove vapor accumulations at the ceiling level within 455 mm (18 in.) of the ceiling.

7.8.12.4 Where required, purge ventilation shall comply with 7.8.12.4.1, 7.8.12.4.2, and 7.8.12.4.3.

7.8.12.4.1 Capacity. The purge ventilation capacity required for major repair areas shall be determined in accordance with the maintenance room volume as per Table 7.8.12.4.1.

7.8.12.4.2* Minor Repair Areas. For minor repair areas, a minimum purge ventilation rate of two air changes per hour (ACH) shall be provided.

7.8.12.4.3 Minimum Ventilation.

7.8.12.4.3.1 Ventilation shall meet the requirements of applicable mechanical standards, building codes, or local regulations.

7.8.12.4.3.2 In no case shall ventilation be less than 0.5 ACH.

7.8.12.4.3.3 Natural or mechanical ventilation shall extract air from within 0.5 m (20 in.) of the ceiling.

Table 7.8.12.4.1 Minimum Purge Ventilation Requirements for Major Repair Areas

Minimum Air Changes per Hour (ACH)	Major Repair Area Volume, V (m^3)
10.0	$V < 400$
8.5	$400 \leq V < 800$
7.0	$800 \leq V < 1600$
6.0	$1600 \leq V < 3200$
5.0	$3200 \leq V < 6400$
4.5	$6400 \leq V < 12800$
4.0	$V \geq 12800$

Source: Canadian Standards Association B401, *Vehicle Maintenance Facilities Code*, Table 4, 2018.

7.8.13 Heat-Producing Appliances and Other Sources of Ignition.

7.8.13.1 Heat-producing appliances shall be listed and installed in accordance with the manufacturer's instructions, governing codes, and the requirements of this section.

7.8.13.2 Solid fuel stoves, improvised furnaces, salamanders, and portable space heaters shall not be permitted.

7.8.13.3 The following shall be considered potential sources of ignition and prohibited from locations as specified elsewhere in this code for CNG and LNG vehicle repair areas:

- (1) Open flame heaters
- (2) Heating systems and other equipment either not employing sealed combustion or with exposed surface temperatures exceeding 399°C (750°F)
- (3) Unit heaters
- (4) Water heaters not employing sealed combustion
- (5) Fired pressure washers
- (6) Arcing and sparking tools or equipment
- (7) Gas-fired cutting torches

7.8.13.4 Fired Heating Equipment.

7.8.13.4.1 Fired heating equipment installed in minor repair areas for CNG and LNG vehicles shall meet the following requirements:

- (1) Fired heating equipment shall be located with flame and combustion air inlet elevation a minimum of 0.61 m (24 in.) above the floor level and a minimum of 1.1 m (42 in.) below the ceiling.
- (2) Fired heating equipment and its combustion air intake shall not be located directly above where a vehicle is normally parked for servicing.
- (3) Fired heating equipment shall be located a minimum horizontal distance of 1 m from all parts of the vehicle.

7.8.13.4.2 Where permitted by the manufacturer's installation instructions, 7.8.13.4.1 shall not apply to radiant heaters with surface temperatures not exceeding 399°C (750°F).

7.8.14 CNG and LNG Defueling Equipment.

7.8.14.1 General.

7.8.14.1.1 Installation of equipment for defueling CNG and LNG vehicles for repair and other purposes shall be in accordance with the following requirements:

- (1) Defueling equipment and installations shall be designed in accordance with applicable codes and standards.
- (2) Defueling equipment and installations shall be approved by the authority having jurisdiction.
- (3) Defueling and captive vent systems and equipment shall be designed to recover, store, flare, or vent gas in a safe manner.
- (4) Where gas is vented, the vent outlet shall comply with the following:
 - (a) Be a minimum of 4.5 m (15 ft) away from building ventilation and heating and air-conditioning exhaust and intake locations
 - (b) Be at a minimum elevation of 3 m (10 ft) above surrounding buildings or equipment within 15 m (50 ft) of the vent location

- (c) Be directed in a vertically upward direction
- (d) Have an electrical area classification in accordance with Table 8.3.3

7.8.14.1.2 The defueling of CNG and LNG vehicles shall be conducted in accordance with manufacturer's instructions.

7.8.14.1.3 In the absence of manufacturer's instructions, the defueling of CNG and LNG vehicles shall be conducted in accordance with CSA SPE-2.1 SERIES 18, *Best practices for defueling, decommissioning, and disposal of compressed natural gas vehicle fuel containers and liquefied natural gas vehicle fuel tanks*.

