



Tentative Interim Amendment

NFPA® 1

Fire Code

2024 Edition

Reference: (NFPA 58 extracts) 2.4, Various paragraphs in 3.3 and Chapters 42, 50 and 69
TIA 24-5
(SC 23-8-20 / TIA Log #1709)

Note: Text of the TIA was issued and approved for incorporation into the document prior to printing.

1. *Revise section 2.4 to read as follows:*

2.4 References for Extracts in Mandatory Sections.

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NFPA 58, *Liquefied Petroleum Gas Code*, 2020/2024 edition.

...

2. *Revise various paragraphs in section 3.3 to read as follows:*

3.3.18 ASME. American Society of Mechanical Engineers. [58, 2020/2024] (FCC-HAZ)

3.3.74.1 ASME Container. A container constructed in accordance with the ASME Code. [58, 2020/2024]

3.3.74.6 [LP-Gas] Container. Any vessel, including cylinders, tanks, portable tanks, and cargo tanks, used for the transporting or storing of LP-Gases. [58, 2020/2024] (FCC-HAZ)

3.3.145 Gallon, U.S. Standard. 1 U.S. gal = 0.833 Imperial gal = 231 in.³ = 3.785 L. [58, 2020/2024] (FCC-HAZ)

3.3.147.9* Liquefied Petroleum Gas (LP-Gas). Any material having a vapor pressure not exceeding that allowed for commercial propane that is composed predominantly of the following hydrocarbons, either by themselves (except propylene) or as mixtures: propane, propylene, butane (normal butane or isobutane), and butylenes. [58, 2020/2024] (FCC-HAZ)

A.3.3.147.9 Liquefied Petroleum Gas (LP-Gas). In the pure state propylene (Chemical Abstract Service 105-07-01) has a vapor pressure of 132.8 psig (915.72 kPa) at 70°F (21.1°C). The vapor pressure of commercial propane (Chemical Abstract Service 74-98-6) at 70°F (21.1°C) is 124 psig (855 kPa). Although commercial propane can contain some propylene, as in impurity, propylene in the pure state does not meet the definition of LP-Gas.

Propylene in the pure state is commonly found in use as an industrial fuel gas. (See NFPA 51.) [58, 2020/2024]

3.3.307 Water Capacity. The amount of water at 60°F (16°C) required to fill a container. [58, 2020/2024] (FCC-HAZ)

3. *Revise various paragraphs in Chapter 42 to read as follows:*

42.11.2 Liquefied Petroleum Gas (LP-Gas).

42.11.2.1 Fuel dispensing facilities for vehicles using LP-Gas shall comply with NFPA 58 and 42.11.2.

42.11.2.2 Scope.

42.11.2.2.1* Chapter 11 of NFPA 58 applies to engine fuel systems installed on mobile and nonstationary engines and off-road vehicles using LP-Gas in internal combustion engines, including containers, container appurtenances, carburetion equipment, piping, hose and fittings, and their installation. [58:11.1.1]

A.42.11.2.2.1 Chapter 11 of NFPA 58 covers engine fuel systems for engines installed on vehicles for any purpose, as well as fuel systems for portable engines. This includes containers, container appurtenances, carburetion equipment, piping, hose, and fittings. [58:A.11.1.1]

42.11.2.2.2* Chapter 11 of NFPA 58 applies to the installation of fuel systems supplying engines used to propel motorized vehicles as defined in 42.11.2.2.1. [58:11.1.3]

A.42.11.2.2.2 Containers for engine fuel systems can be of the permanently installed or exchange type. [58:A.11.1.3]

42.11.2.2.3 Chapter 11 of NFPA 58 applies to garaging of vehicles where such systems are installed. [58:11.1.4]

42.11.2.3 Training. Each person engaged in installing, repairing, filling, or otherwise servicing an LP-Gas engine fuel system shall be trained in accordance with Section 4.4 of NFPA 58. [58:11.2]

42.11.2.4 Industrial (and Forklift) Trucks Powered by LP-Gas:

42.11.2.4.1 Scope. Paragraph 42.11.2.4 applies to LP-Gas installation on industrial trucks (including forklift trucks), both to propel them and to provide the energy for their materials handling attachments. [58:11.11.1]

42.11.2.4.2 Operations. The operation of industrial trucks (including forklift trucks) powered by LP-Gas engine fuel systems shall comply with 42.11.2.4.2.1 through 42.11.2.4.2.3. [58:11.11.4]

42.11.2.4.2.1 Industrial trucks shall be refueled outdoors. [58:11.11.4.1]

42.11.2.4.2.2 Where cylinders are exchanged indoors, the fuel piping system shall be equipped to minimize the release of fuel when cylinders are exchanged, in accordance with either of the following:

- (1) Using an approved quick-closing coupling in the fuel line
- (2) Closing the shutoff valve at the fuel cylinder and allowing the engine to run until the fuel in the line is exhausted [58:11.11.4.2]

42.11.2.4.2.3 Where LP-Gas fueled industrial trucks are used in buildings or structures, the following shall apply:

- (1) The number of fuel cylinders on such a truck shall not exceed two.
- (2) The use of industrial trucks in buildings frequented by the public, including those times when such buildings are occupied by the public, shall require the approval of the AHJ.
- (3) The total water capacity of the fuel cylinders on an individual truck shall not exceed 105 lb (48 kg) [nominal 45 lb (20 kg) propane capacity].
- (4) Trucks shall not be parked and left unattended in areas occupied by or frequented by the public without the approval of the AHJ. If left unattended with approval, the cylinder shutoff valve shall be closed.
- (5) In no case shall trucks be parked and left unattended in areas of excessive heat or near sources of ignition. [58:11.11.4.3]

42.11.2.4.2.4 All cylinders used in industrial truck service (including forklift truck cylinders) shall have the cylinder pressure relief valve replaced in accordance with 5.9.2.14 of NFPA 58. [58:11.11.4.4]

42.11.2.5 General Provisions for Vehicles With Having Engines Mounted on Them (Including Floor Maintenance Machines):

42.11.2.5.1 Scope.

42.11.2.5.1.1 Paragraph 42.11.2.5 applies to the installation of equipment on vehicles that supply LP-Gas as a fuel for engines installed on these vehicles. [58:11.12.1.1]

42.11.2.5.1.2 Vehicles include floor maintenance and any other portable mobile unit, whether the engine is used to propel the vehicle or is mounted on it for other purposes. [58:11.12.1.2]

42.11.2.5.2 General Requirements.

42.11.2.5.2.1 Industrial trucks (including forklift trucks) and other engines on vehicles operating in buildings other than those used exclusively to house engines shall have an approved automatic shutoff valve installed in the fuel system. [58:11.12.2.1]

42.11.2.5.2.2 The source of air for combustion shall be isolated from the driver and passenger compartment, ventilating system, or air conditioning system on the vehicle. [58:11.12.2.2]

42.11.2.5.2.3 Non-self-propelled floor maintenance machinery (floor polishers, scrubbers, buffers) and other similar portable equipment shall be listed. [58:11.12.2.3]

42.11.2.5.2.3.1 A label shall be affixed to the machinery or equipment, with the label facing the operator, with the text denoting that the cylinder or portion of the machinery or equipment containing the cylinder shall be stored in accordance with Chapter 8 of NFPA 58. [58:11.12.2.3(A)]

42.11.2.5.2.3.2 The use of floor maintenance machines in buildings frequented by the public, including the times when such buildings are occupied by the public, shall require the approval of the AHJ. [58:11.12.2.3(B)]

42.11.2.6 Garaging of Vehicles. Where vehicles with LP-Gas engine fuel systems mounted on them, and general-purpose vehicles propelled by LP-Gas engines, are stored or serviced inside garages, the following conditions shall apply:

- (1) The fuel system shall be leak-free.
- (2) The container shall not be filled beyond the limits specified in Chapter 7 of NFPA 58.
- (3) The container shutoff valve shall be closed when the vehicle or the engine is being repaired, except when the engine is required to operate. Containers equipped with an automatic shutoff valve as specified in 11.4.1.7 of NFPA 58 satisfy this requirement.
- (4) The vehicle shall not be parked near sources of heat, open flames, or similar sources of ignition or near inadequately ventilated pits. [58:11.14]

4. Revise various paragraphs in Chapter 50 to read as follows:

50.8.4 Cooking Appliance Installation on Vehicles.

50.8.4.1 Subsection 50.8.4 shall apply to the installation of all appliances on vehicles. It shall not apply to engines.

[58:6.26.7.1]

50.8.4.2 All appliances covered by 50.8.4 installed on vehicles shall be approved. [58:6.26.7.2]

50.8.4.3 Where the device or appliance, such as a cargo heater or cooler, is designed to be in operation while the vehicle is in transit, means, such as an excess-flow valve, to stop the flow of gas in the event of a line break shall be installed.

[58:6.26.7.3]

50.8.4.4 Gas-fired heating appliances shall be equipped with shutoffs in accordance with 5.2324.78(A) of NFPA 58, except for portable heaters used with cylinders having a maximum water capacity of 2.7 lb (1.2 kg), portable torches, melting pots, and tar kettles. [58:6.26.7.4]

50.8.4.5 Gas-fired heating appliances, other than ranges and illuminating appliances installed on vehicles intended for human occupancy, shall be designed or installed to provide for a complete separation of the combustion system from the atmosphere inside the vehicle. [58:6.26.7.5]

50.8.4.6* Where unvented-type heaters that are designed to protect cargo are used on vehicles not intended for human occupancy, provisions shall be made to provide air from the outside for combustion and dispose of the products of combustion to the outside. [58:6.26.7.6]

A.50.8.4.6 Requirements for the design of containers are located in Section 5.2 of NFPA 58. Requirements for container appurtenances are located in Section 5.3.9 of NFPA 58. [58:A.6.26.7.6]

50.8.4.7 Appliances installed in the cargo space of a vehicle shall be readily accessible whether the vehicle is loaded or empty. [58:6.26.7.7]

50.8.4.8 Appliances shall be constructed or otherwise protected to minimize possible damage or impaired operation due to cargo shifting or handling. [58:6.26.7.8]

50.8.4.9 Appliances shall be located so that a fire at any appliance will not block egress of persons from the vehicle. [58:6.26.7.9]

50.8.4.10 A permanent caution plate shall be affixed to either the appliance or the vehicle outside of any enclosure. [58:6.26.7.10]

50.8.4.10.1 The caution plate shall be adjacent to the container(s). [58:6.26.7.10.1]

50.8.4.10.2 The caution plate shall include the following text:

CAUTION:

- (1) Be sure all appliance valves are closed before opening container valve.
- (2) Connections at the appliances, regulators, and containers shall be checked periodically for leaks with soapy water or its equivalent.
- (3) Never use a match or flame to check for leaks.
- (4) Container valves shall be closed when equipment is not in use.

[58:6.26.7.10.2]

50.8.4.11 Gas-fired heating appliances and water heaters shall be equipped with automatic devices designed to shut off the flow of gas to the main burner and the pilot in the event the pilot flame is extinguished. [58:6.26.7.11]

50.8.7.1 LP-Gas systems for mobile cooking operations shall comply with NFPA 58 and NFPA 96 and this section.

[96:17.7.1]

50.8.7.2 **Equipment Installation.** Equipment shall be installed in accordance with Section 6.20.21 of NFPA 58, 50.8.7.2.1, and 50.8.7.2.2. [58:6.26.6]

50.8.7.2.1 Installation shall be made in accordance with the manufacturer's recommendations and, in the case of approved equipment, as provided in the approval. [58:6.26.6.1]

50.8.7.2.2 Equipment installed on vehicles shall be protected against vehicular damage as provided for container appurtenances and connections in 50.8.7.4.7.5. [58:6.26.6.2]

50.8.7.4 LP-Gas Systems on Vehicles (Other than Engine Fuel Systems).

50.8.7.4.1* **Application.** Section 50.8.7.4 shall apply to the following:

- (1) Nonengine fuel systems on all vehicles
- (2) Installations served by exchangeable (removable) cylinder systems and by permanently mounted containers.

[58:6.26.1]

A.50.8.7.4.1 Typical nonengine fuel systems include those on commercial, industrial, construction, and public service vehicles such as trucks, semitrailers, trailers, portable tar kettles, road surface heating equipment, mobile laboratories, clinics, and mobile cooking units (such as catering and canteen vehicles). [58:A.6.26.1]

50.8.7.4.2 Nonapplication. Section 50.8.7.4 shall not apply to the following:

- (1) Systems installed on mobile homes
- (2) Systems installed on recreational vehicles
- (3) Cargo tank vehicles, including trailers and semitrailers, and similar units used to transport LP-Gas as cargo which are covered by Chapter 9 of NFPA 58.
- (4) LP-Gas engine fuel systems on the vehicles, which are covered by (see Chapter 11 of NFPA 58).

[58:6.26.2]

50.8.7.4.6 LP Gas supply system, including the containers, shall be installed either on the outside of the vehicle or in a recess or cabinet vaportight to the inside of the vehicle but accessible from and vented to the outside, with the vents located near the top and bottom of the enclosure and 3 ft (1 m) horizontally away from any opening into the vehicle below the level of the vents.

[58:6.26.3.3]

50.8.7.4.7 Containers shall be mounted securely on the vehicle or within the enclosing recess or cabinet. [58:6.26.3.4]

50.8.7.4.7.1 Containers shall be installed with road clearance in accordance with 11.8.3 of NFPA 58. [58:6.26.3.4.1(A)]

50.8.7.4.7.2 Fuel containers shall be mounted installed to prevent jarring loose and slipping or rotating, and the fastenings shall be designed and constructed to withstand, without permanent visible deformation, static loading in any direction equal to four times the weight of the container filled with fuel. [58:6.26.3.4.1(B)]

50.8.7.4.7.3 Where containers are mounted within a vehicle housing, the securing of the housing to the vehicle shall comply with this provision. Any removable portions of the housing or cabinet shall be secured while in transit. [58:6.26.3.4.1(C)]

50.8.7.4.7.4 Field welding on containers shall be limited to attachments to nonpressure parts such as saddle plates, wear plates, or brackets applied by the container manufacturer. [58:6.26.3.4.1(D)]

50.8.7.4.7.5 All container valves, appurtenances, and connections shall be protected to prevent damage from accidental contact with stationary objects; from loose objects, stones, mud, or ice thrown up from the ground or floor; and from damage due to overturn or similar vehicular accident. [58:6.26.3.4.1(E)]

50.8.7.4.7.6 Permanently mounted ASME containers shall be located on the vehicle to provide the protection specified in 50.8.7.4.7.5. [58:6.26.3.4.1(F)]

50.8.7.4.7.7 Cylinders shall have permanent protection for cylinder valves and connections. [58:6.26.3.4.1(G)]

50.8.7.4.7.8 Where cylinders are located on the outside of a vehicle, weather protection shall be provided. [58:6.26.3.4.1(H)]

50.8.7.4.7.9 Containers mounted on the interior of passenger-carrying vehicles shall be installed in compliance with Section 11.9 of NFPA 58. Pressure relief valve installations for such containers shall comply with 11.8.5 of NFPA 58.

[58:6.26.3.4.1(I)]

50.8.7.5 Installation of LP Gas Container Appurtenances.

50.8.7.5.1 Container appurtenances shall be installed in accordance with the following:

- (1) Pressure relief valve installation on ASME containers installed in the interior of vehicles complying with Section 11.9 of NFPA 58 shall comply with 11.8.5 of NFPA 58.
- (2) Pressure relief valve installations on ASME containers installed on the outside of vehicles shall comply with 11.8.5 of NFPA 58 and 50.8.7.4.6.
- (3) Main shutoff valves on containers for liquid and vapor shall be readily accessible.
- (4) Cylinders shall be designed to be filled in either the vertical or horizontal position, or if they are the universal type, they are permitted to be filled in either position.
- (5) All ASME container inlets, outlets, or valves installed in container inlets or outlets, except pressure relief devices and gauging devices, shall be labeled to designate whether they communicate with the vapor or liquid space.
- (6) Containers from which only vapor is to be withdrawn shall be installed and equipped with connections to minimize the possibility of the accidental withdrawal of liquid.

[58:6.26.4.1]

50.8.7.5.2 Propane containers shall be so located that the discharge from their pressure relief valves shall be not less than 3 ft (0.9 m) measured horizontally along the surface of the vehicle from any of the following located below the level of such discharge:

- (1) Openings into the vehicle
- (2) Propane burning appliance intake and exhaust vents
- (3) All combustion engine and hydronic heating appliance exhaust terminations

[96:17.7.4.2]

50.8.7.6 Regulators shall be installed in accordance with 6.10.2 of NFPA 58 and 50.8.7.6.1 through 50.8.7.6.5. [58:6.26.4.2]

50.8.7.6.1 Regulators shall be installed with the pressure relief vent opening pointing vertically downward to allow for drainage of moisture collected on the diaphragm of the regulator. [58:6.26.4.2(A)]

50.8.7.6.2 Regulators not installed in compartments shall be equipped with a durable cover designed to protect the regulator vent opening from sleet, snow, freezing rain, ice, mud, and wheel spray. [58:6.26.4.2(B)]

50.8.7.6.3 If vehicle-mounted regulators are installed at or below the floor level, they shall be installed in a compartment that provides protection against the weather and wheel spray. [58:6.26.4.2(C)]

50.8.7.6.4 Regulator compartments shall comply with the following:

- (1) The compartment shall be of sufficient size to allow tool operation for connection to and replacement of the regulator(s).
- (2) The compartment shall be vaportight to the interior of the vehicle.
- (3) The compartment shall have a 1 in.³ (650 mm³) minimum vent opening to the exterior located within 1 in. (25 mm) of the bottom of the compartment.
- (4) The compartment shall not contain flame or spark-producing equipment.

[58:6.26.4.2(D)]

50.8.7.6.5 A regulator vent outlet shall be at least 2 in. (51 mm) above the compartment vent opening. [58:6.26.4.2(E)]

50.8.7.7 Gas Piping

50.8.7.7.1 Piping shall be installed in accordance with 6.11.3 of NFPA 58 and 50.8.7.7.1.1 through 50.8.7.7.1.13.

[58:6.26.5.1]

50.8.7.7.1.1 Steel tubing shall have a minimum wall thickness of 0.049 in. (1.2 mm). [58:6.26.5.1(A)]

50.8.7.7.1.2 A flexible connector shall be installed between the regulator outlet and the fixed piping system to protect against expansion, contraction, jarring, and vibration strains. [58:6.26.5.1(B)]

50.8.7.7.1.3 Flexibility shall be provided in the piping between a cylinder and the gas piping system or regulator.

[58:6.26.5.1(C)]

50.8.7.7.1.4 Flexible connectors shall be installed in accordance with 6.11.6 of NFPA 58. [58:6.26.5.1(D)]

50.8.7.7.1.5 Flexible connectors longer than the length allowed in NFPA 58, or fuel lines that incorporate hose, shall be used only where approved. [58:6.26.5.1(E)]

50.8.7.7.1.6 The fixed piping system shall be designed, installed, supported, and secured to minimize the possibility of damage due to vibration, strains, or wear and to preclude any loosening while in transit. [58:6.26.5.1(F)]

50.8.7.7.1.7 Piping shall be installed in a protected location. [58:6.26.5.1(G)]

50.8.7.7.1.8 Where piping is installed outside the vehicle, it shall be installed as follows:

(1) Piping shall be under the vehicle and below any insulation or false bottom.

(2) Fastening or other protection shall be installed to prevent damage due to vibration or abrasion.

(3) At each point where piping passes through sheet metal or a structural member, a rubber grommet or equivalent protection shall be installed to prevent chafing.