7.8.14.2 Defueling equipment and captive vent piping systems shall be designed in accordance with CSA B51, *Boiler, Pressure Vessel, and Pressure Piping Code*, or ASME B31.3, *Process Piping*, where applicable.

7.8.14.3 The location of defueling equipment shall consider the safe movement and parking of the defueling vehicle, as well as other vehicular traffic.

7.8.14.4 Defueling equipment shall be protected from vehicle impact.

7.8.14.5 The flexible hoses of the defueling equipment shall be designed to minimize the potential for hose contact with the ground, accidental hose damage, and tripping hazards.

7.8.14.6 Bonding and Grounding.

7.8.14.6.1 All defueling equipment, hoses, and piping systems shall be bonded to a common ground.

7.8.14.6.2 Convenient bonding of vehicle fuel containers to decanting equipment shall be provided.

7.8.14.6.3 The defueling hose shall be electrically conductive.

7.8.14.7 Captive Vent Systems.

7.8.14.7.1 Major and minor repair areas that have LNG vehicles parked for extended periods of time shall have provisions for a captive vent system to safely vent boil-off gas from the vehicle fuel container to a safe outdoor location.

7.8.14.7.2 The captive vent system shall be designed with engineering supervision.

7.8.14.7.3 The LNG captive vent system shall meet the following requirements:

- (1) The captive vent system shall be designed for cryogenic temperatures and have a design pressure rating in accordance with the highest potential vent flow pressure.
- (2) The captive vent piping system shall be without any in-line valves.
- (3) A single captive vent shall not serve more than one vehicle fuel container.
- (4) The captive vent systems using cryogenic flexible hoses shall be designed to minimize the potential for hose contact with the floor, accidental hose damage, and tripping hazards.
- (5) The captive vent system hoses and piping systems shall be electrically conductive and grounded.
- (6) Convenient bonding of the vehicle fuel container to the captive vent system shall be provided.

Chapter 8 Electrical Installations

8.1 Scope. This chapter shall apply to the installation of electrical wiring and electrical utilization equipment in the following locations:

- (1) In areas where liquids are stored, handled, or dispensed
- (2) In repair garages and in repair areas for CNG and LNG vehicles

8.2 General Requirements.

8.2.1 Electrical wiring and electrical utilization equipment shall be of a type specified by and installed in accordance with *NFPA 70*.

8.2.2 Electrical wiring and electrical utilization equipment shall be approved for the locations in which they are installed.

8.3 Installation in Classified Locations.

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 8.3.3 and in *NFPA 70*.

8.3.1.1 The use of consumer-grade mobile devices for the purpose of communicating with the fuel dispenser within the hazardous location shall not be prohibited.

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

8.3.3* Table 8.3.3, Figure 8.3.3(a), and Figure 8.3.3(b) 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.

8.3.4 Shop-fabricated secondary containment tanks used for storing Class I motor fuels in a Class I, Division 2 location shall be limited to 450 mm (18 in.) from the tank.

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

8.3.6 The area classifications given in Table 8.3.3 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.

8.3.7 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.

8.3.8 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.

8.3.9 For CNG and LNG vehicle repair areas, all purge ventilation electrical systems and components shall meet the requirements of Zone 2 or Class I, Division 2.

Table 8.3.3 Class I Locations — Motor Fuel Dispensing Facilities

Location	Class I		Extent of Classified Location ^a
	Division (Group D)	Zone (Group IIA)	
<i>Dispensing device</i> (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 a 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 the 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 the dispenser enclosure
<i>Dispensing device</i> (overhead type) ^d	1	1	Space within dispenser enclosure and all electrical equipment integral to 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 the edge of the dispenser enclosure
<i>Repair garage, major^e</i> (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 7.4.4.4)
	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 the 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
Specific areas adjacent to classified locations	2	2	Within 0.9 m (3 ft) of any fill or dispensing point, extending in all directions
	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 that are 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
<i>Repair garage, minor^e</i> (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 the 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 7.4.4.4)
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 that are 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
<i>Repair garage or repair area, major^e</i> (where lighter-than-air gaseous fueled ^g vehicles are repaired or stored) (see 3.3.12.1)	2	2	Within 450 mm (18 in.) of the ceiling, except as noted below
	Unclassified	Unclassified	Within 450 mm (18 in.) of the 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

(continues)