[58:6.26.5.1(H)]

50.8.7.7.1.9 Gas piping shall be installed to enter the vehicle through the floor directly beneath or adjacent to the appliance served. [58:6.26.5.1(I)]

50.8.7.7.1.10 If a branch line is installed, the tee connection shall be located in the main gas line under the floor and outside the vehicle. [58:6.26.5.1(J)]

50.8.7.7.1.11 Exposed parts of the fixed piping system either shall be of corrosion-resistant material or shall be coated or protected to minimize exterior corrosion. [58:6.26.5.1(K)]

50.8.7.7.1.12 Hydrostatic relief valves shall be installed in isolated sections of liquid piping as provided in Section 6.15-16 of NFPA 58. [58:6.26.5.1(L)]

50.8.7.7.1.13 Piping systems, including hose, shall be pressure tested and proven free of leaks in accordance with Section 6.16-17 of NFPA 58. [58:6.26.5.1(M)]

50.8.7.7.2 There shall be no fuel connection between a tractor and trailer or other vehicle units. [58:6.26.5.2]

50.8.7.7.3

After installation or modification, piping systems (including hose) shall be proven free of leaks at not less than the normal operating pressure. [58:6.16.1.1]

50.8.7.7.4² Containers shall be designed, fabricated, tested, and marked (or stamped) in accordance with the regulations of the U.S. Department of Transportation (DOT 49 CFR); Federal Aviation Administration (FAA 14 CFR); Section VIII,

"Rules for the Construction of Unfired Pressure Vessels," of the ASME's *Boiler and Pressure Vessel Code*, Section VIII,

"Rules for the Construction of Unfired Pressure Vessels"; or the *API ASME Code for Unfired Pressure Vessels for Petroleum Liquids and Gases*, except for UG-125 through UG-136. [58:5.2.1.1]

A.50.8.7.7.4 Prior to April 1, 1967, regulations of the U.S. Department of Transportation were promulgated by the Interstate Commerce Commission. In Canada, the regulations of the Canadian Transport Commission apply and are available from the Canadian Transport Commission, Union Station, Ottawa, Canada. [58:A.5.2.1.1]

Construction of containers to the *API ASME Code for Unfired Pressure Vessels for Petroleum Liquids and Gases* has not been authorized after July 1, 1961. [58:A.5.2.1.1]

50.8.7.7.4.1 Used containers constructed to specifications of the Association of American Railroads shall not be installed. [58:5.2.1.1(A)]

50.8.7.7.4.2 Adherence to the applicable ASME Code case interpretations and addenda of the applicable ASME Code that have been adopted and published within by ASME 180 calendar days prior to the effective date of NFPA 58 shall be considered as compliance with the ASME Code. [58:5.2.1.1(B)]

50.8.7.7.4.3 Where containers fabricated to earlier editions of regulations, rules, or codes listed in 50.8.7.7.4, or to and of the Interstate Commerce Commission (ICC) *Rules for Construction of Unfired Pressure Vessels*, prior to April 1, 1967, are used, the requirements of Section 1.4 of NFPA 58 shall apply. [58:5.2.1.1(C)]

50.8.7.7.5 Containers that have been involved in a fire and show no distortion shall be requalified for continued service before being used or reinstalled. [58:5.2.1.2]

50.8.7.7.5.1 Cylinders shall be requalified by a manufacturer of that type of cylinder or by a repair facility approved by DOT. [58:5.2.1.2(A)]

50.8.7.7.5.2 ASME or API ASME containers shall be retested using the hydrostatic test procedure applicable at the time of the original fabrication. [58:5.2.1.2(D)]

50.8.7.7.5.3 All container appurtenances shall be replaced. [58:5.2.1.2(C)]

50.8.7.7.5.4 DOT 4E specification (aluminum) cylinders and composite cylinders involved in a fire shall be removed from service. [58:5.2.1.2(D)]

50.8.7.7.6 General Location of Cylinders Storage.

50.8.7.7.6.1 Cylinders in storage shall be located to minimize exposure to excessive temperature rises, physical damage, or tampering. [58:8.2.1.1]

50.8.7.7.6.2 Cylinders in storage having individual water capacity greater than 2.7 lb (1.1 kg) [nominal 1 lb (0.45 kg) LP-Gas capacity] shall be positioned so that the pressure relief valve is in direct communication with the vapor space of the cylinder. [58:8.2.1.2]

50.8.7.7.6.3 Cylinders stored in buildings in accordance with Section 8.3 of NFPA 58 shall not be located near exits, near stairways, or in areas normally used, or intended to be used, for the safe egress of occupants. [58:8.2.1.3]

50.8.7.7.6.4 If empty cylinders that have been in LP-Gas service are stored indoors, they shall be considered as full cylinders for the purposes of determining the maximum quantities of LP-Gas permitted by 8.3.1, 8.3.2.1, and 8.3.3.1 of NFPA 58. [58:8.2.1.4]

50.8.7.7.6.5 Cylinders shall not be stored on roofs. [58:8.2.1.5]

50.8.7.7.7 Protection of Valves on LP-Gas Cylinders in Storage.

50.8.7.7.7.1 Cylinder valves shall be protected as required by 5.2.6.1 and 7.2.2.5 of NFPA 58. [58:8.2.2.1]

50.8.7.7.7.2 Screw-on-type caps or collars shall be in place on all cylinders stored, regardless of whether they are full, partially full, or empty, and cylinder outlet valves shall be closed. [58:8.2.2.2]

50.8.7.7.7.3 Valve outlets on cylinders less than 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] shall be plugged, capped, or sealed in accordance with 7.2.2.5 of NFPA 58. [58:8.2.2.3]

50.8.7.8 Transportation of Cylinders.

50.8.7.8.1 Cylinders having an individual water capacity not exceeding 1000 lb (454 kg) [nominal 420 lb (191 kg) propane capacity], when filled with LP-Gas, shall be transported in accordance with the requirements of Section 9.3 of NFPA 58. [58:9.3.2.1]

50.8.7.8.2 Cylinders shall be constructed as provided in Section 5.2 of NFPA 58 and equipped in accordance with Section 5.9 of NFPA 58 for transportation as cylinders. [58:9.3.2.2]

50.8.7.8.3 The quantity of LP-Gas in cylinders shall be in accordance with Chapter 7 of NFPA 58. [58:9.3.2.3]

50.8.7.8.4 Cylinder valves shall comply with the following:

(1) Valves of cylinders shall be protected in accordance with 5.2.6.1 of NFPA 58.

(2) Screw-on-type protecting caps or collars shall be secured in place.

(3) The provisions of 7.2.2.5 of NFPA 58 shall apply.

[58:9.3.2.4]

50.8.7.8.5 The cargo space of the vehicle shall be isolated from the driver's compartment, the engine, and the engine's exhaust system. [58:9.3.2.5]

50.8.7.8.5.1 Open-bodied vehicles shall be considered to be in compliance with this provision. [58:9.3.2.5(A)]

50.8.7.8.5.2 Closed-bodied vehicles having separate cargo, driver, and engine compartments shall be considered to be in compliance with this provision. [58:9.3.2.5(B)]

50.8.7.8.5.3 Closed-bodied vehicles, such as passenger cars, vans, and station wagons, shall not be used for transporting more than 215 lb (98 kg) water capacity [nominal 90 lb (41 kg) propane capacity], but not more than 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] per cylinder, unless the driver and engine compartments are separated from the cargo space by a vaportight partition that contains no means of access to the cargo space. [58:9.3.2.5(C)]

50.8.7.8.6 Cylinders and their appurtenances shall be determined to be leak free before being loaded into vehicles. [58:9.3.2.6]

50.8.7.8.7 Cylinders shall be loaded into vehicles with flat floors or equipped with racks for holding cylinders. [58:9.3.2.7]

50.8.7.8.8 Cylinders shall be fastened in position to minimize the possibility of movement, tipping, and physical damage. [58:9.3.2.8]

50.8.7.8.9 Cylinders being transported by vehicles shall be positioned in accordance with Table 50.8.7.8.9. [58:9.3.2.9]

Table 50.8.7.8.9 Orientation of Cylinders on Vehicles

Propane Capacity of Cylinder		Open Vehicles	Enclosed Spaces of Vehicles
≤45	≤20	Any position	
>45	>20	Relief valve in communication with the vapor space	
≤1.2	≤1.9		Any position
>1.2	>1.9		Relief valve in communication with the vapor space

[58:Table 9.3.2.9]

50.8.7.8.10 Vehicles transporting cylinders where the total weight is more than 1000 lb (454 kg), including the weight of the LP Gas and the cylinders, shall be placarded as required by DOT regulations or state law. [58:9.3.2.10]

50.8.11 Parking, Servicing, and Repair.

50.8.11.1 Where vehicles with LP Gas fuel systems used for purposes other than propulsion are parked, serviced, or repaired inside buildings, the requirements of 50.8.11.2 through 50.8.11.4 shall apply. [58:6.26.8.1]

50.8.11.2 The fuel system shall be leak free, and the container(s) shall not be filled beyond the limits specified in Chapter 7 of NFPA 58. [58:6.26.8.2]

50.8.11.3 The container shutoff valve shall be closed, except that the container shutoff valve shall not be required to be closed when fuel is required for test or repair. [58:6.26.8.3]

50.8.11.4 The vehicle shall not be parked near sources of heat, open flames, or similar sources of ignition, or near unventilated pits. [58:6.26.8.4]

50.8.11.5 Vehicles having containers with water capacities larger than 300 gal (1.1 m³) shall comply with the requirements of Section 9.7 of NFPA 58. [58:6.26.8.5]

5. Revise various paragraphs in Chapter 69 to read as follows:

69.1.1.3 Stationary Installations. Plans for stationary installations utilizing storage containers with aggregate water capacity exceeding 4000 gal (15.2 m³), and all rooftop installations of ASME containers shall be submitted to the AHJ before the installation is started by the person or company that either installs or contracts to have the containers installed. [See also 6.22.11.1(F) of NFPA 58.] [58:4.3.1]

69.2.1.1 General.

69.2.1.1.1* Containers shall be designed, fabricated, tested, and marked (or stamped) in accordance with the regulations of the U.S. Department of Transportation (DOT 49 CFR); Federal Aviation Administration (FAA 14 CFR); Section VIII, "Rules for the Construction of Unfired Pressure Vessels," of the ASME's Boiler and Pressure Vessel Code; Section VIII, "Rules for the Construction of Unfired Pressure Vessels"; or the API-ASME Code for Unfired Pressure Vessels for Petroleum Liquids and Gases, except for UG-125 through UG-136. [58:5.2.1.1]

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A.69.2.1.1.1 Prior to April 1, 1967, regulations of the U.S. Department of Transportation were promulgated by the Interstate Commerce Commission. In Canada, the regulations of the Canadian Transport Commission apply and are available from the Canadian Transport Commission, Union Station, Ottawa, Canada. [58:A.5.2.1.1]

Construction of containers to the API-ASME Code for Unfired Pressure Vessels for Petroleum Liquids and Gases has not been authorized after July 1, 1961. [58:A.5.2.1.1]

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69.2.1.1.1.1 Used containers constructed to specifications of the Association of American Railroads shall not be installed. [58:5.2.1.1(A)]

69.2.1.1.1.2 Adherence to applicable ASME Code the case interpretations and addenda of the applicable ASME Code that have been adopted and published by ASME within 180 calendar days prior to the effective date of NFPA 58 shall be considered as compliance with the ASME Code. [58:5.2.1.1(B)]

69.2.1.1.1.3 The requirements of Section 1.4 shall apply Where containers are fabricated to earlier editions of regulations, rules, or codes listed in 69.2.1.1.1, and of to the Interstate Commerce Commission (ICC) Rules for Construction of Unfired Pressure Vessels; prior to April 1, 1967, are used, the requirements of Section 1.4 of NFPA 58 shall apply. [58:5.2.1.1(C)]

69.2.1.1.2 Containers that have been involved in a fire and show no distortion shall be requalified for continued service before being used or reinstalled. [58:5.2.1.2]

69.2.1.1.2.1

Cylinders shall be requalified by a manufacturer of that type of cylinder or by a repair facility approved by DOT. [58:5.2.1.2(A)]

69.2.1.1.2.2 ASME or API-ASME containers shall be retested using the hydrostatic test procedure applicable at the time of the original fabrication. [58:5.2.1.2(B)]

69.2.1.1.2.3 All container appurtenances shall be replaced. [58:5.2.1.2(C)]

69.2.1.1.2.4 DOT 4E specification (aluminum) cylinders and composite cylinders involved in a fire shall be permanently removed from service. [58:5.2.1.2(D)]

69.2.1.1.3 ASME paragraph U-68 or U-69 containers shall be permitted to be continued in use, installed, reinstalled, or placed back into service. Installation of containers shall be in accordance with all provisions listed in NFPA 58. (See Section 5.2, Table 5.2.4.3, Table 5.9.2.5(A), and Annex D of NFPA 58.) [58:5.2.1.3]

69.2.1.1.4 Containers that show excessive denting, bulging, gouging, or corrosion shall be removed from service. [58:5.2.1.4]

69.2.1.1.5 Except for containers used in cargo tank vehicle service, ASME containers of 3000 gal (11.4 m³) water capacity or less used to store anhydrous ammonia shall not be converted to LP-Gas fuel service. [58:5.2.1.5]

69.2.1.1.6 Repairs or alteration of a container shall comply with the regulations, rules, or code under which the container was fabricated. Repairs or alteration to ASME containers shall be in accordance with the NBBI/NB23, *National Board Inspection Code*. [58:5.2.1.6]

69.2.1.1.7 Field welding shall be permitted only on saddle plates, lugs, pads, or brackets that are attached to the container by the container manufacturer. [58:5.2.1.7]

69.2.1.1.8 Containers for general use shall not have individual water capacities greater than 120,000 gal (454 m³). [58:5.2.1.8]

69.2.1.1.9 Dispensing systems not located in LP-Gas bulk plants, or industrial plants, or industrial applications shall have an aggregate water capacity not greater than 30,000 gal (114 m³). [58:5.2.1.9]

69.2.1.1.10 Heating or cooling coils shall not be installed inside storage containers. [58:5.2.1.10]

69.2.1.1.11 ASME containers installed underground, partially underground, or as mounded installations shall incorporate provisions for cathodic protection and shall be coated with a material recommended for the service that is applied in accordance with the coating manufacturer's instructions. [58:5.2.1.11]

69.2.1.2 Portable Container Appurtenance Physical Damage Protection.

69.2.1.2.1 Cylinders shall incorporate protection against physical damage to cylinder appurtenances and immediate connections to such appurtenances when not in use by any of the following means:

- (1) A ventilated cap
- (2) A ventilated collar
- (3) A cylinder valve providing inherent protection as defined by DOT in 49 CFR 173.301(h)(3) [58:5.2.6.1]

69.2.1.2.2 Protection of appurtenances of portable containers, skid tanks, and tanks for use as cargo tanks of more than 1000 lb (454 kg) water capacity [nominal 420 lb (191 kg) propane capacity] shall comply with 69.2.1.2.2.1 through 69.2.1.2.2.3. [58:5.2.6.2]

69.2.1.2.2.1 Appurtenance protection from physical damage shall be provided by recessing, by protective housings, or by location on the vehicle. [58:5.2.6.2(A)]

69.2.1.2.2.2 Appurtenance protection shall comply with the provisions under which the containers are fabricated. [58:5.2.6.2(B)]

69.2.1.2.2.3 Appurtenance protection shall be secured to the container in accordance with the ASME code under which the container was designed and built. [58:5.2.6.2(C)]

69.2.1.3 Portable Storage Containers.

69.2.1.3.1 The legs or supports, or the lugs for the attachment of legs or supports, shall be secured to the container in accordance with the ASME code under which the container was designed and built. [58:5.2.7.1]

69.2.1.3.2 The attachment of a container to either a trailer or semitrailer running gear, or the attachments to the container to make it a vehicle, so that the unit can be moved by a conventional over-the-road tractor, shall comply with the DOT requirements for cargo tank service. [58:5.2.7.2]

69.2.1.3.3 Portable tank design and construction of a full framework, skids, or lugs for the attachment of skids, and protection of fittings shall be in accordance with DOT portable tank specifications. The bottom of the skids shall be not less than 2 in. (51 mm) or more than 12 in. (300 mm) below the outside bottom of the tank shell. [58:5.2.7.3]

69.2.1.4 Container Marking.

69.2.1.4.1 Cylinders shall be marked as provided in the regulations, rules, or code under which they are fabricated. [58:5.2.8.1]

69.2.1.4.1.1 Where LP-Gas and one or more other compressed gases are to be stored or used in the same area, the cylinders shall be marked "Flammable" and either "LP-Gas," "Propane," or "Butane," or shall be marked in accordance with the requirements of 49 CFR, "Transportation." [58:5.2.8.1(A)]

69.2.1.4.1.2 When being transported, cylinders shall be marked and labeled in accordance with 49 CFR, "Transportation." [58:5.2.8.1(B)]

69.2.1.4.2* Cylinders shall be marked with the following information:

- (1) Water capacity of the cylinder in pounds
- (2) Tare weight of the cylinder in pounds, fitted for service [58:5.2.8.2]

A.69.2.1.4.2 The tare weight is the cylinder weight plus the weight of all permanently attached valves and other fittings but does not include the weight of protecting devices that are removed in order to load the cylinder. [58:A.5.2.8.2]

69.2.1.4.3* The markings specified for ASME containers shall be on a stainless steel metal nameplate attached to the container, located to remain visible after the container is installed. [58:5.2.8.3]

A.69.2.1.4.3 Head design refers to the shape of the head. Shapes include hemispherical, semi-ellipsoidal, and others. (Refer to the API-ASME Code for Unfired Pressure Vessels for Petroleum Liquids and Gases for more information.) [58:A.5.2.8.3]

69.2.1.4.3.1 The nameplate shall be attached in such a way as to minimize corrosion of the nameplate or its fastening means and not contribute to corrosion of the container. [58:5.2.8.3(A)]

69.2.1.4.3.2 Where the container is buried, mounded, insulated, or otherwise covered so the nameplate is obscured, the information contained on the nameplate shall be duplicated and installed on adjacent piping or on a structure in a clearly visible location. [58:5.2.8.3(B)]

69.2.1.4.3.3 Stationary ASME containers shall be marked with the following information:

- (1) ~~All ASME container nameplate requirements~~ Service for which the container is designed (e.g., underground, aboveground, or both)
- (2) ~~Service (i.e., aboveground, underground, or both)~~ Name and address of container supplier or trade name of container
- (3) ~~Water capacity of container in pounds or U.S. gallons~~ Water capacity of container in pounds or U.S. gallons
- (4) ~~Wording that reads "This container shall not contain a product that has a vapor pressure in excess of ___ psig at 100°F" (see Table 5.2.4.3 of NFPA 58)~~ MAWP in pounds per square inch
- (5) ~~Outside surface area in square feet~~ Wording that reads "This container shall not contain a product that has a vapor pressure in excess of ___ psig at 100°F" (see Table 5.2.4.3 of NFPA 58)
- (6) ~~Shell thickness and head thickness~~ Outside surface area in square feet
- (7) ~~Overall length (OL), outside diameter (OD), and head design (HD)~~ Year of manufacture

[58:5.2.8.3(C)]

69.2.1.4.3.4 In addition to the markings required by this Code, nameplates on cargo tanks shall include the markings required by the ASME Code and the DOT. [58:5.2.8.3(D)]

69.2.1.4.4 Warning labels shall meet the following requirements:

- (1) Warning labels shall be applied to all cylinders of 100 lb (45.4 kg) propane capacity or less that are not filled ~~on-on-~~ site.
- (2) Warning labels shall include information on the potential hazards of LP-Gas. [58:5.2.8.4]

69.2.1.4.5 All containers that contain unodorized LP-Gas products shall be marked "NOT ODORIZED." [58:5.2.8.5]

69.2.1.4.5.1 The marking shall have a contrasting background surrounded by a rectangular red border and with red letters in the sizes shown in Table 69.2.1.4.5.1. [58:5.2.8.5(A)]

Table 69.2.1.4.5.1 Size of "NOT ODORIZED" Marking

Water Capacity		Letter Height		Border Width	
gal	m ³	in.	mm	in.	mm
≥499	≥1.89	4	100	½ ¹ / ₂	13
49–498	0.19–1.88	1½	37	5 ¹ / ₁₆	8
2.6–48	0.01–0.18	¾ ³ / ₄	18	¼ ¹ / ₄	6
1–2.5	0.004–0.009	¾	10	1 ¹ / ₁₆	2

[58: Table 5.2.8.5(A)]

69.2.1.4.5.2 The markings shall be on both ends or on both sides of a container or on both sides and the rear of cargo tanks.

[58:5.2.8.5(B)]

69.2.6 Containers with Attached Supports.

69.2.6.1 Vertical ASME Containers. Vertical ASME containers of over 125 gal (0.5 m³) water capacity for use in permanent installations in stationary service shall be designed with steel supports that allow the container to be ~~mounted~~ installed on and fastened to concrete foundations or supports. [58:5.6.1]

69.2.6.1.1 Steel supports shall be designed to make the container self-supporting without guy wires and to withstand the wind and seismic (earthquake) forces anticipated at the site. [58:5.6.1.1]

69.2.6.1.2 Steel supports shall be protected against fire exposure with a material having a fire resistance rating of at least 2 hours. [58:5.6.1.2]

69.2.6.1.3 Continuous steel skirts having only one opening of 18 in. (460 mm) or less in diameter shall have 2-hour fire protection applied to the outside of the skirt. [58:5.6.1.3]

69.2.6.2 Skid Tanks. Skid tanks shall have a secure steel frame to allow transportation of the skid tank when not filled with LP-Gas. [58:5.6.2]

69.2.6.3 Porta-Pacs.

69.2.6.3.1 The legs or supports, or the lugs for the attachment of legs or supports, shall be secured to the container in accordance with the ASME code under which the container was designed and built. [58:5.6.3.1]

69.2.6.3.2 The ASME container shall be attached to either of the following:

- (1) A trailer or semitrailer running gear, or the attachments to the container to make it a vehicle, so that the unit can be moved by a conventional over-the-road tractor.
- (2) A metal frame such that the container can be moved as a trailer if wheels are added, which is approved for stationary use, or on a flat rail car.

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[58:5.6.3.2]

69.2.6.3.3 Protection of appurtenances shall be in accordance with 69.2.1.2. [58:5.6.3.3]

69.2.6.3.4 Movable fuel storage tenders shall be secured to the trailer support structure for the service involved. [58:5.6.3.4]

69.2.9 Container Appurtenances.

69.2.9.1 Materials.

69.2.9.1.1 Container appurtenances and regulators shall be fabricated of materials that are compatible with LP-Gas and shall be resistant to the action of LP-Gas under service conditions. [58:5.9.1.1]

69.2.9.1.1(A) The following materials shall not be used:

- (1) Gray cast iron
- (2) Nonmetallic materials for bonnets or bodies of valves or regulators

[58:5.9.1.1(A)]

69.2.9.1.2* Pressure-containing metal parts of appurtenances shall have a minimum melting point of 1500°F (816°C), except for the following:

- (1) Fusible elements
- (2) Approved or listed variable liquid level gauges used in containers of 3500 gal (13.2 m³) water capacity or less

[58:5.9.1.2]

A.69.2.9.1.2 Materials with melting points exceeding 1500°F (816°C) include steel, ductile (nodular) iron, malleable iron, or brass, as follows:

- (1) Ductile iron should meet the requirements of ASTM A395/A395M, *Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures*, or equivalent, and malleable iron should meet the requirements of ASTM A47/A47M, *Standard Specification for Ferritic Malleable Iron Castings*, or equivalent.
- (2) Approved or listed variable liquid level gauges used in containers of 3500 gal (13.2 m³) water capacity or less are exempt from the minimum melting point requirement.
- (3) Cast-iron should not be used.
- (4) Nonmetallic materials should not be used for bonnets or bodies of valves or regulators.

[58:A.5.9.1.2]

69.2.9.1.3 Container appurtenances shall have a service pressure of at least 250 psig (1.7 MPa). [58:5.9.1.3]

69.2.9.1.4 Gaskets used to retain LP-Gas in containers shall be resistant to the action of LP-Gas. [58:5.9.1.4]

69.2.9.1.4.1 Gaskets shall be made of metal or other material confined in metal having a melting point over 1500°F (816°C) or shall be protected against fire exposure. [58:5.9.1.4(A)]

69.2.9.1.4.2 When a flange is opened, the gasket shall be replaced. [58:5.9.1.4(B)]

69.2.9.1.4.3 Aluminum O-rings and spiral-wound metal gaskets shall be permitted. [58:5.9.1.4(C)]

69.2.9.1.4.4 Gaskets for use with approved or listed liquid level gauges for installation on a container of 3500 gal (13.2 m³) water capacity or less shall be exempt from the minimum melting point requirement. [58:5.9.1.4(D)]

69.2.10 Piping (Including Hose), Fittings, and Valves. Piping (including hose), fittings, and valves shall comply with Section 5.119 of NFPA 58.

69.3 Installation of LP-Gas Systems.

69.3.1* **Application.** Section 69.3 applies to the following:

- (1) Location and field installation of LP-Gas systems that use components, subassemblies, container assemblies, and container systems that are fabricated in accordance with Chapter 5 of NFPA 58
- (2) Location of containers and liquid transfer systems
- (3) Installation of container appurtenances and regulators
- (4) Installation of piping (including flexible connectors and hose), hydrostatic relief valves, and piping service limitations
- (5) Installation of equipment
- (6) Testing of piping systems
- (7) Location of containers not connected for use

[58:6.1.1]

A.69.3.1 Section 6.5 of NFPA 58 includes general provisions that are applicable to most stationary systems. Sections 6.7 through 6.15-16 of NFPA 58 extend and modify Section 6.5 of NFPA 58 for systems installed for specific purposes. [58:A.6.1.1]

69.3.2 **Nonapplication.** This chapter does not apply to the following:

- (1) Refrigerated containers
- (2) Installation of systems used in the highway transportation of LP-Gas

[58:6.1.2]

69.3.3 Location of Containers.

69.3.3.1 LP-Gas containers shall be located outside of buildings unless they are specifically allowed to be located inside of buildings. [58:6.2.1]

69.3.3.2 LP-Gas containers shall be allowed in buildings only for the following applications:

- (1) Cylinders as specifically provided for in Section 6.22-23 of NFPA 58
- (2) Containers of less than 125 gal (0.5 m³) water capacity for the purposes of being filled in buildings or structures complying with Chapter 10 of NFPA 58
- (3) Containers on LP-Gas vehicles complying with, and parked or garaged in accordance with, Chapter 9 of NFPA 58
- (4) Containers used with LP-Gas portable engine fuel systems complying with 11.13.1 of NFPA 58
- (5) Containers used with LP-Gas stationary engine fuel systems complying with Section 6.28-29 of NFPA 58
- (6) Containers used with LP-Gas-fueled industrial trucks complying with 11.11.4 of NFPA 58
- (7) Containers on LP-Gas-fueled vehicles garaged in accordance with Section 11.14 of NFPA 58
- (8) Cylinders awaiting use, resale, or exchange when stored in accordance with 69.5.2 and 69.5.3

[58:6.2.2]

69.3.4 Location of Containers Not Connected for Use.

69.3.4.1 Cylinders awaiting use, resale, or exchange shall be stored in accordance with Chapter 8 of NFPA 58. [58:6.3.1]

69.3.4.2 ASME containers of 4,000 gal (15.2 m³) or less that have been removed from service but that contain LP-Gas shall be stored outside of buildings in accordance with either 69.3.4.2(1) or 69.3.4.2(2):

- (1) Containers shall be located either at a bulk plant or in an approved area.
- (2) Containers not complying with 69.3.4.2(1) shall comply with the following:
 - (a) Containers shall be located in a manner that will minimize exposure to physical damage.
 - (b) Containers shall be oriented so that the pressure relief valve remains in communication with the vapor space.
 - (c) Containers shall not be located on roofs of buildings.
 - (d) Valve outlets on ASME containers shall be plugged or capped.
 - (e) Where screw-on-type caps or collars are utilized on ASME containers, they shall be in place whenever this type of container is stored regardless of the fill level of the container.
 - (f) The location of ASME containers shall comply with the "Aboveground Containers" column and the "Between Containers" column of Table 69.3.5.1.1 with respect to important buildings and lines of adjoining property that can be built upon.
 - (g) Where the provisions of 69.3.4.2(2)(f) are impractical, alternative storage locations for containers shall be approved by the AHJ.

[58:6.3.2]

69.3.5 Container Separation Distances.

69.3.5.1 Aboveground Containers.

69.3.5.1.1* Containers installed outside of buildings, whether of the portable type replaced on a cylinder exchange basis or permanently installed and refilled at the installation, shall be located with respect to the adjacent containers, important building, group of buildings, or line of adjoining property that can be built upon, in accordance with Table 69.3.5.1.1, Table 69.3.6.1.2, 69.3.5.1.2 through 69.3.5.1.3, 69.3.5.3, 69.3.5.4.1 through 69.3.5.4.4, and 69.3.6.3.6 through 69.3.6.3.11.

[58:6.4.1.1]

Table 69.3.5.1.1 Separation Distances Between Containers, Important Buildings, and Line of Adjoining Property That Can Be Built Upon

Water Capacity per Container		Minimum Distances							
		Mounded or Underground Containers ^a		Aboveground Containers		Between Containers ^b			
		gal	m ³	ft	m	ft	m	ft	m
<125 ^c	<0.5 ^c	10	3	0 ^d	0 ^d	0	0		
125–250	0.5–1.0	10	3	10	3	0	0		
251–500	>1.0–1.9	10	3	10	3	3	1		
501–2,000	>1.9–7.6	10	3	25 ^e	7.6	3	1		
2,001–30,000	>7.6–114	50	15	50	15	5	1.5		
30,001–70,000	>114–265	50	15	75	23	1/4 of sum of diameters of adjacent containers			
...									

^aSee 69.3.5.2.1.

^bSee 69.3.5.4.5.

^cSee 69.3.5.4.4.

^dSee 69.3.5.4.1, 69.3.5.4.2, 69.3.5.4.3, 69.3.5.4.4.

^eSee 69.3.5.1.3.

[58:Table 6.4.1.1]

A.69.3.5.1.1 When applying Table 69.3.5.1.1 to cylinders, which have their capacities expressed in pounds, the first table entry, <125 gal (<0.5 m³), includes all cylinders. Cylinders have a maximum capacity of 1000 lb or 119 gal (454 kg or 3.8 m³) (water capacity). [58:A.6.4.1.1]

The “Line of Adjoining Property ~~that-That can-Can be-Built Built uponUpon~~” refers to the property boundaries of the property adjacent to the one ~~upon~~ where the container is located. This is illustrated in Figure A.69.3.5.1.1 and in Figure I.1(a), Figure I.1(b), and Figure I.1(c) of NFPA 58, taking into consideration a condition that involves property on the other side of a street, highway, navigable waterway, or other right of way. The minimum distance limitation is from the container to the property line where that property line is common to plots of ground of different ownership and would also apply between the container and the property line of the far side of a street or other public right of way. [58:A.6.4.1.1]

Regarding “Important Building,” a building can be important for any number of reasons, including the following:

- (1) Human occupancy
- (2) Replacement value
- (3) Value of the contents
- (4) Vital role of its production equipment or business records to a business
- (5) The effect of building location on product release and fire control activities by fire-fighters and other emergency responders

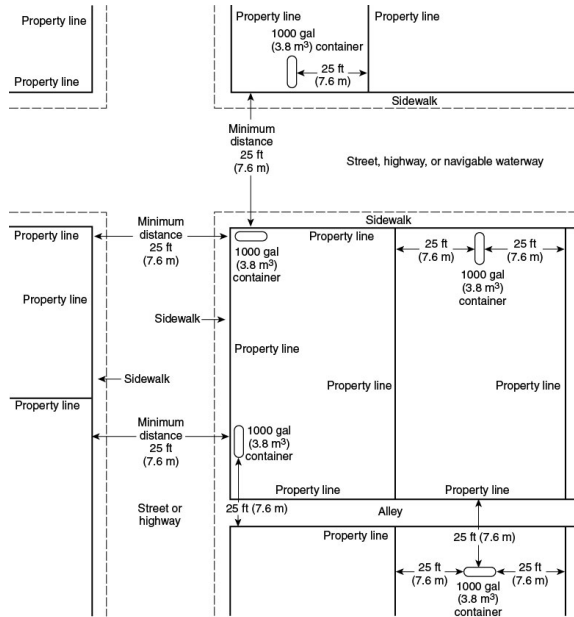
[58:A.6.4.1.1]

Human occupancy in a building does not automatically make it important. Occupancy for brief periods, such as one might find in a garage while a vehicle is being loaded, should not be a factor in classifying a building as important. [58:A.6.4.1.1]

Clearly, buildings that house assembly occupancies, such as theaters and churches, are “important” because the general public will be there, as well as at mercantile occupancies (stores). Homes, apartments, hotels, dormitories, and prisons should also be considered “important.” Storage occupancies might not be considered “important” if workers only occasionally enter the building. [58:A.6.4.1.1]

Buildings with characteristics that (1) hinder emergency responders from being able to gain access to a position where they can safely apply water to a tank or (2) act as an impediment to applying water should also be considered a part of this category. There is such a wide assortment of physical configurations of industrial and bulk plant sites that each location must be considered on its own. Items such as railroad tracks, containers for storage of other fuels, fences obstructing access from preferred directions, topography, and even rows of trees can present unique challenges for access and, with the location of buildings on congested sites, can by themselves, or in combination, make applying water on the tanks extremely difficult. [58:A.6.4.1.1]

Figure A.69.3.5.1.1 Illustration of Separation Distances from Containers to the Line of Adjoining Property ~~that-That can-Can be-Built Built Upon~~. [58:Figure A.6.4.1.1]



69.3.5.1.2 When the provisions of 6.3031.3 through 6.3031.5 of NFPA 58 are met, the minimum distance from an ASME container to a building or adjoining property line that can be built upon shall be reduced by one-half for ASME containers of 2001 gal through 30,000 gal (7.6 m³ through 114 m³) water capacity. [58:6.4.1.2]

69.3.5.1.3 The 25 ft (7.6 m) minimum distance from aboveground ASME containers of 501 gal through 2000 gal (1.9 m³ through 7.6 m³) water capacity to buildings, a group of buildings, or the line of adjoining property that can be built upon shall be reduced to 10 ft (3 m) for a single ASME container of 1200 gal (4.5 m³) or less water capacity where such container is at least 25 ft (7.6 m) from any other LP-Gas container of more than 125 gal (0.5 m³) water capacity. [58:6.4.1.3]

69.3.5.2 Underground or Mounded ASME Containers.

69.3.5.2.1 Minimum distances from important buildings and the line of adjoining property that can be built upon for underground or mounded ASME containers larger than 2000 gal of 2001 gal through 30,000 gal (7.6 m³ through 114 m³) water capacity; incorporating all the provisions of Section 6.3031 of NFPA 58, shall be reduced to 10 ft (3 m). [58:6.4.2.1]

69.3.5.2.2 Distances for all underground and mounded ASME containers shall be measured from the container surface. [58:6.4.2.2]

69.3.5.2.3 No part of an underground or mounded ASME container shall be less than 10 ft (3 m) from a building or line of adjoining property that can be built upon. [58:6.4.2.3]

69.3.5.3 Multiple Containers Less Than 125 gal (0.5 m³) Individual Water Capacity. Multiple containers, each having a water capacity less than 125 gal (0.5 m³) and installed in an aboveground group as a manifolded single service or as individual services, shall comply with the following:

- (1) Where the aggregate water capacity of all containers in any group is 500 gal (1.9 m³) or less, the minimum separation distances required by Table 69.3.5.1.1 for each container shall be 0 ft (0 m) for each container in the group from an important building or line of adjoining property that can be built upon.
- (2) Where the aggregate water capacity of all containers in the group is greater than 500 gal (1.9 m³), the minimum separation distances in Table 69.3.5.1.1 for each container shall be based on the aggregate capacity.
- (3) There shall be no separation required between individual containers within the group.
- (4)* For the application of 69.3.5.3(1) and 69.3.5.3(2), the number of containers in a single group is determined by the number of containers that are less than 10 ft (3 m) from any other container in the group.

[58:6.4.3]

A.69.3.5.3(4) Figure A.69.3.5.3(4)(a) and Figure A.69.3.5.3(4)(b) depict the requirements of 69.3.5.3(4).

[58:A.6.4.3(4)]

Figure A.69.3.5.3(4)(a) Separation Between Containers 10 ft (3 m) or Greater.

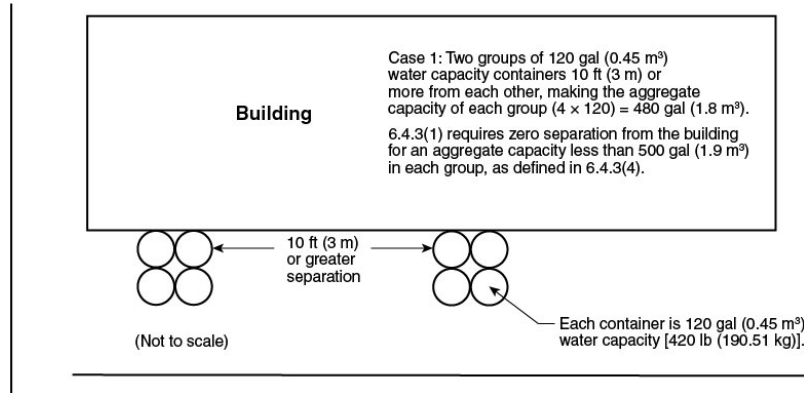
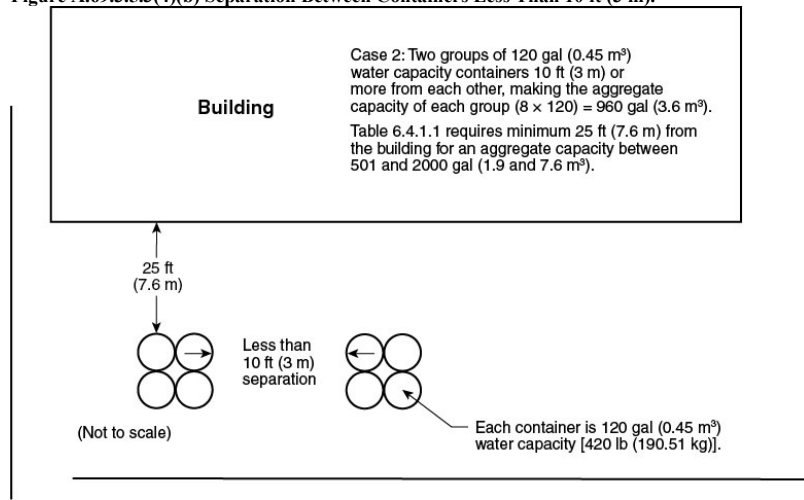


Figure A.69.3.5.3(4)(b) Separation Between Containers Less Than 10 ft (3 m).



69.3.5.4 Separation Distance Between Container Pressure Relief Valve and Building Openings.

69.3.5.4.1 Cylinders shall not be located and installed underneath any building unless the space is open to the atmosphere for 50 percent of its perimeter or more. [58:6.4.4.1]

69.3.5.4.2 ASME containers of less than 125 gal (0.5 m³) water capacity shall be located and installed so that the discharge from pressure relief devices shall not terminate in or beneath any building. [58:6.4.4.2]

69.3.5.4.3* The distance measured horizontally from the point of discharge of a container pressure relief valve to any building opening below the level of such discharge shall be in accordance with Table 69.3.5.4.3. [58:6.4.4.3]

Table 69.3.5.4.3 Separation Distance Between Container Pressure Relief Valve and Building Openings

Container Type	Exchange or Filled at Point of Use	Distance Horizontally from Relief Valve Discharge to Opening Below Discharge		Discharge from Relief Valve, Vent Discharge, and Filling Connection to Exterior Source of Ignition, Openings into Direct-Vent Appliances, and Mechanical Ventilation Air Intakes	
		ft	m	ft	m
Cylinder	Exchange	3	0.9	5	1.5
Cylinder	Filled at the point of use	3	0.9	10	3.0

ASME	Filled at the point of use	5	1.5	10	3.0
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[58:Table 6.4.4.3]

A.69.3.5.4.3 Building openings in the context of 69.3.5.4.3 are any opening that communicates air from the exterior to the interior of the building, including windows, doors, or dryer vent terminations below the level of the relief valve discharge. [58:A.6.4.4.3]

69.3.5.4.4 The distance measured in any direction from the point of discharge of a container pressure relief valve, vent of a fixed maximum liquid level gauge on a container, and the container filling connection to exterior sources of ignition, openings into direct-vent (sealed combustion system) appliances, and mechanical ventilation air intakes shall be in accordance with Table 69.3.5.4.3. [58:6.4.4.4]

69.3.5.4.5 Access at the ends or sides of individual underground containers having a water capacity of 125 gal (0.5 m³) or more shall be provided in multicontainer installations to facilitate working with cranes or hoists. [58:6.4.4.5]

69.3.6 Other Container Location Requirements.

69.3.6.1 ASME Multi-container Requirements.

69.3.6.1.1 Where storage containers having an aggregate water capacity of more than 4000 gal (15.2 m³) are located in heavily populated or congested areas, the siting provisions of 69.3.5.1.1 and Table 69.3.5.1.1 shall be permitted to be modified as indicated by the fire safety analysis described in 6.2930.3 of NFPA 58. [58:6.5.1.1]

69.3.6.1.2 Aboveground multicontainer installations comprised of ASME containers having an individual water capacity of 12,000 gal (45 m³) or more and installed for use in a single location shall be limited to the number of containers in one group, with each group separated from the next group in accordance with the degree of fire protection provided in Table 69.3.6.1.2. [58:6.5.1.2]

4Table 69.3.6.1.2 Maximum Number of Containers in a Group and Their Separation Distances

Fire Protection Provided by	Maximum Number of Containers in One Group	Minimum Separation Between Groups	
		ft	m
Hose streams only (see 6.5.1.2 and 6.2930.3.1 of NFPA 58)	6	50	15
Fixed monitor nozzles per 6.2930.6.3 of NFPA 58	6	25	7.6
Fixed water spray per 6.2930.6.1 of NFPA 58	9	25	7.6
Insulation per 6.2930.5.1 of NFPA 58	9	25	7.6

[58: Table 6.5.1.2]

69.3.6.1.3 Where the provisions of 6.3031.3 and 6.3031.4 of NFPA 58 are met, the minimum separation distance between groups of ASME containers protected by hose stream only shall be one-half the distances required in Table 69.3.6.1.2. [58:6.5.1.3]

69.3.6.2 Underground and Mounded ASME Containers.

69.3.6.2.1 Underground or mounded ASME containers shall be located in accordance with 69.3.6.2.2 and 69.3.6.2.3. [58:6.5.2.1]

69.3.6.2.2 Underground or mounded containers shall be located outside of any buildings. [58:6.5.2.2]

69.3.6.2.3 Buildings shall not be constructed over any underground or mounded containers. [58:6.5.2.3]

69.3.6.2.4 The sides of adjacent containers shall be separated in accordance with Table 69.3.5.1.1 but shall not be separated by less than 3 ft (1 m). [58:6.5.2.4]

69.3.6.2.5 Where containers are installed parallel with ends in line, the number of containers in one group shall not be limited. [58:6.5.2.5]

69.3.6.2.6 Where more than one row of containers is installed, the adjacent ends of the containers in each row shall be separated by not less than 10 ft (3 m). [58:6.5.2.6]

69.3.6.3 Additional Container Installation Requirements.

69.3.6.3.1 Additional container installation requirements shall comply with 69.3.6.3.2 through 69.3.6.3.13 and 69.3.6.4. [58:6.5.3.1]

69.3.6.3.2 Containers shall not be stacked one above the other. [58:6.5.3.2]

69.3.6.3.3* Combustible materials shall not accumulate or be stored within 10 ft (3 m) of a container. [58:6.5.3.3]

A.69.3.6.3.3 Clearance is required between combustible materials and propane containers in order to minimize the effects of fires on the container. The requirement to maintain separation between the container and stored combustible materials is needed so that an accumulation of materials that might represent a hazard to the container does not occur. The term *stored* is intended to denote materials that are purposely placed. The term *accumulate* is intended to denote materials that are there by other than being purposely placed. Vegetation of any type located near or under the container is not considered to be a hazard. [58:A.6.5.3.3]

69.3.6.3.4* The area under containers shall be graded or shall have dikes or curbs installed so that the flow or accumulation of flammable liquids with flash points below 200°F (93.4°C) is prevented. [58:6.5.3.4]

A.69.3.6.3.4 For information on determination of flash points, see NFPA 30. [58:A.6.5.3.4]

69.3.6.3.5* LP-Gas containers shall be located at least 10 ft (3 m) from the centerline of the wall of diked areas containing **Class I** flammable or Class II combustible liquids. [58:6.5.3.5]

A.69.3.6.3.5 Examples of Class I flammable liquids are gasoline and methanol. Examples of Class II combustible liquids are diesel, kerosene, or fuel oils. [58:A.6.5.3.5]

69.3.6.3.6 The minimum horizontal separation between aboveground LP-Gas containers and aboveground tanks containing liquids having flash points below 200°F (93.4°C) shall be 20 ft (6 m). [58:6.5.3.6]

69.3.6.3.7 The requirements of 69.3.6.3.6 shall not apply where LP-Gas containers of 125 gal (0.5 m³) or less water capacity are installed adjacent to fuel oil supply tanks of 660 gal (2.5 m³) or less capacity. [58:6.5.3.7]

69.3.6.3.8 No horizontal separation shall be required between aboveground LP-Gas containers and underground tanks containing flammable or combustible liquids installed in accordance with NFPA 30. [58:6.5.3.8]

69.3.6.3.9* The minimum separation between LP-Gas containers and oxygen or gaseous hydrogen containers shall be in accordance with NFPA 55. [58:6.5.3.9]

A.69.3.6.3.9 Also see NFPA 51. [58:A.6.5.3.9]

69.3.6.3.10 Where protective structures having a minimum fire resistance rating of 2 hours interrupt the line of sight between uninsulated portions of the oxygen or hydrogen containers and the LP-Gas containers, no minimum distance shall apply. [58:6.5.3.10]

69.3.6.3.11 The minimum separation between LP-Gas containers and liquefied hydrogen containers shall be in accordance with NFPA 55. [58:6.5.3.11]

69.3.6.3.12 Where LP-Gas cylinders are to be stored or used in the same area with other compressed gases, the cylinders shall be marked to identify their content in accordance with CGA C-7, *Guide to Classification and Labeling of Compressed Gases*. [58:6.5.3.12]

69.3.6.3.13 An aboveground LP-Gas container and any of its parts shall not be located within 6 ft (1.8 m) of a vertical plane beneath overhead electric power lines that are over 600 volts, nominal. [58:6.5.3.13]

69.3.6.3.14 The minimum separation distances specified in Table 69.3.5.1.1 between containers and buildings of noncombustible construction devoted exclusively to gas manufacturing and distribution operations shall be reduced to 10 ft (3 m). [58:6.5.3.14]

69.3.6.4* Structure Requirements.