Table 8.3.3 *Continued*

Location	Class I		Extent of Classified Location ^a
	Division (Group D)	Zone (Group IIA)	
<i>Repair garage or repair area, major</i> (where LNG vehicles are repaired or stored) (see 3.3.12.1)	2	2	Within 450 mm (18 in.) of the ceiling, except as noted below
	2	2	Within 450 mm (18 in.) above floor level
	1	1	Entire space within any pit, belowgrade work area, or subfloor work area that is not 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 7.4.4.4)
	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 7.4.4.4)
	Unclassified	Unclassified	Within 450 mm (18 in.) of the ceiling 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 450 mm (18 in.) of the highest point in the ceiling
Defueling and captive vent outlet	1	1	1.5 m (5 ft) in all directions from vent outlet
	2	2	Beyond 1.5 m (5 ft) in all directions up to 4.5 m (15 ft) from vent outlet
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 that are 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
<i>Remote pump</i>			
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 the pump
	2	2	Within 900 mm (3 ft) of any edge of the pump, extending horizontally in all directions
	2	2	Up to 450 mm (18 in.) above grade level, extending 3 m (10 ft) horizontally in all directions from any edge of the pump
Indoor	1	1	Entire space within any pit
	2	2	Within 1.5 m (5 ft) of any edge of the 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 the pump
<i>Sales, storage, rest rooms</i> (including structures, such as the attendant's kiosk, on or adjacent to dispensers)	Unclassified	Unclassified	Except as noted below
	1	1	Entire volume, if there is any opening to the room within the extent of a Division 1 or Zone 1 location
	2	2	Entire volume, if there is any opening to the room within the extent of a Division 2 or Zone 2 location
<i>Tank, aboveground</i>			
Inside tank	1	0	Entire inside volume
Shell, ends, roof, dike area	1	1	Entire space within the dike, where the dike height exceeds the distance from the tank shell to inside of the dike wall for more than 50 percent of the tank circumference
	2	2	Entire space within the dike, where the dike height does not exceed the distance from the tank shell to the inside of the dike wall for more than 50 percent of the tank circumference
Vent	2	2	Within 3 m (10 ft) of shell, ends, or roof of tank
	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
<i>Tank, aboveground, shop-fabricated, secondary containment tank used for the storage of Class I motor fuels</i>			
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 the vent, extending in all directions
	2	2	Between 1.5 m and 3 m (5 ft and 10 ft) from open end of the vent, extending in all directions

(continues)

Table 8.3.3 *Continued*

Location	Class I		Extent of Classified Location ^a
	Division (Group D)	Zone (Group IIA)	
<i>Tank, underground</i>			
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
Vent	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
	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
<i>Vapor processing system</i>			
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; and (3) houses any equipment used to transfer or process vapors
Equipment in protective enclosures	2	2	Entire space within enclosure
Equipment <i>not</i> 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 mm (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 <i>not</i> 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
<i>Vault</i>	1	1	Entire interior space, if Class I liquids are stored within

^aFor marine application, *grade level* means the surface of a pier, extending down to water level.

^bRefer to Figures 8.3.3(a) and 8.3.3(b) for illustrations of classified locations around dispensing devices.

^cArea classification inside the dispenser enclosure is covered in UL 87, *Power-Operated Dispensing Devices for Petroleum Products*.

^dCeiling-mounted hose reel.

^eThe terms *repair garage, major* and *repair garage, minor* are intended to correlate with Article 511.3 of NFPA 70. For the purposes of the application of this table, these terms do not include associated floor space used for offices, parking, or showrooms.

^fIncludes draining of Class I liquids from vehicles.

^gIncludes fuels such as hydrogen and natural gas, but not LP-Gas.

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.