A.69.3.6.4 The presence of such structures can create significant hazards, such as the following:

- (1) Pocketing of escaping gas
- (2) Interference with application of cooling water by fire departments
- (3) Redirection of flames against containers
- (4) Impeding the egress of personnel in an emergency

[58:A.6.5.4]

69.3.6.4.1 Structures such as fire walls, fences, earth or concrete barriers, and other similar structures shall be permitted around installed nonrefrigerated containers in accordance with all of the following:

- (1) Clearance shall be provided around the container for inspection and maintenance.
- (2) The structure shall be open on at least one side that includes the longest dimension of the container.
- (3) The top of the container shall be capable of being wetted by an emergency response hose stream.

[58:6.5.4.1]

69.3.6.4.2 Structures used to prevent flammable or combustible liquid accumulation or flow shall be permitted in accordance with 69.3.6.3.4. [58:6.5.4.2]

69.3.6.4.3 Structures between LP-Gas containers and gaseous hydrogen containers shall be permitted in accordance with 69.3.6.3.10. [58:6.5.4.3]

69.3.6.4.4 Structures such as fences shall be permitted in accordance with 6.21-22.4 of NFPA 58. [58:6.5.4.4]

69.3.7 Location of Transfer Operations.

69.3.7.1 Transfer of Liquids.

69.3.7.1.1* Liquid shall be transferred into containers, including containers mounted on vehicles, only outdoors, under weather canopies, or in structures in accordance with Chapter 10 of NFPA 58, specially designed for such purpose.

[58:6.7.1.1]

A.69.3.7.1.1 It is the intent to allow transfer of liquid into containers in open areas under canopies or roofs where 50 percent or more of the perimeter is not enclosed. [58:A.6.7.1.1]

69.3.7.1.2 The transfer of liquid into containers on the roofs of structures shall be permitted, provided that the installation conforms to the requirements specified in 6.8-7.6.8.9 and 6.23.11 in NFPA 58 ~~mounted on vehicles shall not take place within a building but shall be permitted to take place under a weather shelter or canopy. (See 6.27.3.3 of NFPA 58.)~~ [58:6.7.1.2]

~~69.3.7.1.3 The transfer hose shall not be routed in or through any buildings except those specified in 6.7.1.1. Structures housing transfer operations or converted for such use after December 31, 1972, shall comply with Chapter 10 of NFPA 58. [58:6.7.1.3]~~

~~69.3.7.1.4 Filling of containers located outdoors in stationary installations in accordance with Section 6.4 of NFPA 58 shall be permitted to be filled at that location. The transfer of liquid into containers on the roofs of structures shall be permitted, provided that the installation conforms to the requirements specified in 6.8.7 and 6.22.11 of NFPA 58. [58:6.7.1.4]~~

~~69.3.7.1.5 The transfer hose shall not be routed in or through any building except those specified in 69.3.7.1.3. [58:6.7.1.5]~~

~~69.3.7.1.6 Filling of containers located outdoors in stationary installations in accordance with 69.3.5 shall be permitted to be filled at that location. [58:6.7.1.6]~~

69.3.7.2 Container Point of Transfer Location Requirements.

69.3.7.2.1* If the point of transfer of containers located outdoors in stationary installations is not located at the container, it shall be located in accordance with Table 69.3.7.2.1. [58:6.7.2.1]

Table 69.3.7.2.1 Distance Between Point of Transfer and Exposures

Part	Exposure	Minimum Horizontal Distance	
		ft	m
	Buildings, ^a mobile homes, recreational vehicles, and modular homes with at least 1-hour fire-rated walls	10	3.1
B	Buildings ^a with other than at least 1-hour fire-rated walls	25 ^b	7.6 ^b
C	Building wall openings or pits at or below the level of the point of transfer	25 ^b	7.6 ^b
D	Line of adjoining property that can be built upon	25 ^b	7.6 ^b
E	Outdoor places of public assembly, including schoolyards, athletic fields, and playgrounds	50 ^b	15 ^b
F	Public ways, including public streets, highways, thoroughfares, and sidewalks		
	(1) From points of transfer for LP-Gas dispensing systems	10	3.1
	(2) From other points of transfer	25 ^b	7.6 ^b
G	Driveways ^c	5	1.5
H	Mainline railroad track centerlines	25	7.6
I	Containers ^d other than those being filled	10	3.1
J	Flammable and Class II combustible liquid ^e dispensers and the fill connections of containers	10 ^b	3.1 ^b
K	Flammable and Class II combustible liquid ^e aboveground containers, and filling connections of underground containers	20	6.1
L	Stored or accumulated combustible materials	10	3.1

^aFor the purpose of this table, buildings also include structures such as tents and box trailers at construction sites.

^bSee 69.3.7.3.4.

^cNot applicable to driveways and points of transfer at vehicle fuel dispensers.

^dNot applicable to filling connections at the storage container or to dispensing vehicle fuel dispenser units of 4000 gal (15.2 m³) water capacity or less when used for filling containers not mounted on vehicles.

^eNFPA 30 defines Class I flammable liquids as including those having a flash point below 100°F (37.8°C) and having a vapor pressure not exceeding 40 psia (276 kPa) at 100°F (37.8°C). NFPA 30 defines Class II combustible liquids as including those having a flash point at or above 100°F (37.8°C) and below 140°F (60°C).

[58: Table 6.7.2.1]

A.69.3.7.2.1 Examples of Class I flammable liquids, as referenced in Table 69.3.7.2.1 Part J, are gasoline and methanol; examples of Class II combustible liquids, as referenced in Table 69.3.7.2.1 Part K, are diesel, kerosene, and fuel oils. [58:A.6.7.2.1]

69.3.7.2.2 Containers not located in stationary installations shall be filled at a location determined by the point of transfer in accordance with Table 69.3.7.2.1. [58:6.7.2.2]

69.3.7.3 Separation Distance from Point of Transfer.

69.3.7.3.1 If the point of transfer is a component of a system covered by Section 6.26-27 or Chapter 11 of NFPA 58, the requirements of parts A, B, and C of Table 69.3.7.2.1 shall not apply to the structure containing the point of transfer. [58:6.7.3.1]

69.3.7.3.2 If LP-Gas is vented to the atmosphere under the conditions stipulated in 7.3.1.1(4) of NFPA 58, the distances in Table 69.3.7.2.1 shall be doubled. [58:6.7.3.2]

69.3.7.3.3 If the point of transfer is housed in a structure complying with Chapter 10 of NFPA 58, and the common walls comply with 10.2.1 of NFPA 58, separation distances in Table 69.3.7.2.1 shall not be required where the common walls comply with 10.3.1.3 of NFPA 58. [58:6.7.3.3]

69.3.7.3.4 The distances in Table 69.3.7.2.1, parts B, C, D, E, F(2), and J, shall be reduced by one-half where the system incorporates the provisions of low-emission transfer as provided in 6.3.9.1.5 of NFPA 58. [58:6.7.3.4]

69.3.8 Installation of Containers.

69.3.8.1 General Requirements.

69.3.8.1.1 Containers shall be positioned so that the pressure relief valve is in direct communication with the vapor space of the container. [58:6.8.1.1]

69.3.8.1.2 LP-Gas containers or systems that are installed within 10 ft (3 m) of public vehicular thoroughfares shall be provided with a means of vehicular barrier protection. [58:6.8.1.2]

69.3.8.1.3 Field welding on containers shall be limited to nonpressure parts such as saddle plates, wear plates, or brackets installed by the container manufacturer. [58:6.8.1.3]

69.3.8.1.4* Aboveground containers shall be painted. [58:6.8.1.4]

A.69.3.8.1.4 Generally, a light-reflecting color paint is preferred unless the system is installed in an extremely cold climate. [58:A.6.8.1.4]

69.3.8.1.5 Containers shall be installed so that all container operating appurtenances are accessible. [58:6.8.1.5]

69.3.8.1.6 Where necessary to prevent flotation due to possible high flood waters around aboveground or mounded containers, or high water table for those underground and partially underground, containers shall be securely anchored. [58:6.8.1.6]

69.3.8.1.7 ASME containers that have liquid interconnections shall be installed so that the maximum permitted filling level of each container is at the same elevation. [58:6.8.1.7]

69.3.8.2 Installation of Cylinders.

69.3.8.2.1 Cylinders shall be installed only above ground and shall be set upon a firm foundation or otherwise be firmly secured. (See 69.3.8.2.2.) [58:6.8.2.1]

69.3.8.2.2 The cylinder shall not be in contact with the soil. [58:6.8.2.2]

69.3.8.2.3 Flexibility shall be provided in the connecting piping. (See 69.3.8.2.4.) [58:6.8.2.3]

69.3.8.2.4 Where flexible connectors are used, they shall comply with 6.11.6-7 of NFPA 58. [58:6.8.2.4]

69.3.9 Internal Valves.

69.3.9.1 The requirements of 69.3.9.2 through 69.3.9.5 shall be required for internal valves in liquid service that are in-stalled in containers of over 4000 gal (15.2 m³) water capacity by July 1, 2003. [58:6.13.1]

69.3.9.2 Internal valves shall be installed in accordance with 5.9.4.2 and Table 5.9.4.2 of NFPA 58 on containers of over 4000 gal (15.2 m³) water capacity. [58:6.13.2]

69.3.9.3 Thermal Activation.

69.3.9.3.1 Automatic shutdown of internal valves in liquid service shall be provided using thermal (fire) actuation. [58:6.13.3.1]

69.3.9.3.2 The thermal sensing element of the internal valve shall be within 5 ft (1.5 m) of the internal valve. [58:6.13.3.2]

69.3.9.4 **Emergency Remote Shutdown of Internal Valves** ~~Station~~. Where emergency remote shutdown devices are required to operate valves or electrical equipment, they shall comply with the following requirements:

1. The devices shall be readily accessible.
2. The devices shall be located along a path of egress.
3. The devices shall be installed not less than 20 ft (6 m) or more than 100 ft (30 m) from the point of transfer controlled by the valve or electrical equipment.
4. The devices shall be identified by a sign incorporating the words "[name of the LP-Gas] Emergency Shutoff" in block letters at least 2 in. (51 mm) in height on a background of contrasting color to the letters.
5. Where the facility provides a single product or a single emergency shutoff controlling multiple products, the "[name of the LP-Gas]" designation in accordance with 69.3.9.4(4) shall not be required.
6. The sign required by 69.3.9.4(4) shall be located at the device.
7. The devices shall be installed outside of buildings except as in 69.3.9.4(8).
8. The devices shall be permitted to be installed within the structure where the point of transfer is located within a structure complying with Chapter 10 of NFPA 58.

[58:4.10]

~~69.3.9.4.1 At least one remote emergency shutdown device in accordance with Section 4.10 of NFPA 58 shall be installed station for internal valves in liquid service, shall be installed in accordance with the following:~~

- ~~(1) Not less than 25 ft (7.6 m) or more than 100 ft (30 m) from the liquid transfer point~~
- ~~(2) Not less than 25 ft (7.6 m) from the internal valves that are being controlled~~
- ~~(3) Along a path of egress from the liquid transfer point~~

[58:6.13.4.1]

69.3.9.4.2 ~~The~~ requirements of 69.3.9.4.1 shall be retroactive to all internal valves required by NFPA 58 within 3 years of the first adoption of this edition. [58:6.13.4.2]

~~69.3.9.5 Emergency remote shutdown stations shall be identified by a sign, visible from the point of transfer, incorporating the words "Propane — Container Liquid Valve Emergency Shutoff" in block letters of not less than 2 in. (51 mm) in height on a background of contrasting colors to the letters. [58:6.13.5]~~

~~69.3.9.5 Remote shutdown equipment operating valves specified in 5.9.4.2 of NFPA 58 shall be tested for proper operation monthly, with the results documented, except as specified in 69.3.9.6. [58:6.13.4.3]~~

~~69.3.9.6 If the interval between transfers exceeds 30 days, the test shall be performed prior to the next transfer. [58:6.13.4.4]~~

~~69.3.9.7* Internal valves and emergency shutoff valves installed in lieu of internal valves in liquid service shall be visually verified for closure during the monthly inspection, except as specified in 69.3.9.6. [58:6.13.4.5]~~

~~A.69.3.9.7 An option for visual verification could consist of an inspection of the actuator to verify it moved into the fully closed position. [58:A.6.13.4.5]~~

~~69.3.9.8 Remote shutdown of internal valves and emergency shutoff valves as specified in Section 6.14 of NFPA 58 shall be permitted to be incorporated into the same remote shutdown station. [58:6.13.4.6]~~

69.3.10 Emergency Shutoff Valves.

~~69.3.10.1 On new installations and on existing installations, stationary Stationary container storage systems with an aggregate water capacity of more than 4000 gal (15.2 m³) utilizing a liquid transfer line that is 1½ in. (39 mm) or larger, and a pressure equalizing vapor line that is 1¼ in. (32 mm) or larger, shall be equipped with emergency shutoff valves. [58:6.4415.1]~~

~~69.3.10.2 An emergency shutoff valve shall be installed in the transfer lines of the fixed piping transfer system within 20 ft (6 m) of lineal pipe from the nearest end of the hose or swivel-type piping connections. [58:6.4415.2]~~

~~69.3.10.3 When the flow is only into the container, a backflow check valve shall be permitted to be used in lieu of an emergency shutoff valve if installed in the piping transfer system downstream of the hose or swivel-type piping connections. [58:6.4415.3]~~

~~69.3.10.4 The backflow check valve shall have a metal-to-metal seat or a primary resilient seat with metal backup, not hinged with combustible material, and shall be designed for this specific application. [58:6.4415.4]~~

~~69.3.10.5 Where there are two or more liquid or vapor lines with hoses or swivel-type piping connected of the sizes designated, an emergency shutoff valve or a backflow check valve, where allowed, shall be installed in each leg of the piping. [58:6.4415.5]~~

~~69.3.10.6 Emergency shutoff valves shall be installed so that the temperature-sensitive element in the valve, or a supplemental temperature-sensitive element that operates at a maximum temperature of 250°F (121°C) that is connected to actuate the valve, is not more than 5 ft (1.5 m) from the nearest end of the hose or swivel-type piping connected to the line in which the valve is installed. [58:6.4415.6]~~

~~69.3.10.7 Temperature-sensitive elements of emergency shutoff valves shall not be painted or coated after manufacture. [58:6.4415.7]~~

~~69.3.10.8* The emergency shutoff valves or backflow check valves shall be installed in the fixed piping so that any break resulting from a pull will occur on the hose or swivel-type piping side of the connection while retaining intact the valves and piping on the plant side of the connection. [58:6.4415.8]~~

~~A.69.3.10.8 Anchorage can be accomplished by the use of concrete bulkheads or equivalent anchorage or by the use of a weakness or shear fitting. [58:A.6.4415.8]~~

~~69.3.10.9 Where emergency shutoff valves are required to be installed in accordance with 69.3.10.2, a means shall be incorporated to actuate the emergency shutoff valves in the event of a break of the fixed piping resulting from a pull on the hose. [58:6.4415.9]~~

~~69.3.10.10 Emergency shutoff valves required by NFPA 58 shall be tested annually-monthly for the functions required by 5.4415.2.3(2) and 5.4415.2.3(3) of NFPA 58, and-with the results of the test shall be documented, except as specified in 6.15.10.1 of NFPA 58. [58:6.4415.10]~~

~~69.3.10.11 Backflow check valves installed in lieu of emergency shutoff valves shall be checked annually for proper operation, and the results of the test shall be documented. [58:6.4415.11]~~

~~69.3.10.12 All new and existing emergency shutoff valves shall comply with 69.3.10.12.1 through 69.3.10.12.23. [58:6.4415.12]~~

~~69.3.10.12.1 Each emergency shutoff valve shall have at least one remote emergency shutdown device in accordance with Section 4.10 of NFPA 58 shall be installed for each emergency shutoff valve, clearly identified and easily accessible manually operated remote emergency shutoff device. [58:6.4415.12.1]~~

~~69.3.10.12.2 The shutoff device shall be located not less than 25 ft (7.6 m) or more than 100 ft (30 m) in the path of egress from the emergency shutoff valve. [58:6.4415.12.2]~~

~~69.3.10.12.3 Where an emergency shutoff valve is used in lieu of an internal valve in compliance with 5.9.4.2(D)(2) of NFPA 58, the remote shutoff device shall be installed in accordance with 69.3.9.4 and 69.3.9.5. [58:6.4415.12.23]~~

~~69.3.10.13 Emergency shutoff valves for railroad tank car transfer systems shall be in accordance with 6.2122.2.6, 6.3031.4, 7.2.3.7, and 7.2.3.8 of NFPA 58. [58:6.4415.13]~~

69.3.11 Installation in Areas of Heavy Snowfall.

~~69.3.11.1* In areas where the ground snow load is equal to or exceeds 100 psf (488 kg/m²), piping, regulators, meters, and other equipment installed in the piping system shall be protected from the forces of accumulated snow. [58:6.4819.1]~~

A.69.3.11.1 The variables that affect the potential for damage to outdoor gas system components present in areas where heavy snowfalls occur are numerous. Therefore, the selection of an appropriate method to mitigate potential damage from snow and ice should be based upon the characteristics of the installation site and the forces that are anticipated. Some alternatives include the following:

- (1) Locating aboveground piping, regulators, and meters above snow levels
- (2) Locating aboveground piping, regulators, and meters on the gable end of buildings
- (3) Adding support to aboveground piping, regulators, and meters or securing them to the structure to withstand snow and ice load
- (4) Installing dedicated covers for regulators and meters that are designed to withstand a vertical static load equal to two times the ground snow load (psf) for the area but not less than 350 psf
- (5) Locating aboveground piping, regulators, and meters in an elevated and protected location under extended roof overhangs and eaves. The equipment should be located near the elevation of the bottom of the eave or overhang. If the equipment is located too far below the eave or overhang, snow shedding from the roof can curl back under the eave and impact equipment. See Figure A.6.4819.1 of NFPA 58.

[58:A.6.4819.1]

69.3.12 LP-Gas Systems in Buildings or on Building Roofs or Exterior Balconies.

69.3.12.1 Application.

69.3.12.1.1 Subsection 69.3.12 shall apply to the installation of the following LP-Gas systems in buildings or structures:

- (1) Cylinders inside of buildings or on the roofs or exterior balconies of buildings
- (2) Systems in which the liquid is piped from outside containers into buildings or onto the roof

[58:6.2223.1.1]

69.3.12.1.2 The phrase *cylinders in use* shall mean connected for use. [58:6.2223.1.2]

69.3.12.1.2.1 The use of cylinders indoors shall be only for the purposes specified in 6.2223.4 through 6.2223.10 of NFPA 58. [58:6.2223.1.2(A)]

69.3.12.1.2.2 The use of cylinders indoors shall be limited to those conditions where operational requirements make the indoor use of cylinders necessary and location outside is impractical. [58:6.2223.1.2(B)]

69.3.12.1.2.3 The use of cylinders on roofs shall be limited to those conditions where operational requirements make the use of cylinders necessary and location other than on roofs of buildings or structures is impractical. [58:6.2223.1.2(C)]

69.3.12.1.2.4 Liquid LP-Gas shall be piped into buildings or structures only for the purposes specified in 6.11.1.1 (E) of NFPA 58. [58:6.2223.1.2(D)]

69.3.12.1.3 Storage of cylinders awaiting use shall be in accordance with Chapter 8 of NFPA 58. [58:6.2223.1.3]

69.3.12.1.4 Transportation of cylinders within a building shall be in accordance with 6.2223.3.6 of NFPA 58. [58:6.2223.1.4]

69.3.12.1.5 The following provisions shall be required in addition to those specified in Sections 6.2 and 6.4 of NFPA 58:

- (1) Liquid transfer systems shall be in accordance with Chapter 7 of NFPA 58.
- (2) Engine fuel systems used inside buildings shall be in accordance with Chapter 11 of NFPA 58.
- (3) LP-Gas transport or cargo tank vehicles stored, serviced, or repaired in buildings shall be in accordance with Chapter 9 of NFPA 58.