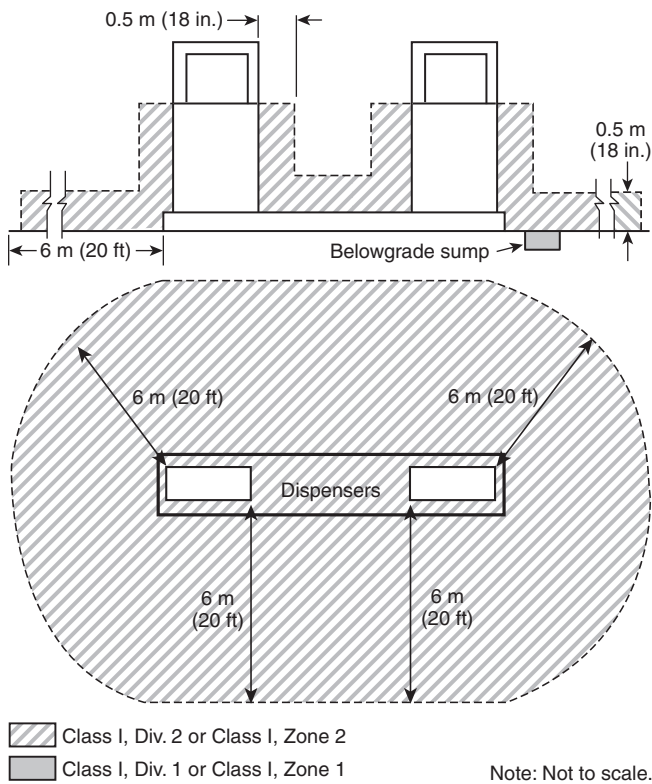


FIGURE 8.3.3(a) Classified Areas Adjacent to Dispensers.

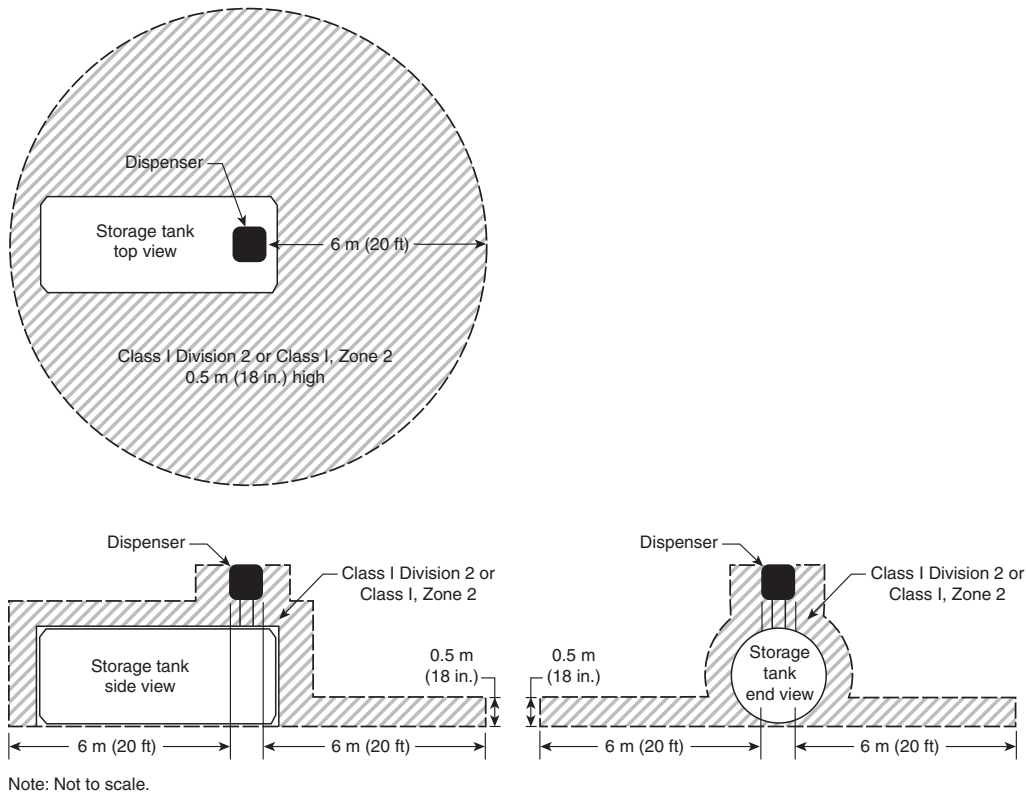


FIGURE 8.3.3(b) Classified Areas Adjacent to Dispenser Mounted on Aboveground Storage Tank.

Chapter 9 Operational Requirements

9.1 Scope. This chapter applies to those requirements that relate to the operation of motor fuel dispensing facilities, fuel dispensing systems, repair garages, and repair areas.

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.

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.

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

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 Delivery Vehicle Location.

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

9.2.2.4.2 Where fuel dispensing facilities are located inside buildings, the fuel delivery vehicle shall be permitted to be located off premises at approved locations.

9.2.2.4.3 Existing fuel dispensing facilities shall not be required to meet 9.2.2.4.1.

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.

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

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.

Δ 9.2.5.1 Sources of Ignition. Lit smoking materials or igniters, including electronic cigarettes, shall not be used within 6 m (20 ft) of areas used for fueling, servicing fuel systems of internal combustion engines, or receiving or dispensing of Class I and Class II liquids.