[58:6.2223.1.5]

69.3.12.2 Additional Equipment Requirements for Cylinders, Equipment, Piping, and Appliances Used in Buildings, Building Roofs, and Exterior Balconies.

69.3.12.2.1 Cylinders shall be in accordance with the following:

- (1) Cylinders shall not exceed 245 lb (111 kg) water capacity [nominal 100 lb (45 kg) propane capacity] each.
- (2) Cylinders shall comply with other applicable provisions requirements of Section 5.2 of NFPA 58; and they shall be equipped as provided in Section 5.9 of NFPA 58.
- (3) Cylinders shall be marked in accordance with 5.2.8.1 and 5.2.8.2 of NFPA 58.
- (4) Cylinders with propane capacities greater than 2 lb (0.9 kg) shall be equipped as provided in Table 5.9.4.1(B) of NFPA 58, and an excess-flow valve shall be provided for vapor service when used indoors.
- (5) Cylinders with propane capacities greater than 2 lb (0.9 kg) shall be equipped with an excess-flow valve installed at the cylinder discharge when used indoors for vapor service. Cylinder valves shall be protected in accordance with 5.2.6.1 of NFPA 58.
- (6) Cylinder valves shall be protected in accordance with 5.2.6.1 of NFPA 58.
- (7) Cylinders having water capacities greater than 2.7 lb (1.2 kg) and connected for use shall stand on a firm and substantially level surface.
- (8) Cylinders shall be secured in an upright position if necessary.
- (9) Cylinders and the valve-protecting devices used with them shall be oriented to minimize the possibility of impingement of the pressure relief device discharge on the cylinder and adjacent cylinders.

[58:6.2223.2.1]

69.3.12.2.2 Manifolds and fittings connecting cylinders to pressure regulator inlets shall be designed for at least 250 psig (1.7 MPag) service pressure. [58:6.2223.2.2]

69.3.12.2.3 Piping shall comply with Section 5.11 of NFPA 58 and shall have a pressure rating of 250 psig (1.7 MPa). [58:6.2223.2.3]

69.3.12.2.4 Liquid piping and vapor piping at pressures above 125 psig (0.9 MPa) shall be installed in accordance with 6.11.3 of NFPA 58. [58:6.2223.2.4]

69.3.12.2.5 Hose, hose connections, and flexible connectors shall comply with the following:

- (1) Hose used at pressures above 5 psig (34 kPa) shall be designed for a pressure of at least 350 psig (2.4 MPa).
- (2) Hose used at a pressure of 5 psig (34 kPa) or less and used in agricultural buildings not normally occupied by the public shall be designed for the operating pressure of the hose.
- (3) Hose shall comply with 5.11.6-7 of NFPA 58.
- (4) Hose shall be installed in accordance with 6.23.24.4 of NFPA 58.
- (5) Hose shall be as short as practical, without kinking or straining the hose or causing it to be close enough to a burner to be damaged by heat.
- (6) Hoses greater than 10 ft (3 m) in length shall be protected from damage.

[58:6.2223.2.5]

69.3.12.2.6* Portable heaters, including salamanders, shall comply with the following:

- (1) Portable heaters shall be equipped with an approved automatic device to shut off the flow of gas to the main burner and to the pilot, if used, in the event of flame extinguishment or combustion failure.
- (2) Portable heaters shall be self-supporting unless designed for cylinder mounting.
- (3) Portable heaters shall not be installed utilizing cylinder valves, connectors, regulators, manifolds, piping, or tubing as structural supports.
- (4) Portable heaters having an input of more than 50,000 Btu/hr (53 MJ/hr) shall be equipped with either a pilot that must be lighted and proved before the main burner can be turned on or an approved electric ignition system.

[58:6.2223.2.6]

A.69.3.12.2.6 The requirement for a pilot or an electronic ignition system became effective for heaters with inputs over 50,000 Btu/hr (53 MJ/hr) manufactured on or after May 17, 1967. [58:A.6.2223.2.6]

69.3.12.2.7 The provisions of 6.23.2.6 shall not be applicable to the following:

- (1) Tar kettle burners, hand torches, or melting pots
- (2) Portable heaters with less than 7500 Btu/hr (8 MJ/hr) input if used with cylinders having a maximum water capacity of 2.7 lb (1.2 kg) and filled with not more than 16.8 oz (0.522 kg) of LP-Gas

[58:6.2223.2.7]

69.3.12.3 Buildings Under Construction or Undergoing Major Renovation.

69.3.12.3.1 Where cylinders are used and transported in buildings or structures under construction or undergoing major renovation and such buildings are not occupied by the public, the requirements of 69.3.12.3.2 through 69.3.12.3.10 shall apply. [58:6.2223.4.1]

69.3.12.3.2 The use and transportation of cylinders in the unoccupied portions of buildings or structures under construction or undergoing major renovation that are partially occupied by the public shall be approved by the AHJ. [58:6.2223.4.2]

69.3.12.3.3 Cylinders, equipment, piping, and appliances shall comply with 69.3.12.2. [58:6.2223.4.3]

69.3.12.3.4 Heaters used for temporary heating shall be located at least 6 ft (1.8 m) from any cylinder. (See 69.3.12.3.5 for an exception to this requirement.) [58:6.2223.4.4]

69.3.12.3.5 Integral heater-cylinder units specifically designed for the attachment of the heater to the cylinder, or to a supporting standard attached to the cylinder, and designed and installed to prevent direct or radiant heat application to the cylinder shall be exempt from the spacing requirement of 69.3.12.3.4. [58:6.2223.4.5]

69.3.12.3.6 Blower-type and radiant-type units shall not be directed toward any cylinder within 20 ft (6.1 m). [58:6.2223.4.6]

69.3.12.3.7 If two or more heater-cylinder units of either the integral or nonintegral type are located in an unpartitioned area on the same floor, the cylinder(s) of each such unit shall be separated from the cylinder(s) of any other such unit by at least 20 ft (6.1 m). [58:6.2223.4.7]

69.3.12.3.8 If heaters are connected to cylinders manifolded together for use in an unpartitioned area on the same floor, the total water capacity of cylinders manifolded together serving any one heater shall not be greater than 735 lb (333 kg) [nominal 300 lb (136 kg) propane capacity]. If there is more than one such manifold, it shall be separated from any other by at least 20 ft (6.1 m). [58:6.2223.4.8]

69.3.12.3.9 Where cylinders are manifolded together for connection to a heater(s) on another floor, the following shall apply.

- (1) Heaters shall not be installed on the same floors with manifolded cylinders.
- (2) The total water capacity of the cylinders connected to any one manifold shall not be greater than 2450 lb (1111 kg) [nominal 1000 lb (454 kg) propane capacity].
- (3) Manifolds of more than 735 lb (333 kg) water capacity [nominal 300 lb (136 kg) propane capacity], if located in the same unpartitioned area, shall be separated from each other by at least 50 ft (15 m).

[58:6.2223.4.9]

69.3.12.3.10 Where compliance with the provisions of 69.3.12.3.6 through 69.3.12.3.9 is impractical, alternate installation provisions shall be allowed with the approval of the AHJ. [58:6.2223.4.10]

69.3.12.4 Buildings Undergoing Minor Renovation When Frequented by the Public.

69.3.12.4.1 Cylinders used and transported for repair or minor renovation in buildings frequented by the public during the hours the public normally occupies the building shall comply with the following:

- (1) The maximum water capacity of individual cylinders shall be 50 lb (23 kg) [nominal 20 lb (9.1 kg) propane capacity], and the number of cylinders in the building shall not exceed the number of workers assigned to the use of the propane.
- (2) Cylinders having a water capacity greater than 2.7 lb (1.2 kg) shall not be left unattended.

[58:6.2223.5.1]

69.3.12.4.2 During the hours the building is not open to the public, cylinders used and transported within the building for repair or minor renovation and with a water capacity greater than 2.7 lb (1.2 kg) shall not be left unattended. [58:6.2223.5.2]

69.3.12.5 Buildings Housing Industrial Occupancies.

69.3.12.5.1 Cylinders used in buildings housing industrial occupancies for processing, research, or experimental purposes shall comply with 69.3.12.5.1.1 and 69.3.12.5.1.2. [58:6.2223.6.1]

69.3.12.5.1.1 If cylinders are manifolded together, the total water capacity of the connected cylinders shall be not more than 735 lb (333 kg) [nominal 300 lb (136 kg) propane capacity]. If there is more than one such manifold in a room, it shall be separated from any other by at least 20 ft (6.1 m). [58:6.2223.6.1(A)]

69.3.12.5.1.2 The amount of LP-Gas in cylinders for research and experimental use in the building shall be limited to the smallest practical quantity. [58:6.2223.6.1(B)]

69.3.12.5.2 The use of cylinders to supply fuel for temporary heating in buildings housing industrial occupancies with essentially noncombustible contents shall comply with the requirements in 69.3.12.3 for cylinders in buildings under construction. [58:6.2223.6.2]

69.3.12.5.3 The use of fuel cylinders for temporary heating shall be permitted only where a portable appliance for space heating is essential and a permanent heating installation is not practical. [58:6.2223.6.3]

69.3.12.6 Buildings Housing Educational and Institutional Occupancies.

69.3.12.6.1 The use of cylinders in classrooms shall be prohibited unless they are used temporarily for classroom demonstrations in accordance with 69.3.12.8.1. [58:6.2223.7.1]

69.3.12.6.2 Where cylinders are used in buildings housing educational and institutional laboratory occupancies for research and experimental purposes, the following shall apply:

- (1) The maximum water capacity of individual cylinders used shall be 50 lb (23 kg) [nominal 20 lb (9.1 kg) propane capacity] if used in educational occupancies and 12 lb (5.4 kg) [nominal 5 lb (2 kg) propane capacity] if used in institutional occupancies.
- (2) If more than one such cylinder is located in the same room, the cylinders shall be separated by at least 20 ft (6.1 m).
- (3) Cylinders not connected for use shall be stored in accordance with Chapter 8 of NFPA 58.
- (4) Cylinders shall not be stored in a laboratory room.

[58:6.2223.7.2]

69.3.12.7 Temporary Heating and Food Service Appliances in Buildings in Emergencies.

69.3.12.7.1 Cylinders shall not be used in buildings for temporary emergency heating purposes except when all of the following conditions are met:

- (1) The permanent heating system is temporarily out of service.
- (2) Heat is necessary to prevent damage to the buildings or contents.
- (3) The cylinders and heaters comply with, and are used and transported in accordance with, 69.3.12.2 and 69.3.12.3.
- (4) The temporary heating appliance is not left unattended.
- (5) Air for combustion and ventilation is provided in accordance with NFPA 54.

[58:6.2223.8.1]

69.3.12.7.2 When a public emergency has been declared and gas, fuel, or electrical service has been interrupted, portable listed LP-Gas commercial food service appliances meeting the requirements of 69.3.12.8.4 shall be permitted to be temporarily used inside affected buildings. [58:6.2223.8.2]

69.3.12.7.3 The portable appliances used shall be discontinued and removed from the building at the time the permanently installed appliances are placed back in operation. [58:6.2223.8.3]

69.3.12.8 Use in Buildings for Demonstrations or Training, and Use of Small Cylinders for Self-Contained Torch Assemblies and Food Service Appliances.

69.3.12.8.1 Cylinders used temporarily inside buildings for public exhibitions or demonstrations, including use in classroom demonstrations, shall be in accordance with the following:

- (1) The maximum water capacity of a cylinder shall be 12 lb (5.4 kg) [nominal 5 lb (2 kg) propane capacity].
- (2) If more than one such cylinder is located in a room, the cylinders shall be separated by at least 20 ft (6.1 m).

[58:6.2223.9.1]

69.3.12.8.2 Cylinders used temporarily in buildings for training purposes related to the installation and use of LP-Gas systems shall be in accordance with the following:

- (1) The maximum water capacity of individual cylinders shall be 245 lb (111 kg) [nominal 100 lb (45 kg) propane capacity], but not more than 20 lb (9.1 kg) of propane shall be placed in a single cylinder.
- (2) If more than one such cylinder is located in the same room, the cylinders shall be separated by at least 20 ft (6.1 m).
- (3) The training location shall be acceptable to the AHJ.
- (4) Cylinders shall be promptly removed from the building when the training class has terminated.

[58:6.2223.9.2]

69.3.12.8.3* Cylinders used in buildings as part of approved self-contained torch assemblies or similar appliances shall be in accordance with the following:

- (1) Cylinders used in buildings shall comply with UL 147A, *Nonrefillable (Disposable) Type Fuel Gas Cylinder Assemblies*.
- (2) Cylinders shall have a maximum water capacity of 2.7 lb (1.2 kg).

[58:6.2223.9.3]

A.69.3.12.8.3 The weight of the cylinders will be affected by the specific gravity of the LP-Gas. Weights varying from 16.0 oz to 16.8 oz (454 g to 476 g) are recognized as being within the range of what is nominal.

[58:A.6.2223.9.3]

69.3.12.8.4 Cylinders used with commercial food service appliances shall be used inside restaurants and in attended commercial food catering operations in accordance with the following:

- (1) Cylinders and appliances shall be listed.
- (2) Commercial food service appliances shall not have more than two 10 oz (296 ml) nonrefillable butane gas cylinders, each having a maximum capacity of 1.08 lb (0.490 kg).
- (3) Cylinders shall comply with UL 147B, *Nonrefillable (Disposable) Type Metal Container Assemblies for Butane*.
- (4) Cylinders shall be connected directly to the appliance and shall not be manifolded.
- (5) Cylinders shall be an integral part of the listed, approved, commercial food service device and shall be connected without the use of a rubber hose.
- (6) Storage of cylinders shall be in accordance with 8.3.1 of NFPA 58.

[58:6.222.9.4]

69.3.12.9 Cylinders on Roofs or Exterior Balconies.

69.3.12.9.1 Where cylinders are installed permanently on roofs of buildings, the buildings shall be of fire-resistant construction or noncombustible construction having essentially noncombustible contents, or of other construction or contents that are protected with automatic sprinklers. [58:6.2223.11.1]

69.3.12.9.1.1 The total water capacity of cylinders connected to any one manifold shall be not greater than 980 lb (445 kg) [nominal 400 lb (181 kg) propane capacity]. If more than one manifold is located on the roof, it shall be separated from any other by at least 50 ft (15 m). [58:6.223.11.1(A)]

69.3.12.9.1.2 Cylinders shall be located in areas where there is free air circulation, at least 10 ft (3 m) from building openings (such as windows and doors), and at least 20 ft (6.1 m) from air intakes of air-conditioning and ventilating systems. [58:6.2223.11.1(B)]

69.3.12.9.1.3 Cylinders shall not be located on roofs that are entirely enclosed by parapets more than 18 in. (460 mm) high unless the parapets are breached with low-level ventilation openings not more than 20 ft (6.1 m) apart, or unless all openings communicating with the interior of the building are at or above the top of the parapets. [58:6.2223.11.1(C)]

69.3.12.9.1.4 Piping shall be in accordance with 69.3.12.2.3 through 69.3.12.2.5. [58:6.2223.11.1(D)]

69.3.12.9.1.5 Hose shall not be used for connection to cylinders. [58:6.2223.11.1(E)]

69.3.12.9.1.6 The fire department shall be advised of each installation. [58:6.2223.11.1(F)]

69.3.12.9.2 Cylinders having water capacities greater than 2.7 lb (1 kg) [nominal 1 lb (0.5 kg) LP-Gas capacity] shall not be located on decks or balconies of dwellings of two or more living units above the first floor unless they are served by exterior stairways. [58:6.2223.11.2]

69.3.13 Installation of Appliances Other Than on Vehicles.

69.3.13.1 Installation of Patio Heaters.

69.3.13.1.1 Patio heaters utilizing an integral LP-Gas container greater than 1.08 lb (0.49 kg) propane capacity shall comply with 69.3.13.1.2 and 69.3.13.1.3. [58:6.23.224.1.1]

69.3.13.1.2 Patio heaters shall be listed and used in accordance with their listing and the manufacturer's instructions. [58:6.23.224.1.2]

69.3.13.1.3 Patio heaters shall not be located within 5 ft (1.5 m) of exits from an assembly occupancy. [58:6.23.224.1.3]

69.3.13.2 Hose for Portable Appliances.

69.3.13.2.1 The requirements of 69.3.13 shall apply to hoses used on the low-pressure side of regulators to connect portable appliances. [58:6.2324.4.1]

69.3.13.2.2 Where used inside buildings, the following shall apply:

- (1) The hose shall be the minimum practical length and shall be in accordance with 69.3.12.2.5.
- (2) The hose shall not extend from one room to another or pass through any partitions, walls, ceilings, or floors except as provided by 69.3.12.3.9.

(3) The hose shall not be concealed from view or used in concealed locations.

[58:6.2324.4.2]

69.3.13.2.3 Where installed outside of buildings, the following shall apply:

1. The hose length shall be permitted to exceed 10 ft (3.3 m).

+2. The hose shall be as short as practical. [58:6.2324.4.3]

69.3.13.2.4 Hose shall be securely connected to the appliance. [58:6.2324.4.4]

69.3.13.2.5 The use of rubber slip ends shall not be permitted. [58:6.2324.4.5]

69.3.13.2.6 A shutoff valve shall be provided in the piping immediately upstream of the inlet connection of the hose.

[58:6.2324.4.6]

69.3.13.2.7 Where more than one such appliance shutoff valve in accordance with 6.24.4.6 of NFPA 58 is located near

another, the valves shall be marked to indicate which appliance is connected to each valve. [58:6.2324.4.7]

69.3.13.2.8 Hose shall be protected against physical damage. [58:6.2324.4.8]

69.3.14 LP-Gas Systems on Vehicles (Other Than Engine Fuel Systems).

69.3.14.1* **Application.** This section shall apply to nonengine fuel systems on all vehicles. Subsection 69.3.14 shall apply to the following:

(1) Nonengine fuel systems on all vehicles

(2) Installations served by exchangeable (removable) cylinder systems and by permanently mounted containers

[58:6.2627.1]

A.69.3.14.1 Typical nonengine fuel systems include those on commercial, industrial, construction, and public service vehicles such as trucks, semitrailers, trailers, portable tar kettles, road surface heating equipment, mobile laboratories, clinics, and mobile cooking units (such as catering and canteen vehicles). [58:A.6.26.1]

69.3.14.2 **Nonapplication.** Subsection 69.3.14 shall not apply to the following:

(1) Systems installed on mobile homes

(2) Systems installed on recreational vehicles

(3) Systems installed on mobile food facilities (see Chapter 16 of NFPA 58)

(4) Cargo tank vehicles, cargo tank vehicles (including trailers and semitrailers), and similar units used to transport LP-Gas as cargo, which are covered by (see Chapter 9 of NFPA 58)

(4) LP-Gas engine fuel systems on the vehicles, which are covered by (see Chapter 11 of NFPA 58)

[58:6.2627.2]

69.3.14.3 **Container Installation Requirements.**

69.3.14.3.1 Containers shall comply with 69.3.14.3.1.1 through 69.3.14.3.1.5. [58:6.2627.3.1]

69.3.14.3.1.1 ASME mobile containers shall be in accordance with one of the following:

(1) A MAWP of 312 psig (2.2 MPag) or higher where installed in enclosed spaces of vehicles

(2) A MAWP of 312 psig (2.2 MPag) or higher where installed on passenger vehicles

(3) A MAWP of 250 psig (1.7 MPag) or higher for containers where installed on the exterior of nonpassenger vehicles

[58:6.2627.3.1(A)]

69.3.14.3.1.2 LP-Gas fuel containers used on passenger-carrying vehicles shall not exceed 200 gal (0.8 m³) aggregate water capacity. [58:6.2627.3.1(B)]

69.3.14.3.1.3 The capacity of individual LP-Gas containers on highway nonpassenger vehicles shall be either less than or equal to 1000 gal (3.8 m³) water capacity or be in accordance with U.S. Department of Transportation regulations.

[58:6.2627.3.1(C)]

69.3.14.3.1.4 The capacity of cargo tank motor vehicles shall not be limited by NFPA 58. [58:6.2627.3.1(D)]

69.3.14.3.1.5 Containers designed for stationary service only and not in compliance with the container appurtenance protection requirements of 5.2.6 of NFPA 58 shall not be used. [58:6.2627.3.1(E)]

69.3.14.3.2 ASME containers and cylinders utilized used for the purposes covered by 69.3.14 shall not be installed, transported, or temporarily or permanently stored (even temporarily) inside any vehicle covered by 69.3.14, except for ASME containers installed in accordance with 69.3.14.3.4.9, Chapter 9 of NFPA 58, or DOT regulations. [58:6.2627.3.2]

69.3.14.3.3 The LP-Gas supply system, including the containers, and pressure regulators shall be installed either on the outside of the vehicle or in a recess or cabinet vaportight to the inside of the vehicle but accessible from and vented to the outside, with the vents located near the top and bottom of the enclosure and 3 ft (1 m) horizontally away from any opening into the vehicle below the level of the vents. [58:6.2627.3.3]

69.3.14.3.4 Containers shall be mounted securely on the vehicle or within the enclosing recess or cabinet. [58:6.26.3.4]

69.3.14.3.4.1 Containers shall be installed with road clearance in accordance with 11.8.3 of NFPA 58. [58:6.2627.3.34(A)]

69.3.14.3.4.2 Fuel containers shall be installed mounted to prevent recess or cabinet or jarring loose and slipping or rotating, and with the fastenings shall be designed and constructed to withstand, without permanent visible deformation, static loading in any direction equal to four times the weight of the container filled with fuel. [58:6.2627.3.43(B)]

69.3.14.3.4.3 Where containers are installed mounted within a vehicle housing, the securing of the housing to the vehicle shall comply with this provision. Any removable portions of the housing or cabinet shall be secured while in transit.

[58:6.2627.3.43(C)]

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69.3.14.3.4.4 Field welding on containers shall be limited to attachments to nonpressure parts ~~such as saddle plates, wear plates, or brackets~~ applied by the container manufacturer. [58:6.2627.3.43(D)]

69.3.14.3.4.5 All container valves, appurtenances, and connections shall be protected to prevent damage from accidental contacts with stationary objects; from loose objects, stones, mud, or ice thrown up from the ground or floor; and from ~~damage due to an~~ overturn or similar vehicular accident. [58:6.2627.3.43(E)]

69.3.14.3.4.6 ~~Permanently mounted ASME containers shall be located on the vehicle to provide the protection specified in 69.3.14.3.4.5. [58:6.26.3.4(F)]~~

69.3.14.3.4.7-6 Cylinders shall have permanent protection for cylinder valves and connections. [58:6.2627.3.43(GF)]

69.3.14.3.4.8-7 Where cylinders are located on the outside of a vehicle, weather protection shall be provided.

[58:6.2627.3.43(HG)]

69.3.14.3.4.9-8 Containers ~~installed~~ mounted on the interior of passenger-carrying vehicles shall be installed in compliance with Section 11.9 of NFPA 58, ~~with~~ Pressure-pressure relief valve installations ~~in compliance for such containers shall comply with 11.8.5 of NFPA 58. [58:6.2627.3.43(HH)]~~

69.3.14.3.5 Cylinders installed on portable tar kettles alongside the kettle, on the vehicle frame, or on road surface heating equipment shall be protected from radiant or convected heat from open flame or other burners by the use of a heat shield or by the location of the cylinder(s) on the vehicle. In addition, the following shall apply:

- (1) Cylinder valves shall be closed when burners are not in use.
- (2) Cylinders shall not be refilled while burners are in use as provided in 7.2.3.2(B) of NFPA 58.

[58:6.2627.3.54]

69.3.14.4 Installation of Container Appurtenances.

69.3.14.4.1 Container appurtenances shall be installed in accordance with the following:

- (1) Pressure relief valve installation on ASME containers installed in the interior of vehicles complying with Section 11.9 of NFPA 58 shall comply with 11.8.5 of NFPA 58.
- (2) Pressure relief valve installations on ASME containers installed on the outside of vehicles shall comply with 11.8.5 of NFPA 58 and 69.3.14.3.3.
- (3) Main shutoff valves on containers for liquid and vapor shall be readily accessible.
- (4) Cylinders shall be designed to be filled in either the vertical or horizontal position, or if they are the universal type, they are permitted to be filled in either position.
- (5) All ASME container inlets, outlets, or valves installed in container inlets or outlets, except pressure relief devices and gauging devices, shall be labeled to designate whether they communicate with the vapor or liquid space.
- (6) Containers from which only vapor is to be withdrawn shall be installed and equipped with connections to minimize the possibility of the accidental withdrawal of liquid.

[58:6.2627.4.1]

69.3.14.4.2 Regulators shall be installed in accordance with 6.10.2 of NFPA 58 and 69.3.14.4.2.1 through 69.3.14.4.2.5.

[58:6.2627.4.2]

69.3.14.4.2.1 Regulators shall be installed with the pressure relief vent opening pointing vertically downward to allow for drainage of moisture collected on the diaphragm of the regulator. [58:6.2627.4.2(A)]

69.3.14.4.2.2 Regulators not installed in compartments shall be equipped with a durable cover designed to protect the regulator vent opening from sleet, snow, freezing rain, ice, mud, and wheel spray. [58:6.2627.4.2(B)]

69.3.14.4.2.3 ~~If vehicle-mounted,~~ Regulators ~~are~~ installed at or below the floor level; ~~they~~ shall be installed in a compartment that provides protection against the weather and wheel spray. [58:6.2627.4.2(C)]

69.3.14.4.2.4 Regulator compartments shall comply with the following:

- (1) The compartment shall be of sufficient size to allow tool operation for connection to and replacement of the regulator(s).
- (2) The compartment shall be vaportight to the interior of the vehicle.
- (3) The compartment shall have a 1 in.² (650 mm²) minimum vent opening to the exterior located within 1 in. (25 mm) of the bottom of the compartment.
- (4) The compartment shall not contain flame or spark-producing equipment.

[58:6.2627.4.2(D)]

69.3.14.4.2.5 A regulator vent outlet shall be at least 2 in. (51 mm) above the compartment vent opening. [58:6.2627.4.2(E)]

69.3.14.5 Piping.

69.3.14.5.1 Piping shall be installed in accordance with 6.11.3 of NFPA 58 and 69.3.14.5.1.1 through 69.3.14.5.1.13.

[58:6.2627.5.1]

69.3.14.5.1.1 Steel tubing shall have a minimum wall thickness of 0.049 in. (1.2 mm). [58:6.2627.5.1(A)]

69.3.14.5.1.2 A flexible connector shall be installed between the regulator outlet and the fixed piping system to protect against expansion, contraction, jarring, and vibration strains. [58:6.2627.5.1(B)]

69.3.14.5.1.3 Flexibility shall be provided in the piping between a cylinder and the gas piping system or regulator.

[58:6.2627.5.1(C)]

69.3.14.5.1.4 Flexible connectors shall be installed in accordance with 6.11.6-7 of NFPA 58. [58:6.2627.5.1(D)]

69.3.14.5.1.5 Flexible connectors longer than the length allowed in the *Code*, or fuel lines that incorporate hose, shall be used only where approved. [58:6.2627.5.1(E)]

69.3.14.5.1.6 The fixed piping system shall be designed, installed, supported, and secured to minimize the possibility of damage due to vibration, strains, or wear and to preclude any loosening while in transit. [58:6.2627.5.1(F)]

69.3.14.5.1.7 Piping shall be installed in a protected location. [58:6.2627.5.1(G)]

69.3.14.5.1.8 Where piping is installed outside the vehicle, it shall be installed as follows:

- (1) Piping shall be under the vehicle and below any insulation or false bottom.
- (2) Fastening or other protection shall be installed to prevent damage due to vibration or abrasion.
- (3) At each point where piping passes through sheet metal or a structural member, a rubber grommet or equivalent protection shall be installed to prevent chafing.

[58:6.2627.5.1(H)]

69.3.14.5.1.9 Gas piping shall be installed to enter the vehicle through the floor directly beneath or adjacent to the appliance served. [58:6.2627.5.1(I)]

69.3.14.5.1.10 If a branch line is installed, the tee connection shall be located in the main gas line under the floor and outside the vehicle. [58:6.2627.5.1(J)]

69.3.14.5.1.11 Exposed parts of the fixed piping system either shall be of corrosion-resistant material or shall be coated or protected to minimize exterior corrosion. [58:6.2627.5.1(K)]

69.3.14.5.1.12 Hydrostatic relief valves shall be installed in isolated sections of liquid piping as provided in Section 6.45-16 of NFPA 58. [58:6.2627.5.1(L)]

69.3.14.5.1.13 Piping systems, including hose, shall be proven free of leaks in accordance with Section 6.46-17 of NFPA 58. [58:6.2627.5.1(M)]

69.3.14.5.2 There shall be no fuel connection between a tractor and trailer or other vehicle units. [58:6.2627.5.2]

69.3.14.6 Equipment Installation.

Equipment shall be installed in accordance with Section 6.20-21 of NFPA 58 and 69.3.14.6.1 and 69.3.14.6.2. [58:6.2627.6]

69.3.14.6.1 Installation shall be made in accordance with the manufacturer's recommendations and, in the case of approved equipment, as provided in the approval. [58:6.2627.6.1]

69.3.14.6.2 Equipment installed on vehicles shall be protected against vehicular damage as provided for container appurtenances and connections in 69.3.14.3.4.5. [58:6.2627.6.2]

69.3.14.7 Appliance Installation on Vehicles.

69.3.14.7.1 Paragraph 69.3.14.7 shall apply to the installation of all appliances on vehicles. It shall not apply to engines. [58:6.2627.7.1]

69.3.14.7.2 All appliances covered by 69.3.14.7 installed on vehicles shall be approved. [58:6.2627.7.2]

69.3.14.7.3 Where the device or appliance, such as a cargo heater or cooler, is designed to be in operation while the vehicle is in transit, means, such as an excess-flow valve to stop the flow of gas in the event of a line break, shall be installed. [58:6.2627.7.3]

69.3.14.7.4 Gas-fired heating appliances shall be equipped with shutoffs in accordance with 5.2324.78(A) of NFPA 58, except for portable heaters used with cylinders having a maximum water capacity of 2.7 lb (1.2 kg), portable torches, melting pots, and tar kettles. [58:6.2627.7.4]

69.3.14.7.5 Gas-fired heating appliances, other than ranges and illuminating appliances installed on vehicles intended for human occupancy, shall be designed or installed to provide for a complete separation of the combustion system from the atmosphere inside the vehicle. [58:6.2627.7.5]

69.3.14.7.6* Where unvented-type heaters that are designed to protect cargo are used on vehicles not intended for human occupancy, provisions shall be made to provide air from the outside for combustion and dispose of the products of combustion to the outside. [58:6.2627.7.6]

A.69.3.14.7.6 Requirements for the design of containers are located in Section 5.2 of NFPA 58. Requirements for container appurtenances are located in Section 5.9 of NFPA 58. [58:A.6.2627.7.6]

69.3.14.7.7 Appliances installed in the cargo space of a vehicle shall be readily accessible whether the vehicle is loaded or empty. [58:6.2627.7.7]

69.3.14.7.8 Appliances shall be constructed or otherwise protected to minimize possible damage or impaired operation due to cargo shifting or handling. [58:6.2627.7.8]

69.3.14.7.9 Appliances shall be located so that a fire at any appliance will not block egress of persons from the vehicle. [58:6.2627.7.9]

69.3.14.7.10 A permanent caution plate shall be affixed to either the appliance or the vehicle outside of any enclosure. [58:6.2627.7.10]

69.3.14.7.10.1 The caution plate shall be adjacent to the container(s). [58:6.2627.7.10.1]

69.3.14.7.10.2 The caution plate shall include the following text:

CAUTION:

- (1) Be sure all appliance valves are closed before opening container valve.

- (2) Connections at the appliances, regulators, and containers shall be checked periodically for leaks with soapy water or its equivalent.
- (3) Never use a match or flame to check for leaks.
- (4) Container valves shall be closed when equipment is not in use.

[58:6.2627.7.10.2]

69.3.14.7.11 Gas-fired heating appliances and water heaters shall be equipped with automatic devices designed to shut off the flow of gas to the main burner and the pilot in the event the pilot flame is extinguished. [58:6.2627.7.11]

69.3.14.8 Parking, Servicing, and Repair.

69.3.14.8.1 Where vehicles with LP-Gas fuel systems used for purposes other than propulsion are parked, serviced, or repaired inside buildings, the requirements of 69.3.14.8.2 through 69.3.14.8.4 shall apply. [58:6.2627.8.1]

69.3.14.8.2 The fuel system shall be leak-free, and the container(s) shall not be filled beyond the limits specified in Chapter 7 of NFPA 58. [58:6.2627.8.2]

69.3.14.8.3 The container shutoff valve shall be closed, except that the container shutoff valve shall not be required to be closed when fuel is required for test or repair. [58:6.2627.8.3]

69.3.14.8.4 The vehicle shall not be parked near sources of heat, open flames, or similar sources of ignition, or near unventilated pits. [58:6.2627.8.4]

69.3.14.8.5 Vehicles having containers with water capacities larger than 300 gal (1.1 m³) shall comply with the requirements of Section 9.7 of NFPA 58. [58:6.2627.8.5]

69.3.15 Vehicle Fuel Dispenser and Dispensing Systems.

69.3.15.1 Application.

69.3.15.1.1 Subsection 69.3.15 includes the location, installation, and operation of vehicle fuel dispensers and dispensing systems. [58:6.2728.1.1]

69.3.15.1.2 The provisions of 69.3.3 and 69.3.5, as modified by 69.3.15, shall apply. [58:6.2728.1.2]

69.3.15.2 Location.

69.3.15.2.1 Location of vehicle fuel dispensers and dispensing systems shall be in accordance with Table 69.3.7.2.1.

[58:6.2728.2.1]

69.3.15.2.2 Vehicle fuel dispensers and dispensing systems shall be located away from pits in accordance with Table 69.3.7.2.1, with no drains or blow-offs from the unit directed toward or within 15 ft (4.6 m) of a sewer system's opening.

[58:6.2728.2.2]

69.3.15.3 General Installation Provisions.

69.3.15.3.1 Vehicle fuel dispensers and dispensing systems shall be installed in accordance with the manufacturer's installation instructions. [58:6.2728.3.1]

69.3.15.3.2 Vehicle fuel dispensers and dispensing systems shall not be located within a building or structure, unless they comply with Chapter 10 of NFPA 58. [58:6.2728.3.2]

69.3.15.3.3 No more than 50 percent of the perimeter of an area where a dispenser or dispensing system is located shall be enclosed. [58:6.2728.3.3]

69.3.15.3.4 A weather shelter or canopy shall be permitted to cover the working space for the filling operation. [58:6.2728.3.4]

69.3.15.3.5 Control for the pump used to transfer LP-Gas through the unit into containers shall be provided at the device in order to minimize the possibility of leakage or accidental discharge. [58:6.2728.3.5]

69.3.15.3.6 A device that shuts off the flow of gas when flow exceeds the predetermined flow rate shall be installed as close as practical to the point where the dispenser hose connects to the liquid piping and upstream of the hose. [58:6.2728.3.6]

69.3.15.3.7 Piping and the dispensing hose shall be provided with hydrostatic relief valves in accordance with Section 6.15.16 of NFPA 58. [58:6.2728.3.7]

69.3.15.3.8 Protection against trespassing and tampering shall be in accordance with 6.24.22.4 of NFPA 58. [58:6.2728.3.8]

69.3.15.3.9 The container liquid withdrawal opening used with vehicle fuel dispensers and dispensing ~~systems stations~~ shall be equipped with one of the following:

- (1) An internal valve fitted for remote closure and automatic shutoff using thermal (fire) actuation
- (2) A positive shutoff valve that is located as close to the container as practical and an excess-flow valve installed in the container, plus an emergency shutoff valve that is fitted for remote closure and installed downstream in the line as close as practical to the positive shutoff valve

[58:6.2728.3.9]

69.3.15.3.10 ~~An identified and accessible~~ At least one remote ~~emergency~~ shutdown ~~device~~ shall be installed for either the internal valve or the emergency shutoff valve required by 69.3.15.3.9(1) or 69.3.15.3.9(2). ~~shall be installed not less than 3 ft (1 m) or more than 100 ft (30 m) from the liquid transfer point.~~ [58:6.2728.3.10]

69.3.15.3.10.1 The shutdown device shall comply with the requirements of Section 4.10 of NFPA 58 except as permitted by 69.3.15.10.2. [58:6.28.3.10.1]

69.3.15.3.10.2 The minimum distance required by 69.3.9.4(3) shall be permitted to be reduced to 3 ft (0.9 m).

[58:6.28.3.10.2]

69.3.15.3.11 Emergency shutoff valves and internal valves that are fitted for remote closure as required in this section shall be tested annually for proper operation. [58:6.2728.3.11]

69.3.15.3.12 A manual shutoff valve and an excess-flow check valve shall be located in the liquid line between the pump and the dispenser inlet where the dispensing device is installed at a remote location and is not part of a complete storage and dispensing unit mounted on a common base. [58:6.2728.3.12]

69.3.15.3.13 All dispensers shall be installed either on a concrete foundation or shall be part of a complete storage and dispensing unit mounted on a common base and installed in accordance with 6.8.3.51(F) of NFPA 58. [58:6.2728.3.13]

69.3.15.3.14 Vehicle barrier protection (VBP) shall be provided for containers serving liquid dispensers where those containers are located within 10 ft (3 m) of a vehicle thoroughfare or parking location in accordance with 69.3.15.3.14.1 or 69.3.15.3.14.2. [58:6.2728.3.14]

69.3.15.3.14.1 Concrete filled guard posts shall be constructed of steel not less than 4 in. (102 mm) in diameter, with the following characteristics:

- (1) Spaced not more than 4 ft (1200 mm) between posts on center
- (2) Set not less than 3 ft (900 mm) deep in a concrete footing of not less than 15 in. (380 mm) diameter
- (3) Set with the top of the posts not less than 3 ft (900 mm) above ground
- (4) Located not less than 3 ft (900 mm) from the protected installation

[58:6.2728.3.14(A)]

69.3.15.3.14.2* Equivalent protection in lieu of guard posts shall be approved, minimum of 3 ft (900 mm) in height and shall resist a force of 6000 lb (26,700 N) applied 3 ft (900 mm) above the adjacent ground surface. [58:6.2728.3.14(B)]

69.3.15.3.14.2

Other barriers are designed to be equal in proportion to the anticipated damages. For example, the height of a commonly used concrete "Jersey barrier" or heavy concrete blocks is typically less than 3 ft (0.9 m) tall and both have been effectively used as alternative means of equivalent protection in lieu of guard posts. Other examples of equivalent vehicle barrier protection include the guardrails and guard cables that are commonly seen along highways that help keep vehicles from leaving the roadway.

[58:A.6.28.3.14(B)]

69.3.15.3.15 Where the dispenser is not mounted on a common base with its storage container and the dispensing unit is located within 10 ft (3 m) of a vehicle thoroughfare, parking location, or an engine fuel filling station, the dispenser shall be provided with VBP. [58:6.2728.3.15]

69.3.15.3.16 Dispensers shall be protected from physical damage. [58:6.2728.3.16]

69.3.15.3.17 A listed quick-acting shutoff valve shall be installed at the discharge end of the transfer hose. [58:6.2728.3.17]

69.3.15.3.18 *At least one remote shutdown device in accordance with Section 4.10 of NFPA 58 shall be installed for the electrical supply. An identified and accessible switch or circuit breaker shall be installed outside at a location not less than 20 ft (6 m) or more than 100 ft (30 m) from the dispenser to shut off the power in the event of a fire, an accident, or other emergency.* [58:6.2728.3.18]

69.3.15.3.19 The markings for the switches or breakers shall be visible at the point of liquid transfer. [58:6.2728.3.19]

69.3.15.4 Installation of Vehicle Fuel Dispensers.

69.3.15.4.1 Hose shall comply with the following:

- (1) Hose length shall not exceed 18 ft (5.5 m) unless approved by the AHJ.
- (2) All hose shall be listed.
- (3) When not in use, the hose shall be secured to protect the hose from damage.

[58:6.2728.3.204.1]

69.3.15.4.2 A listed emergency breakaway device shall be installed and shall comply with UL 567, *Emergency Breakaway Fittings, Swivel Connectors, and Pipe-Connection Fittings for Petroleum Products and LP-Gas*, and be designed to retain liquid on both sides of the breakaway point, or other devices affording equivalent protection approved by the AHJ.

[58:6.2728.4.12]

69.3.15.4.3 Vehicle fuel dispensers shall be located as follows:

- (1) Conventional systems shall be at least 10 ft (3.0 m) from any dispensing device for Class I or Class II liquids.
- (2) Low-emission transfer systems in accordance with 6.3031.5 of NFPA 58 shall be at least 5 ft (2 m) from any dispensing device for Class I or Class II liquids.

[58:6.2728.4.23]

69.4 LP-Gas Liquid Transfer.

69.4.1* Scope.