N 9.2.5.2* Continuing Operation. The engines of all equipment or vehicles being fueled shall be shut off except where continuing operation is essential for protecting life, property, or the environment.

9.2.5.3* Fire Extinguishers.

9.2.5.3.1 Portable fire extinguishers shall be selected, installed, inspected, and maintained in accordance with NFPA 10 and 9.2.5.3.2 through 9.2.5.3.5.

9.2.5.3.2 All portable fire extinguishers installed to achieve compliance with this code shall be a minimum of 4.54 kg (10 lb) ABC dry chemical having an agent discharge rate of 0.45 kg/sec (1 lb/sec) or greater.

9.2.5.3.3 The maximum travel distance from a minimum 9.1 kg (20 lb) ABC dry chemical extinguisher having an agent discharge rate of 0.45 kg/sec (1 lb/sec) or greater shall be permitted to be 30.5 m (100 ft).

9.2.5.3.4 New Fire Extinguishers. Installed fire extinguishers, including replacements or exchanges, shall meet the requirements of 9.2.5.3.

9.2.5.3.5 Repair Garages.

9.2.5.3.5.1 At least one portable fire extinguisher shall be provided in any repair garage.

9.2.5.3.5.2* The maximum travel distance from any point in the vehicle service area to a portable fire extinguisher shall not exceed 15 m (50 ft).

9.2.5.3.6 Indoor Liquid Motor Fuel Dispensing Areas.

9.2.5.3.6.1 At least one portable fire extinguisher shall be provided at a position no less than 4.6 m (15 ft) but no more than 15 m (50 ft) from the fuel dispenser and within the identified path of egress from the fuel dispensing area.

9.2.5.3.6.2 An additional compliant extinguisher shall be provided within the egress path in cases where the travel distance and the egress requirements cannot be simultaneously met.

9.2.5.3.7 Outdoor Liquid Motor Fuel Dispensing Areas. At least one portable fire extinguisher shall be provided at all fuel dispensing islands, or group of islands, so as not to exceed a maximum travel distance of 23 m (75 ft) to any single portable fire extinguisher.

9.2.5.3.8 Gaseous Fuel Dispensing Areas. At least one portable fire extinguisher shall be provided for each gaseous fuel dispenser or group of dispensers so as not to exceed a maximum travel distance of 15 m (50 ft) but not less than 4.6 m (15 ft) to any single portable fire extinguisher.

9.2.5.4 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.

9.2.5.5* 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.

9.2.5.6* Display of Materials. The storage or placement for display or sale of products shall be prohibited within 6 m (20 ft) of any fuel dispenser.

N 9.2.5.6.1 Display of Merchandise. The display for retail sale of uncartoned Class III combustible liquids not exceeding 94.6 L (25 gal) in total shall be permitted not less than 1.5 m (5 ft) from any fuel dispenser and not be more than 1.5 m (5 ft) in height.

N 9.2.5.6.1.1 Where multiple displays are present no single display shall exceed 94.6 L (25 gal) in total volume.

N 9.2.5.6.1.2 Multiple displays shall be at least 6 m (20 ft) from any adjacent displays.

N 9.2.5.6.1.3 Merchandise other than uncartoned Class III combustible liquids shall not be displayed, stored, or placed within 6 m (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.

9.2.6.2 Crankcase drainings and waste liquids shall be stored in approved tanks or containers outside any building or in tanks installed in accordance with Chapters 4 and 5 until they can be removed from the premises.

9.2.6.3 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.

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 9.2.5.5, 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.

N 9.6 Operating Requirements for Fleet Vehicle Motor Fuel Dispensing Facilities.

N 9.6.1 The dispensing of motor fuels shall be conducted only by employees or other authorized affiliates of the business or operation.

N 9.6.2 If dispensing is conducted after normal working hours of the facility or when normal facility telecommunications are not available for use, then 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.

N 9.6.3 A listed, automatic closing-type hose nozzle valve that meets the requirements of 6.6.2 and has a latch-open device shall be provided.

N 9.6.4 Operating instructions shall be conspicuously posted in the dispensing area.

N 9.6.4.1 The instructions in 9.6.4 shall include the location of emergency controls and a requirement that the user stay outside of their vehicle and in view of the fueling nozzle during dispensing.

N 9.6.5 In addition to the warning signs specified in 9.2.5.5, emergency instructions shall be conspicuously posted in the dispenser area.