A.69.4.1 Ignition source control at transfer locations is covered in Section 6.25-26 of NFPA 58. Fire protection is covered in Section 6.29-30 of NFPA 58. [58:A.7.1]

69.4.1.1 Section 69.4 applies to the following types of transfers:

- (1) Transfer of liquid LP-Gas from one container to another wherever such a transfer involves connections and disconnections in the transfer system or the venting of LP-Gas to the atmosphere
- (2) Transfer of LP-Gas vapor between containers and from containers to the atmosphere

[58:7.1.1]

69.4.1.2 Section 69.4 also applies to operational safety and methods for determining the quantity of LP-Gas permitted in containers. [58:7.1.2]

69.4.2 Operational Safety.

69.4.2.1 Transfer Personnel.

69.4.2.1.1 Transfer operations shall be conducted by qualified personnel meeting the provisions of Section 4.4 of NFPA 58. [58:7.2.1.1]

69.4.2.1.2 At least one qualified person shall remain in attendance at the transfer operation from the time connections are made until the transfer is completed, shutoff valves are closed, and lines are disconnected. [58:7.2.1.2]

69.4.2.1.3 Transfer personnel shall exercise caution to ensure that the LP-Gases transferred are those for which the transfer system and the containers to be filled are designed. [58:7.2.1.3]

69.4.2.2 Filling and Evacuating of Containers.

69.4.2.2.1 Transfer of LP-Gas to and from a container shall be accomplished only by qualified individuals trained in proper handling and operating procedures meeting the requirements of Section 4.4 of NFPA 58 and in emergency response procedures. [58:7.2.2.1]

69.4.2.2.2 When noncompliance with Section 5.2 or Section 5.9 of NFPA 58 is found or it is determined in accordance with 69.4.2.2.7 that the container will not be filled, the container owner and user shall be notified in writing. [58:7.2.2.2]

69.4.2.2.3 Injection of compressed air, oxygen, or any oxidizing gas into containers to transfer LP-Gas liquid shall be prohibited. [58:7.2.2.3]

69.4.2.2.4 When evacuating a container owned by others, the qualified person(s) performing the transfer shall not inject any material other than LP-Gas into the container. [58:7.2.2.4]

69.4.2.2.5* Valve outlets on refillable cylinders of 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] or less shall be equipped with a redundant pressure-tight seal or one of the following listed connections: CGA 790, CGA 791, or CGA 810, as described in CGA V-1, *Standard for Compressed Gas Cylinder Valve Outlet and Inlet Connections*. [58:7.2.2.5]

A.69.4.2.2.5 Examples of an effective seal are a POL plug or cap. Listed quick-closing couplings with CGA V-1 connection numbers 790 (~~fork lift~~forklift ACME connection), 791 (portable cylinder ACME/POL connection), and 810 (socket/plug quick connection) have secondary seals. Therefore, plugs or caps for these connections are not required or recommended. [58:A.7.2.2.5]

69.4.2.2.6 Where redundant pressure seals are used, they shall be in place whenever the cylinder is not connected for use. [58:7.2.2.6]

69.4.2.2.7* Defects/Damage.

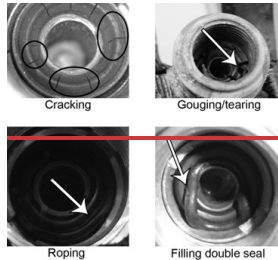
A.69.4.2.2.7 CGA 791 and 793 connections are primarily used on consumer LP-Gas equipment. Both connection designs employ the use of a face seal to seal the male and female sides of the connection before gas flow occurs. Damage to the face seal (e.g., cracking, gouging, tearing, roping) affects the sealing surfaces and could result in a leak. Examples of cracking, gouging/tearing, roping, ~~and~~-filling double seal, and missing face seal are shown in Figure A.69.4.2.2.7. [58:A.7.2.2.7]

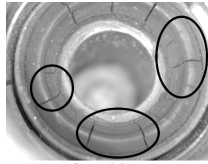
This inspection is intended to identify visible damage to the face seal, not to confirm whether the CGA 791 or CGA 793 connections are within dimensional tolerance. [58:A.7.2.2.7]

The photographs below depict examples of visible damage to a face seal that resulted in leakage when connected to an appliance. [58:A.7.2.2.7]

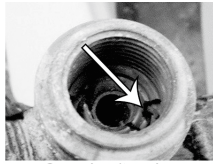
Training materials regarding the pre-fill inspection of cylinders, including the face seals, can be found in the Propane Education and Research Council (PERC) training program "Dispensing Propane Safely." [58:A.7.2.2.7]

Figure A.69.4.2.2.7 Examples of Defects. [Figure 58:A.7.2.2.7]

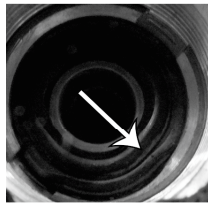




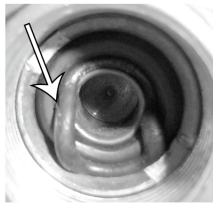
Cracking



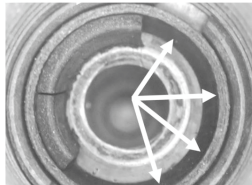
Gouging/tearing



Roping



Filling double seal



Missing face seal

The CGA 791 and 793 connections as manufactured do not permit the replacement of the face seal, and the face seal design is not the same for all manufacturers. Therefore, if the face seal has been compromised, the cylinder should not be filled. [58:A.7.2.2.7]

69.4.2.2.7.1 Prior to filling cylinders with CGA 791 and CGA 793 connections, the face seal shall be visually inspected for visible damage~~examined for defects~~. [58:7.2.2.7(A)]

69.4.2.2.7.2 If visible damage a defect on the face seal is found, the cylinder shall not be filled. [58:7.2.2.7(B)]

69.4.2.2.8 Nonrefillable (disposable) and new unused cylinders shall not be required to be equipped with valve outlet seals. [58:7.2.2.8]

69.4.2.2.9 Containers shall be filled only after determination that they comply with the design, fabrication, inspection, marking, and requalification provisions of NFPA 58. [58:7.2.2.9]

69.4.2.2.10 Prior to refilling a cylinder that has a cylinder sleeve, the cylinder sleeve shall be removed to facilitate the visual inspection of the cylinder. [58:7.2.2.10]

69.4.2.2.11 Cylinders required to have an overfilling prevention device (OPD) shall not be filled unless they are equipped with this device and a fixed maximum liquid level gauge. [58:7.2.2.11]

69.4.2.2.12 The requirements of 69.4.2.2.10 shall not apply to containers that comply with 5.2.9 of NFPA 58 and are included in the flight log of a hot air balloon. [58:7.2.2.12]

69.4.2.2.13 Hot air balloon containers shall not be required to be removed from the aircraft for filling. [58:7.2.2.13]

69.4.2.2.14 "Single trip," "nonrefillable," or "disposable" cylinders shall not be refilled with LP-Gas. [58:7.2.2.14]

69.4.2.2.15 Containers shall comply with the following with regard to service or design pressure requirements:

- (1) The service pressure marked on the cylinder shall be not less than 80 percent of the vapor pressure of the LP-Gas for which the cylinder is designed at 130°F (54°C).
- (2) The maximum allowable working pressure (MAWP) for ASME containers shall be in accordance with Table 5.2.4.3 of NFPA 58.

[58:7.2.2.15]

69.4.2.2.16 Universal cylinders shall be permitted to be filled when in the vertical position or in the horizontal position when the positioning slot is in the correct orientation. [58:7.2.2.16]

69.4.2.2.17 Transfer of refrigerated LP-Gas product shall be made only into systems that are designed to accept refrigerated LP-Gas product. [58:7.2.2.17]

69.4.2.2.18 A container shall not be filled if the container assembly does not meet the requirements for continued service. [58:7.2.2.18]

69.4.2.2.19 Transfer hoses larger than 1/2 in. (12 mm) internal diameter shall not be used for making connections to individual cylinders being filled indoors. [58:7.2.2.19]

69.4.2.3 Arrangement and Operation of Transfer Systems.

69.4.2.3.1 Public access to areas where LP-Gas is stored and transferred shall be prohibited, except where necessary for the conduct of normal business activities. [58:7.2.3.1]

69.4.2.3.2 Sources of ignition shall be turned off during transfer operations, while connections or disconnections are made, or while LP-Gas is being vented to the atmosphere. [58:7.2.3.2]

69.4.2.3.2.1 Internal combustion engines within 15 ft (4.6 m) of a point of transfer shall be shut down while such transfer operations are in progress, with the exception of the following:

- (1) Engines of LP-Gas cargo tank vehicles, constructed and operated in compliance with Chapter 9 of NFPA 58, while such engines are driving transfer pumps or compressors on these vehicles to load containers in accordance with 6.7.2.2 of NFPA 58
- (2) Portable engines with shielded ignition systems and exhaust system spark-arresters located at least 10 ft (3 m) from a point of transfer while such engines are driving transfer pumps or compressors
- (3) Engines for industrial (and forklift) trucks powered by LP-Gas used in buildings as provided in Section 11.11 of NFPA 58

[58:7.2.3.2(A)]

69.4.2.3.2.2 Smoking, open flame, portable electrical tools, and extension lights capable of igniting LP-Gas shall not be permitted within 25 ft (7.6 m) of a point of transfer while filling operations are in progress. [58:7.2.3.2(B)]

69.4.2.3.2.3 Metal cutting, grinding, oxygen-fuel gas cutting, brazing, soldering, or welding shall not be permitted within 35 ft (10.7 m) of a point of transfer while filling operations are in progress. [58:7.2.3.2(C)]

69.4.2.3.2.4 Materials that have been heated above the ignition temperature of LP-Gas shall be cooled before LP-Gas transfer is started. [58:7.2.3.2(D)]

69.4.2.3.2.5 Sources of ignition shall be turned off during the filling of any LP-Gas container on the vehicle. [58:7.2.3.2(E)]

69.4.2.3.3 Cargo tank vehicles unloading into storage containers shall be at least 10 ft (3.0 m) from the container and so positioned that the shutoff valves on both the truck and the container are readily accessible. [58:7.2.3.3]

69.4.2.3.4 The cargo tank vehicle shall not transfer LP-Gas into dispensing ~~station~~-system storage while parked on a public way. [58:7.2.3.4]

69.4.2.3.5 Transfers to containers serving agricultural or industrial equipment requiring refueling in the field shall comply with 69.4.2.3.5.1 and 69.4.2.3.5.2. [58:7.2.3.5]

69.4.2.3.5.1* Where the intake of air-moving equipment is less than 50 ft (15 m) from a point of transfer, it shall be shut down while containers are being refilled. [58:7.2.3.5(A)]

A.69.4.2.3.5.1 Air-moving equipment includes large blowers on crop dryers, space heaters, and some central heating equipment. Equipment employing open flames includes flame cultivators, weed burners, and tar kettles.

[58:A.7.2.3.5(A)]

69.4.2.3.5.2 Equipment employing open flames or equipment with integral containers shall be shut down while refueling. [58:7.2.3.5(B)]

69.4.2.3.6 From the time railroad tank cars are delivered to sidings and disconnected from the motive force for loading or unloading until they are again connected to the motive force for removal, the following shall apply:

- (1) A caution sign, with wording such as "STOP. TANK CAR CONNECTED," shall be placed at the active end(s) of the siding while the car is connected for LP-Gas product-transfer, as required by DOT regulations.
- (2) Wheel chocks shall be placed to prevent movement of the car in either direction.
- (3) Access to the track shall be secured to prevent entry by other rail equipment while the car is connected for LP-Gas product-transfer.
- (4) The requirements of 69.4.2.3.6(2) shall not apply to movement on the siding to facilitate loading or unloading.

[58:7.2.3.6]

69.4.2.3.7 Where a hose or swivel-type piping is used for loading or unloading railroad tank cars, it shall be protected as follows:

- (1) An emergency shutoff valve shall be installed at the railroad tank car end of the hose or swivel-type piping where flow into or out of the railroad tank car is possible.
- (2) An emergency shutoff valve or a backflow check valve shall be installed on the railroad tank car end of the hose or swivel piping where flow is only into the railroad tank car.

[58:7.2.3.7]

69.4.2.3.8 Where cargo tank vehicles are filled directly from railroad tank cars on a private track with nonstationary storage tanks involved, the following requirements shall be met:

- (1) Transfer protection shall be provided in accordance with 69.3.10.
- (2) Ignition source control shall be in accordance with Section 6.25-26 of NFPA 58.

- (3) Control of ignition sources during transfer shall be provided in accordance with 69.4.2.3.2.
- (4) Fire extinguishers shall be provided in accordance with 9.4.7 of NFPA 58.
- (5) Transfer personnel shall meet the provisions of 69.4.2.1.
- (6) Cargo tank vehicles shall meet the requirements of 69.4.2.3.
- (7) The points of transfer shall be located in accordance with Table 69.3.7.2.1 with respect to exposures.
- (8) Provision for anchorage and breakaway shall be provided on the cargo tank vehicle side for transfer from a railroad tank car directly into a cargo tank vehicle.
- (9) The provisions of Chapter 15 of NFPA 58 shall apply to all LP-Gas transfers performed in accordance with 69.4.2.3.8.

[58:7.2.3.8]

69.4.2.3.9 Where cargo tank vehicles are filled from other cargo tank vehicles or cargo tanks, the following requirements shall apply:

- (1) Transfer between cargo tanks or cargo tank vehicles where one is used as a bulk plant shall be temporary installations that comply with 4.3.2, 6.2+22.1, 6.2+22.2, 6.2+22.4 through 6.2+22.6 of NFPA 58, and 69.4.2.3.1.
- (2) Arrangements and operations of the transfer system shall be in accordance with the following:
 - (a) The point of transfer shall be in accordance with Table 69.3.7.2.1.
 - (b) Sources of ignition within the transfer area shall be controlled during the transfer operation as specified in 69.4.2.3.2.
 - (c) Fire extinguishers shall be provided in accordance with 9.4.7 of NFPA 58.
- (3) Cargo tanks shall comply with the requirements of 69.4.2.2.9.
- (4) Provisions designed either to prevent a pull-away during a transfer operation or to stop the flow of LP-Gas products from both cargo tank vehicles or cargo tanks in the event of a pull-away shall be incorporated.
- (5) Off-truck remote shutoff devices that meet 49 CFR 173.315(n) requirements and are installed on the cargo tank vehicle unloading the LP-Gas product shall satisfy the requirements of 69.4.2.3.9(4).
- (6) Cargo tank vehicle LP-Gas transfers that are for the sole purpose of testing, maintaining, or repairing the cargo tank vehicle shall be exempt from the requirements of 69.4.2.3.9(1).

[58:7.2.3.9]

69.4.2.4 Hose Inspection.

69.4.2.4.1 Transfer hose assemblies shall be observed for leakage or for damage that could impair their integrity before each use. [58:7.2.4.1]

69.4.2.4.2 Transfer hose assemblies shall be inspected at least annually. [58:7.2.4.2]

69.4.2.4.3 Inspection of pressurized hose assemblies shall include inspection for the following:

- (1) Damage to outer cover that exposes reinforcement
- (2) Kinked or flattened hose
- (3) Soft spots or bulges in hose
- (4) Couplings that have slipped on the hose, are damaged, have missing parts, or have loose bolts
- (5) Leakage other than permeability leakage

[58:7.2.4.3]

69.4.2.4.4 Hose assemblies shall be replaced, repaired, or continued in service based on the results of the inspection.

[58:7.2.4.4]

69.4.2.4.5 Leaking or damaged hose shall be immediately repaired or removed from service. [58:7.2.4.5]

69.4.3 Venting LP-Gas to the Atmosphere.

69.4.3.1 Outdoors.

69.4.3.1.1 LP-Gas in liquid or vapor form shall ~~only~~ be vented to the atmosphere ~~only~~ under the following conditions:

- (1) Where the maximum flow from fixed liquid level, rotary, or slip tube gauges does not exceed that from a No. 54 drill orifice
- (2) Between shutoff valves before disconnecting the liquid transfer line from the container
- (3) ~~Where necessary, b~~By the use of ~~bleeder-vent~~ valves
- (4) Where the rate of discharge does not exceed the discharge from a No. 31 drill size orifice, from listed liquid transfer pumps ~~manufactured before January 1, 2000,~~ using such vapor as a source of energy
- (5) For purging in accordance with 7.3.3 of NFPA 58
- (6) In emergencies
- (7) Where ~~utilized-used~~ as the pressure source in remote shutdown systems for internal valves and emergency shutoff valves

[58:7.3.1.1]

69.4.3.1.2 Venting of compressor liquid traps shall be attended. [58:7.3.1.2]

69.5 Storage of Cylinders Awaiting Use, Resale, or Exchange.

69.5.1 Scope.

69.5.1.1 The provisions of Section 69.5 apply to the storage of cylinders of 1000 lb (454 kg) water capacity or less, whether filled, partially filled, or empty, as follows:

- (1) At consumer sites or dispensing systems, where not connected for use
- (2) In storage for resale or exchange by dealer or reseller

[58:8.1.1]

69.5.1.2 Section 69.5 does not apply to new or unused cylinders. [58:8.1.2]

69.5.1.3 Section 69.5 does not apply to cylinders stored at bulk plants. [58:8.1.3]

69.5.2 General Provisions.

69.5.2.1 General Location of Cylinders.

69.5.2.1.1 Cylinders in storage shall be located to minimize exposure to excessive temperature rises, physical damage, or tampering. [58:8.2.1.1]

69.5.2.1.2 Cylinders in storage having individual water capacity greater than 2.7 lb (1.1 kg) [nominal 1 lb (0.45 kg) LP-Gas capacity] shall be positioned so that the pressure relief valve is in direct communication with the vapor space of the cylinder. [58:8.2.1.2]

69.5.2.1.3 Cylinders stored in buildings in accordance with 69.5.3 shall not be located near exits, near stairways, or in areas normally used, or intended to be used, for the safe egress of occupants. [58:8.2.1.3]

69.5.2.1.4 If empty cylinders that have been in LP-Gas service are stored indoors, they shall be considered as full cylinders for the purposes of determining the maximum quantities of LP-Gas permitted by 69.5.3.1, 69.5.3.2.1, and 69.5.3.3.1. [58:8.2.1.4]

69.5.2.1.5 Cylinders shall not be stored on roofs. [58:8.2.1.5]

69.5.2.2 Protection of Valves on Cylinders in Storage.

69.5.2.2.1 Cylinder valves shall be protected as required by 69.2.1.2.1 and 69.4.2.2.5. [58:8.2.2.1]

69.5.2.2.2 Screw-on-type caps or collars shall be in place on all cylinders stored, regardless of whether they are full, partially full, or empty, and cylinder outlet valves shall be closed. [58:8.2.2.2]

69.5.2.2.3 Valve outlets on cylinders less than 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] shall be plugged, capped, or sealed in accordance with 69.4.2.2.5. [58:8.2.2.3]

69.5.3 Storage Within Buildings.

69.5.3.1 General. Storage of cylinders in buildings shall be in accordance with Table 69.5.3.1(a) or Table 69.5.3.1(b) or the requirements of 69.5.3. [58:8.3.1]

Table 69.5.3.1(a) Maximum Allowable Storage Quantities (MAQ) of LP-Gas Storage for Maximum 1 lb Cylinders Without Protection, in Cabinets, or in Areas Protected by Suppression in Other Than Industrial, Storage, and Mercantile Occupancies

Occupancy	Assembly	Educational	Day Care	Health Care	Ambulatory Health Care	Detention and Correctional	One- and Two-Family Dwellings	Lodging or Rooming House	Hotel and Dormitory	Apartment	Residential Board and Care	Business
Maximum Allowable Quantity (MAQ):												
Storage	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb
Total MAQ for cylinders stored in cabinets	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb*	2-lb*	2-lb	2-lb*	2-lb	2-lb
Total MAQ for cylinders protected by suppression	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb*	2-lb*	2-lb	2-lb*	2-lb	2-lb
Total for	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb	2-lb*	2-lb*	2-lb	2-lb*	2-lb	2-lb

cylinders both stored in cabinets and protected by suppression													
Total for attended catered food service per NFPA 58 in 10 oz maximum cylinders	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb
Total for 10 oz cylinders in storage protected by a 2-hr fire wall	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb	15-lb
Total MAQ after any exemptions	20-lb	20-lb	0	5-lb									
Flame effects per NFPA 160; additional 20 lb units with 20 ft (6 m) separation	In-labs; not in classrooms; additional 20 lb units with 20 ft (6 m) separation			In-labs only; additional 5 lb units with 20 ft separation									

For SI units, 1 lb = 0.45 kg; 1 oz = 0.028 kg, 1 ft = 0.3 m.

*1 lb maximum cylinder

Assembly	Educational	Day Care	Health Care	Ambulatory Health Care	Detention and Correctional	One- and Two-Family Dwellings	Lodging or Rooming House	Hotel and Dormitory	Apartment	Residential Board and Care	Business
2 lb (1 kg) ^a	2 lb (1 kg) ^b	2 lb (1 kg)	2 lb (1 kg) ^c	2 lb (1 kg)	2 lb (1 kg)	2 lb (1 kg)	2 lb (1 kg)	2 lb (1 kg)	2 lb (1 kg)	2 lb (1 kg)	2 lb (1 kg)

Note: Additional 15 lb (7 kg) in restaurants and food service in accordance with 69.5.3.2.3 in 10 oz (0.4 kg) maximum cylinders; one additional 15 lb (7 kg) unit where protected by 2-hour fire wall protection.

^aAdditional 20 lb (9 kg) in assembly occupancies used for flame effects per NFPA 160; additional 20 lb units with 20 ft (6 m) separation.

^bAdditional 20 lb (9 kg) in educational occupancies (in labs, not in classrooms); additional 20 lb (9 kg) units with 20 ft (6 m) separation.

^cAdditional 5 lb (2 kg) in health care occupancies in labs only; additional 5 lb (2 kg) units with 20 ft (6 m) separation.

[58:Table 8.3.1(a)]

7Table 69.5.3.1(b) Maximum Allowable Storage Quantities Quantity (MAQ) of LP-Gas Storage in Containers with No Protection, in Cabinets, and Where Protected by Suppression in Mercantile, Industrial, and Storage Occupancies

Occupancy	Mercantile	Industrial	Storage
Maximum Allowable Quantity (MAQ):			
Storage	200 lb (1 lb maximum/cylinder)	300 lb	300 lb
Total MAQ for cylinders protected by suppression	200 lb	300 lb	300 lb
Total MAQ for cylinders both stored in cabinets and protected by suppression	200 lb	300 lb	300 lb
Total MAQ after any exemptions above	1000 lb	Additional 300 lb	10,000 lb
	Separation of groups of 200 lb by 50 ft and a sprinkler density of 0.300 gpm/ft ² (12.2 mm/min) over the most remote 2000 ft ² (18.6 m ²) area and 250 gpm (946 L/min) hose stream allowance	300-ft separation	In special rooms or buildings per Chapter 10 of NFPA 58

For SI units, 1 lb = 0.45 kg; 1 gpm = 3.8 L/min; 1 ft = 0.3 m; 1 ft² = 0.09 m².

Mercantile	Industrial	Storage
200 lb (91 kg) [1 lb (0.5 kg) maximum/cylinder] ^a	300 lb (136 kg) ^b	300 lb (136 kg) ^c

^aA total of 1000 lb (454 kg) in 200 lb (91 kg) units with additional units with a 200 ft (60 m) separation and with suppression in accordance with 69.5.3.2.1.

^bAdditional 300 lb (136 kg) with 300 ft (91 m) separation.

^cA total of 10,000 lb (454 kg) in special rooms in accordance with Chapter 10 of NFPA 58.

[58:Table 8.3.1(b)]

69.5.3.2 Storage Within Buildings Frequented by the Public.

69.5.3.2.1 The quantity of LP-Gas in cylinders stored or displayed shall not exceed 200 lb (91 kg) in one location, with additional storage separated by 50 ft (15 m). ~~The maximum quantity to be stored in one building shall not exceed 1000 lb (454 kg).~~ [58:8.3.2.1]

69.5.3.2.1.1 The maximum quantity to be stored in one building shall not exceed 1000 lb (454 kg). [58:8.3.2.1(A)]

69.5.3.2.1.2 Where the total quantity stored in a mercantile occupancy building exceeds 200 lb (91 kg), an approved sprinkler system that, at a minimum, meets the ordinary hazard (Group 2) requirement of NFPA 13 ~~for Ordinary Hazard (Group 2)~~ shall be installed. [58:8.3.2.1(AE)]

69.5.3.2.1.3 The sprinkler density shall be 0.300 gpm/ft² (12.2 mm/min) over the most remote 2000 ft² (18.6 m²) area, and the hose stream allowance shall be 250 gpm (946 L/min). [58:8.3.2.1(BC)]

69.5.3.2.2 The cylinders shall not exceed a water capacity of 2.7 lb (1.1 kg) [nominal 1 lb (0.45 kg) LP-Gas]. [58:8.3.2.2]

69.5.3.2.3 **Storage in Restaurants and Food Service Locations.** [Move as 69.5.3.3] In restaurants and at food service locations, storage of 10 oz (283 g) butane nonrefillable containers shall be limited to not more than 24 containers and 24 additional 10 oz (283 g) butane nonrefillable containers stored in another location within the building ~~where~~ constructed with at least 2-hour fire wall protection. [58:8.3.2.3]

69.5.3.3-4 Storage Within Buildings Not Frequented by the Public.

69.5.3.34.1 The maximum quantity of LP-Gas allowed in one storage location shall not exceed 735 lb (334 kg) water capacity [nominal 300 lb (136 kg) propane capacity]. [58:8.3.34.1]

69.5.3.34.2 Where additional storage locations are required on the same floor within the same building, they shall be separated by a minimum of 300 ft (91.4 m). [58:8.3.34.2]

69.5.3.34.3 Storage beyond the limitations described in 69.5.3.3.2 shall comply with 69.5.3.4. [58:8.3.34.3]

69.5.3.34.4 Cylinders carried as part of the service equipment on highway mobile vehicles shall not be part of the total storage capacity requirements of 69.5.3.3.1, where such vehicles are stored in private garages and carry no more than three cylinders with a total aggregate capacity per vehicle not exceeding 100 lb (45.4 kg) of propane. [58:8.3.34.4]

69.5.3.34.5 Cylinder valves shall be closed when not in use. [58:8.3.34.5]

69.5.3.4.5 Storage Within Special Buildings or Rooms.

69.5.3.45.1 The maximum quantity of LP-Gas stored in special buildings or rooms shall be 10,000 lb (4540 kg). [58:8.3.45.1]

69.5.3.45.2 Special buildings or rooms for storing LP-Gas cylinders shall not be located where the buildings or rooms adjoin the line of property occupied by schools, churches, hospitals, athletic fields, or other points of public gathering. [58:8.3.45.2]

69.5.3.45.3 The construction of all special buildings and rooms specified in 69.5.3.4.2 shall comply with Chapter 10 of NFPA 58 and the following:

- (1) Vents to the outside only shall be provided at both the top and bottom of the building and shall be located at least 5 ft (1.5 m) from any building opening.
- (2) The entire area shall be classified for purposes of ignition source control in accordance with Section 6.25-26 of NFPA 58.

[58:8.3.45.3]

69.5.3.5.6 Storage Within Residential Buildings. Storage of cylinders within a residential building, including the basement or any storage area in a common basement of a multiple-family building and attached or detached garages, shall be limited to cylinders each with a maximum water capacity of 2.7 lb (1.2 kg) and shall not exceed 5.4 lb (2.4 kg) aggregate water capacity per each living space unit. [58:8.3.56]

69.5.4 Storage Outside of Buildings.

69.5.4.1* Location of Storage Outside of Buildings.

A.69.5.4.1 The filling process in 69.5.4.1.4 refers to the time period beginning when a cylinder or cylinders are brought to a dispensing station to be filled and ending when the last cylinder is filled and all the cylinders are removed from the filling area. This is meant to define a continuous process, with the cylinders being unattended for only brief periods, such as operator breaks or lunch. [58:A.8.4.1]

69.5.4.1.1 Storage outside of buildings for cylinders awaiting use or resale or that are part of a cylinder exchange point shall be located as follows:

- (1) At least 5 ft (1.5 m) from any doorway or opening in a building frequented by the public where occupants have at least two means of egress as defined by NFPA 101
- (2) At least 10 ft (3 m) from any doorway or opening in a building or sections of a building that has only one means of egress
- (3) At least 20 ft (6.1 m) from any automotive service station fuel dispenser

[58:8.4.1.1]

69.5.4.1.2 Distances from cylinders in storage outside of buildings shall be in accordance with Table 69.5.4.1.2 with respect to the following:

- (1) Nearest important building or group of buildings
- (2) Line of adjoining property that can be built upon
- (3) Busy thoroughfares or sidewalks on other than private property
- (4) Line of adjoining property occupied by schools, churches, hospitals, athletic fields, or other points of public gathering
- (5) Dispenser

[58:8.4.1.2]

Table 69.5.4.1.2 Distances from Cylinders in Storage and Exposures

Quantity of LP-Gas Stored		Horizontal Distance to ...					
		(1) and (2)		(3) and (4)		(5)*	
lb	kg	ft	m	ft	m	ft	m
≤720	≤227	0	0	0	0	5	1.5
721–2,500	>227–1,134	0	0	10	3	10	3
2,501–6,000	>1,134–2,721	10	3	10	3	10	3
6,001–10,000	>2,721–4,540	20	6.1	20	6.1	20	6.1
>10,000	>4,540	25	7.6	25	7.6	25	7.6

*The minimum distance from a point of transfer associated with a dispensing system must comply with Table 69.3.7.2.1.

[58: Table 8.4.1.2]

69.5.4.1.3 Fire-Resistive Protective Structure.

69.5.4.1.3.1 The distances in Table 69.5.4.1.2 shall be reduced to 0 where a 2-hour fire-resistive protective structure made of noncombustible materials is provided that breaks the line of sight of the storage and the building. [58:8.4.1.3(A)]

69.5.4.1.3.2 For buildings with exterior walls rated 2-hour fire resistance and constructed of noncombustible materials not provided with eaves over the storage, the exterior wall shall be allowed in lieu of a protective structure to reduce the distance to 0. [58:8.4.1.3(B)]

69.5.4.1.4 Cylinders in the filling process shall not be considered to be in storage. [58:8.4.1.4]

69.5.4.2 Protection of Cylinders.

69.5.4.2.1* Cylinders at a location open to the public shall be placed on shelves constructed of materials with a flame spread index of less than 25, in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*, and shall be of sufficient strength to support the cylinders. [58:8.4.2.1]

A.69.5.4.2.1 It has been shown that when tested in accordance with ASTM E84, *Standard Test Method for Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*, materials such as steel, concrete, gypsum board, and aluminum will meet the requirements of a flame spread index of 25 or less. In contrast, the flame spread indices of some combustible materials can be much higher.

Typically, untreated wood products will exhibit a flame spread index ranging between 50 and 200. [58:A.8.4.2.1]

69.5.4.2.2 Cylinders at a location open to the public shall be protected by either of the following:

- (1) An enclosure in accordance with 6.2+22.4.2 of NFPA 58
- (2) A lockable ventilated enclosure of metal exterior construction

[58:8.4.2.2]

69.5.4.2.3* Vehicular barrier protection (VBP) shall be provided where vehicle traffic is expected at the location, except where cylinders are protected in accordance with 69.5.4.2.2(2). [58:8.4.2.3]

A.69.5.4.2.3 Research conducted demonstrated that lockable, ventilated enclosures of aluminum or steel construction protect cylinders stored within those cabinets from potentially catastrophic damage due to impact from a motor vehicle. The report, "Evaluation of Collision Protection Provided by Vehicle Impact Bollards and Propane Cylinder Exchange Cabinets," was prepared for the National Propane Gas Association and is available from NFPA. [58:A.8.4.2.3]

Where cylinders are not stored in lockable, ventilated metal enclosures, 69.5.4.2.2(1) requires them to be stored in a fenced enclosure (*see 6.2+22.4.2 of NFPA 58*), which could provide sufficient protection for the cylinders. Where fenced enclosures warrant additional vehicular barrier protection (VBP), the following provide such protection:

- (1) [Guard rails/Guardrails](#)
- (2) Steel bollards
- (3) Raised sidewalks [minimum of 6 in. (150 mm) in height]
- (4) Fencing
- (5) Ditches
- (6) Berms (not to exceed 50 percent of the container perimeter)
- (7) Jersey barriers
- (8) Parking bumpers [minimum of 6 in. (150 mm) in height]
- (9) Fencing/gates

[58:A.8.4.2.3]

69.5.4.3 Alternative Location and Protection of Storage. Where the provisions of 69.5.4.1 and 69.5.4.2.2 are impractical at construction sites or at buildings or structures undergoing major renovation or repairs, alternative storage of cylinders shall be acceptable to the AHJ. [58:8.4.3]

69.5.5 Fire Protection and Electrical Area Classification.

69.5.5.1* Retail cylinder exchange locations having aggregate quantities of 720 lb (327 kg) or more of propane shall be provided with at least one portable fire extinguisher having a minimum dry chemical agent capacity of 10 lb (4.5 kg) dry chemical per Section 4.7 of NFPA 58. [58:8.5.1]

A.69.5.5.1 Although fire extinguishers are required in locations where cylinders are stored and awaiting use or resale, the specific site characteristics should be considered. For example, where the installation is a retail exchange cabinet, cylinders will be locked inside and will typically contain either a CGA 791, CGA 793, or CGA 810 valve connection, all of which have redundancy built into them that prevents the flow of gas unless connected to an appliance. As such, any cylinder fire in a retail facility cabinet should never be extinguished by anyone other than fire service personnel because the source of the gas cannot be turned off. The sole function for fire extinguishers in these locations is to extinguish incipient fires in the vicinity of the cabinet. [58:A.8.5.1]

69.5.5.2 Other than those complying with 69.5.5.1, propane storage locations having aggregate quantities of propane exceeding 720 lb (327 kg), shall be provided with at least one approved portable fire extinguisher having a minimum dry chemical agent capacity of 18 lb (8.2 kg) per Section 4.7 of NFPA 58. [58:8.5.2]

69.5.5.3 The required fire extinguisher shall be located within 50 ft (15 m) travel distance of the propane storage location.

[58:8.5.3]

69.5.5.4 The storage of cylinders awaiting resale shall be exempt from the electrical classification requirements of NFPA 58.

[58:8.5.4]

69.5.6 Automated Cylinder Exchange Stations.

69.5.6.1 Cylinder exchange cabinets that include an automated vending system for exchanging cylinders shall comply with the requirements in 69.5.6.2 through 69.5.6.6. [58:8.6.1]

69.5.6.2 Electrical equipment installed in cylinder storage compartments shall comply with the requirements for Class I, Division 2 equipment in accordance with *NFPA 70*. [58:8.6.2]

69.5.6.3 Cabinets shall be designed such that cylinders can be placed inside only in the upright position. [58:8.6.3]

69.5.6.4 Door releases for access to stored cylinders shall be permitted to be pneumatic, mechanical, or electrically powered. [58:8.6.4]

69.5.6.5 A manual override control shall be permitted for use by authorized personnel. [58:8.6.5]

69.5.6.6 The vending system shall not be capable of returning to automatic operation after a manual override until the system has been inspected and reset by authorized personnel. [58:8.6.6]

69.6 Vehicular Transportation of LP-Gas.

69.6.1 Transportation in Portable Containers.

69.6.1.1 Transportation of Cylinders.

69.6.1.1.1 Cylinders having an individual water capacity not exceeding 1000 lb (454 kg) [nominal 420 lb (191 kg) propane capacity], when filled with LP-Gas, shall be transported in accordance with the requirements of 69.6.1. [58:9.3.2.1]

69.6.1.1.2 Cylinders shall be constructed as provided in 69.2.1 and equipped in accordance with Section 5.9 of NFPA 58 for transportation as cylinders. [58:9.3.2.2]

69.6.1.1.3 The quantity of LP-Gas in cylinders shall be in accordance with Chapter 7 of NFPA 58. [58:9.3.2.3]

69.6.1.1.4 Cylinder valves shall comply with the following:

- (1) Valves of cylinders shall be protected in accordance with 69.2.1.2.1.
- (2) Screw-on-type protecting caps or collars shall be secured in place.
- (3) The provisions of 69.4.2.2.5 shall apply.

[58:9.3.2.4]

69.6.1.1.5 The cargo space of the vehicle shall be isolated from the driver's compartment, the engine, and the engine's exhaust system. [58:9.3.2.5]

69.6.1.1.5.1 Open-bodied vehicles shall be considered to be in compliance with 69.6.1.1.5. [58:9.3.2.5(A)]

69.6.1.1.5.2 Closed-bodied vehicles having separate cargo, driver, and engine compartments shall be considered to be in compliance with 69.6.1.1.5. [58:9.3.2.5(B)]

69.6.1.1.5.3 Closed-bodied vehicles, such as passenger cars, vans, and station wagons, shall not be used for transporting more than 215 lb (98 kg) water capacity [nominal 90 lb (41 kg) propane capacity], but not more than 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] per cylinder, unless the driver and engine compartments are separated from the cargo space by a vaportight partition that contains no means of access to the cargo space. [58:9.3.2.5(C)]

69.6.1.1.6 Cylinders and their appurtenances shall be determined to be leak-free before being loaded into vehicles.

[58:9.3.2.6]

69.6.1.1.7 Cylinders shall be loaded into vehicles with flat floors or equipped with racks for holding cylinders. [58:9.3.2.7]

69.6.1.1.8 Cylinders shall be fastened in position to minimize the possibility of movement, tipping, and physical damage.

[58:9.3.2.8]

69.6.1.1.9 Cylinders being transported by vehicles shall be positioned in accordance with Table 69.6.1.1.9. [58:9.3.2.9]

Table 69.6.1.1.9 Orientation of Cylinders on Vehicles

Propane Capacity of Cylinder		Open Vehicles	Enclosed Spaces of Vehicles
lb	kg		
≤45	≤20	Any position	
>45	>20	Relief valve in communication with the vapor space	
≤4.2	≤1.9		Any position
>4.2	>1.9		Relief valve in communication with the vapor space

[58:Table 9.3.2.9]

69.6.1.1.10 Vehicles transporting cylinders where the total weight is more than 1000 lb (454 kg), including the weight of the LP-Gas and the cylinders, shall be placarded as required by DOT regulations or state law. [58:9.3.2.10]

69.6.1.2 Fire Extinguishers.

69.6.1.2.1 Each truck or trailer transporting portable containers in accordance with 69.6.1.1 or 69.6.1.2 shall be equipped with at least one portable fire extinguisher in accordance with Section 4.7 of NFPA 58 having a minimum capacity of 18 lb (8.2 kg) dry chemical. [58:9.3.5.1]

69.6.2 Parking and Garaging Vehicles Used to Carry LP-Gas Cargo.

69.6.2.1 Application. Subsection 69.6.2 applies to the parking and garaging of vehicles used for the transportation of LP-Gas. [58:9.7.1]

69.6.2.2 Parking Outdoors.

69.6.2.2.1 Vehicles shall not be left unattended on any street, highway, avenue, or alley, except for necessary absences from the vehicle associated with drivers' normal duties, including stops for meals and rest stops during the day or night, except as follows:

- (1) This requirement shall not apply in an emergency.
- (2) This requirement shall not apply to vehicles parked in accordance with 69.6.2.2.3 and 69.6.2.2.4.

[58:9.7.2.1]

69.6.2.2.2* Vehicles shall not be parked in congested areas. [58:9.7.2.2]

A.69.6.2.2.2 The term *congested area* is intended to describe situations where access to the vehicle during an emergency ~~would be impeded~~ or where moving the vehicle away from an emergency ~~could be impeded~~ ~~would be prevented~~. [58:A.9.7.2.2]

69.6.2.2.3 Where vehicles are parked off the street in uncongested areas, they shall be at least 50 ft (15 m) from any building used for assembly, institutional, or multiple residential occupancy. [58:9.7.2.3]

69.6.2.2.4 Where vehicles carrying portable containers or cargo tank vehicles of 3500 gal (13 m³) water capacity or less are parked on streets adjacent to the driver's residence in uncongested residential areas, the parking locations shall be at least 50 ft (15 m) from a building used for assembly, institutional, or multiple residential occupancy. [58:9.7.2.4]

69.6.2.3 Parking Indoors.

69.6.2.3.1 Cargo tank vehicles parked in any public garage or building shall have LP-Gas liquid removed from the following:

- (1) Cargo tank
- (2) Piping
- (3) Pump
- (4) Meter
- (5) Hose
- (6) Related equipment

[58:9.7.3.1]

69.6.2.3.2 Vehicles used to carry portable containers shall not be moved into any public garage or building for parking until all portable containers have been removed from the vehicle. [58:9.7.3.2]

69.6.2.3.3 The pressure in the delivery hose and related equipment shall be reduced to approximately atmospheric.

[58:9.7.3.3]

69.6.2.3.4 All valves shall be closed before the vehicle is moved indoors. [58:9.7.3.4]

69.6.2.3.5 Delivery hose or valve outlets shall be plugged or capped before the vehicle is moved indoors. [58:9.7.3.5]

69.6.2.3.6 Vehicles carrying or containing LP-Gas shall only be parked in buildings complying with Chapter 10 of NFPA 58 and located on premises owned or under the control of the operator of such vehicles where the following provisions are met:

- (1) The public shall be excluded from such buildings.
- (2) Floor level ventilation shall be provided in all parts of the building where such vehicles are parked.
- (3) Leaks in the vehicle LP-Gas systems shall be repaired before the vehicle is moved indoors.
- (4) Primary shutoff valves on cargo tanks and other LP-Gas containers on the vehicle (except propulsion engine fuel containers) shall be closed and delivery hose outlets plugged or capped to contain system pressure before the vehicle is moved indoors.
- (5) Primary shutoff valves on LP-Gas propulsion engine fuel containers shall be closed while the vehicle is parked.
- (6) No LP-Gas container shall be located near a source of heat or within the direct path of hot air being blown from a blower-type heater.
- (7)* LP-Gas containers shall be gauged or weighed to determine that they are not filled beyond the maximum filling limit according to Section 7.4 of NFPA 58.

[58:9.7.3.6]

A.69.6.2.3.6(7) The proper fill level of propane containers that are permanently installed on vehicles, can be determined by using the fixed maximum liquid level gauge or any other approved method. Fill levels of portable containers can be determined by using the fixed maximum liquid level gauge, by weighing the cylinder, or any other approved method. [58:A.9.7.3.6(7)]

69.6.2.3.7 Where vehicles are serviced or repaired indoors, the following shall apply:

- (1) When it is necessary to move a vehicle into any building located on premises owned or operated by the operator of such vehicle for service on engine or chassis, the provisions of 69.6.2.3.6 shall apply.

- (2) When it is necessary to move a vehicle carrying or containing LP-Gas into any public garage or repair facility for service on the engine or chassis, the provisions of 69.6.2.3.1 shall apply, or the driver or a qualified representative of an LP-Gas operator shall be in attendance at all times while the vehicle is indoors, and the following shall apply:
- (a) Leaks in the vehicle LP-Gas systems shall be repaired before the vehicle is moved indoors.
 - (b) Primary shutoff valves on cargo tanks, portable containers, and other LP-Gas containers installed on the vehicle (other than propulsion engine fuel containers) shall be closed.
 - (c) LP-Gas liquid shall be removed from the piping, pump, meter, delivery hose, and related equipment and the pressure therein reduced to approximately atmospheric before the vehicle is moved inside.
 - (d) Delivery hose or valve outlets shall be plugged or capped before the vehicle is moved indoors.
 - (e) No container shall be located near a source of heat or within the direct path of hot air blown from a blower or from a blower-type heater.
 - (f) LP-Gas containers shall be gauged or weighed to determine that they are not filled beyond the maximum filling capacity in accordance with Section 7.4 of NFPA 58.

[58:9.7.3.7]

69.6.2.3.8 If repair work or servicing is to be performed on a cargo tank vehicle system, all LP-Gas shall be removed from the cargo tank and piping, and the system shall be thoroughly purged before the vehicle is moved indoors. [58:9.7.3.8]

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