N 9.6.5.1 The instructions in 9.6.5 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.

9.7 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 9.7.1 through 9.7.9 have been met.

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

9.7.2 The tank vehicle shall comply with the requirements of NFPA 385.

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

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

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

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

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

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

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

N 9.7.10 Portable Fire Extinguishers.

N 9.7.10.1 Fuel delivery tank vehicles shall be provided with at least one portable fire extinguisher selected, installed, inspected, and maintained as required by NFPA 10.

N 9.7.10.2 The fire extinguisher shall be a minimum 9.1 kg (20 lb) ABC dry chemical agent type and shall also be rated with an agent discharge rate of 0.45 kg/sec (1 lb/sec) or greater.

N 9.7.10.3 The fire extinguisher shall be readily accessible from the ground level whenever fuel dispensing or tank filling is under way.

N 9.7.10.4 Installed fire extinguishers, including replacements or exchanges, shall meet the requirements of 9.7.10.

9.8 Repair Areas.

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

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

9.8.1.2 Major repair and minor repair of CNG and LNG vehicles shall comply with Sections 7.8 and 8.3 of this code.

9.8.2 Welding and Open Flame Operations.

9.8.2.1 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.

9.8.2.2 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.

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

9.8.2.4 Compressed gases shall be stored in accordance with Chapter 4 of NFPA 51 and Chapters 4 and 7 of NFPA 55.

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

9.8.2.6 Exterior storage of cylinders shall comply with NFPA 51 and Chapters 4 and 7 of NFPA 55.

9.8.3 Spray Painting and Undercoating.

9.8.3.1 Spray painting shall meet the requirements of NFPA 33.

9.8.3.2 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.

9.8.3.3 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.

9.8.3.4 Undercoating spray operations that do not meet the requirements of 9.8.3.3 shall meet all requirements of NFPA 33.

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

9.8.5 Repair of Fuel Tanks Containing Flammable or Combustible Liquids.

9.8.5.1 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.

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

9.8.5.3 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.

9.8.5.4 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.

9.8.6 Parts Cleaning.

9.8.6.1 Cleaning of parts shall be performed with a nonflammable solvent or combustible liquid that has a flash point above 37.8°C (100°F) (closed cup) and used where there is adequate ventilation in the cleaning area and no sources of ignition are present.

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

- (1) NFPA 31
- (2) NFPA 54

9.8.6.2.1 The heating devices described in 9.8.6.2 shall be installed in accordance with the requirements of Section 7.6.

9.8.6.3 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.

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

9.8.7 Chassis Cleaning.

9.8.7.1 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.

9.8.7.2 Steam cleaning devices shall be of an approved type.

9.8.8 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.

9.8.9 Housekeeping.

9.8.9.1 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.

9.8.9.2 Clear aisle space shall be maintained to permit ready access to and the use of **firefighting** equipment.

9.8.9.3 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.

9.8.9.4 Metal lockers shall be provided for employees' clothes.

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

9.8.9.6 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.

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

9.9 LNG Vehicle Fueling System Monitoring and Management.

9.9.1* Repairs to LNG vehicles lasting 8 hours or more shall require pressure monitoring and management of the LNG tank.

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 ignitable 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 and in accordance with the following:

- (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

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 ignitable 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 ignitable 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.

11.2.3 Pumps that are not integral to the dispensing device shall also be located on shore or on a pier of the solid-fill type.

11.2.4 Where tanks are located on a pier not of the solid-fill type, tanks shall be permitted with AHJ approval, providing the tank does not exceed 4164 L (1100 gal) aggregate capacity and meets Chapters 4 and 5 and NFPA 30.

11.2.5 Tanks at Elevation.

11.2.5.1 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.

11.2.5.2 This device shall be located adjacent to and downstream of the outlet valve specified by 22.13.1 of NFPA 30.

11.2.5.3 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 struc-

ture 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.

11.3.6 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.

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.

11.4.1.1 Where hoses are attached to a hose-retrieving mechanism in a marine motor fuel dispensing facility, a listed emergency breakaway device shall not be required between the point of attachment of the hose-retrieving mechanism to the hose and the hose nozzle valve.

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.

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 protected from a release 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* **Continuing Operation.** The engines of all equipment and vessels being fueled shall be shut off, except where continuing operation is essential for protecting life, property, or the environment.

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 Portable Fire Extinguishers.

11.7.1 Portable fire extinguishers shall be selected, installed, inspected, and maintained in accordance with *NFPA 10* and 11.7.1.1 through 11.7.1.3.

N 11.7.1.1 All portable fire extinguishers installed to achieve compliance with this code shall be a minimum 9.1 kg (20 lb) ABC dry chemical type having an agent discharge rate of 0.45 kg/sec (1 lb/sec) or greater.

N 11.7.1.2 The maximum travel distance to any single fire extinguisher shall not exceed 30 m (100 ft) as measured along the designated walkways and aisles of the dock, pier, wharf, or bulkhead.

N 11.7.1.3 The maximum travel distance measurement shall not include traversing stairs, steps, ladders, or a gantry but can include walking ramps.

N 11.7.1.4 Fire extinguishers shall be required to comply with 11.7.1.1 through 11.7.1.3 when installed, replaced, or exchanged.

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*.

Δ 11.7.3 Materials shall not be placed on a pier in such a manner that they obstruct access to firefighting equipment or important piping system control valves.

N 11.7.3.1 Where the pier is accessible to vehicular traffic, an unobstructed roadway to the shore end of the wharf shall be maintained for access by firefighting 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.

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 LP-Gas

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.

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.

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.

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.

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 6.4 of NFPA 58.

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).

12.3.4.1 Dispensers and aboveground tanks storing CNG, LNG, or LP-Gas shall not require separation if handling fuels of the same chemical composition.

12.3.4.2 Where dispensers and aboveground tanks storing CNG, LNG, or LP-Gas 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 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.

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 ignitable 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.

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 cm³ (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.

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.

N 12.7 Leak Inspection of CNG Vehicles.

N 12.7.1 The leak inspection of CNG vehicles shall be conducted in accordance with manufacturer's instructions.

N 12.7.2 In the absence of manufacturer's instructions, the defueling of CNG vehicles shall be conducted in accordance with CSA SPE-2.2.1, *Best practices for CNG vehicle system leak inspection*.

Chapter 13 Farms and Remote Sites

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.

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) indi-

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

vidual capacity or capacities that meet the requirements of 13.2.3

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

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 mm² (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.

13.2.3.1 Tanks shall be of single-compartment design and meet the requirements of Sections 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.

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

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.

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.
- (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.

Chapter 14 On-Demand Mobile Fueling

14.1* Scope. This chapter applies to the practice of mobile fueling of motor vehicles while the motor vehicle being fueled is parked.

14.1.1 This chapter shall not apply to the following:

- (1) Fueling from tank vehicles at commercial, industrial, governmental, or manufacturing establishments in accordance with Section 9.7.
- (2) Fueling from portable containers in cases of emergency or for personal use.

14.1.2 Dispensing Class I and Class II Liquids for On-Demand Mobile Fueling.

14.1.2.1 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 Sections 14.2 through 14.4 have been met.

14.1.2.2 The dispensing of all other motor fuels from mobile refueling vehicles into the fuel tank of a motor vehicle shall be permitted only if the following requirements are met:

- (1) Completion of a risk assessment and operating plan addressing the identified hazards
- (2) Approval of the authority having jurisdiction

14.2 Approvals and Mobile Fueling Locations.

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.

14.2.2 Mobile fueling operations shall occur only at approved locations.

14.2.3* Safety and Emergency Response Plan.

14.2.3.1 The authority having jurisdiction shall be permitted to require a safety and emergency response plan for locations where mobile fueling is approved.

14.2.3.2 When required, the safety and emergency response plan shall be available on each mobile fueling vehicle.

14.2.4 Training.

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

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

14.2.5* Mobile fueling shall not take place within 7.6 m (25 ft) of buildings, property lines, or combustible storage.

14.2.6 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.

Δ 14.2.7 Buildings and Parking Structures. Mobile fueling operations shall be prohibited in buildings and in parking structures.

N 14.2.7.1* Mobile fueling operations shall be permitted in open parking structures when approved.

N 14.2.7.2* When approved, mobile fueling operations conducted in above-ground open parking structures shall comply with 14.2.7.2.1 through 14.2.7.2.16 in addition to the other requirements of this chapter.

N 14.2.7.2.1* Open parking structures shall meet the definition in the jurisdiction's adopted building code.

N 14.2.7.2.2 Mobile fueling shall not occur in parking garages where other occupancies exist above or below.

N 14.2.7.2.3 Mobile fueling operations shall not occur within 7.6 m (25 ft) of attached occupancies.

N 14.2.7.2.4 Means shall be provided to prevent liquid spills from leaving the dispensing area.

N 14.2.7.2.5 The attendant shall remain at the dispensing nozzle during fuel flow.

N 14.2.7.2.6 The mobile refueling vehicle shall not be parked in the parking structure when not performing a dispensing event.

N 14.2.7.2.7 Mobile fueling vehicles shall comply with Section 14.3.

N 14.2.7.2.8 Operations shall comply with Section 14.4.

N 14.2.7.2.9* Mobile fueling vehicles shall be positioned in a manner to preclude vehicles from driving over the dispensing hose.

N 14.2.7.2.10 Fuel dispensing shall occur at street level.

N 14.2.7.2.11 The mobile refueling vehicle and the vehicle being fueled shall both be on the same level within the structure.

N 14.2.7.2.12* Fuel dispensing shall occur no more than 15 m (50 ft) from openings in exterior walls where the openings are accessible to firefighting apparatus.

N 14.2.7.2.12.1 Openings in 14.2.7.2.12 that are exterior walls shall be adjacent to roads, ways, or public streets.

N 14.2.7.2.13 The simultaneous fueling of more than one vehicle from a single mobile fueling vehicle shall be prohibited.

N 14.2.7.2.14 Operators shall place a drip pan or absorbent pad under each fuel fill opening prior to and during dispensing operations.

N 14.2.7.2.14.1 Drip pans and absorbent pads shall be safely removed from the site and handled and disposed of in accordance with local and state requirements.

N 14.2.7.2.15 Mobile fueling vehicles shall be equipped with a listed shutoff valve assembly and a fuel limit switch set to a maximum of 57 L (15 gal).

N 14.2.7.2.16 The authority having jurisdiction shall be authorized to specify time-of-day and day-of-week limitations on mobile fueling operations.

14.2.8 Mobile fueling operations shall be prohibited on public streets and public ways unless approved by the authority having jurisdiction.

14.2.9* Where approved by the authority having jurisdiction, mobile fueling operations conducted on public streets and public ways shall comply with Chapter 14 and the following:

- (1) The dispensing hose shall not cross an active traffic lane or vehicle pathway.
- (2)* The mobile fueling vehicle and the dispensing hose shall not encumber a marked pedestrian crossing or bicycle lane or obstruct a pedestrian walkway.
- (3) The mobile fueling vehicle's hazard warning signal and flashers shall be activated during dispensing operations.
- (4) The authority having jurisdiction shall be authorized to specify time-of-day and day-of-week limitations on mobile fueling operations.

14.3 Mobile Fueling Vehicles and Equipment.

Δ 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 7274 L (1600 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

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

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

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

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

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

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

14.3.8 Mobile fueling vehicles shall be provided with at least one portable fire extinguisher selected, installed, inspected, and maintained as required by NFPA 10.

14.3.8.1 The extinguisher shall be a minimum 4.5 kg (10 lb) ABC dry chemical agent-type and shall also be rated with an agent discharge rate of 0.45 kg/sec (1 lb/sec) or greater.

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.

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

14.3.11 The mobile fueling vehicles shall be fitted with 360-degree retro reflective tape or markings in compliance with 49 CFR 571.108, "*Lamps, Reflective Devices, and Associated Equipment*."

14.4 Operations.

14.4.1 Nighttime deliveries shall be made only in areas deemed adequately lighted by the authority having jurisdiction. The source of lighting shall be permitted to originate from the mobile fueling vehicle.

14.4.2 The mobile fueling vehicle's hazard warning signal and flashers shall be activated during dispensing operations.

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

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

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.

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

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

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

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

14.4.10 Inspection Program.

14.4.10.1 The mobile fueling operator shall have in place an approved vehicle inspection program.

14.4.10.2 Vehicles shall be inspected prior to each shift with records available to the AHJ upon request.

14.4.11 Operations Using Metal Safety Cans.

14.4.11.1 All metal safety cans shall be listed.

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

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

N Chapter 15 Marine Mobile Fueling

N 15.1 Scope. This chapter shall apply to the practice of the dispensing of Class I, II, and III liquid fuels from a mobile fueling vehicle into the tank(s) of a marine pleasure craft, recreation vessels, personal watercraft, and commercial marine vessels less than 272 metric tons (300 tons).

N 15.1.1 This chapter shall not apply to the following:

- (1) Marine fueling in accordance with Sections 11.8 or 11.9
- (2) Fueling from portable containers in cases of emergency for personal use

N 15.1.2* Marine 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.