

CHAPTER 52
LIQUEFIED PETROLEUM GASES

Authority

Unless otherwise expressly noted, all provisions of this Chapter 52 were adopted by the Superintendent of State Police, Department of Law and Public Safety, pursuant to authority delegated at N.J.S.A. 21:1B-2(a), filed and effective prior to September 1, 1969.

Chapter Expiration Date

Chapter 52, Liquefied Petroleum Gases, expires on July 1, 2006.

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SUBCHAPTER 1. SCOPE AND PURPOSE

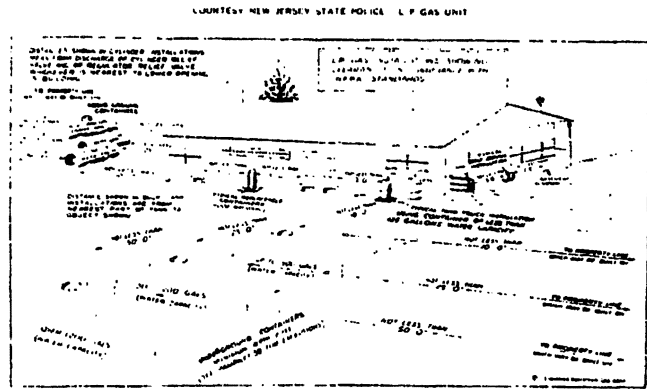
13:52-1.1 Applicability of Chapter

(a) The provisions of this Chapter cover the design, construction, location, installation and operation of equipment for storing, handling, transporting by motor vehicle, tank truck, tank trailer, and utilizing liquefied petroleum gas.

(b) These provisions represent minimum standards and are considered to be reasonably necessary for the protection of the health, welfare and safety of the public and persons using liquefied petroleum gas as well as the prevention of destruction of property by fire.

13:52-1.2 New and existing installations

The provisions of this Chapter apply to all new liquefied petroleum gas equipment, systems and installations. Existing installations may be required to comply with these regulations if satisfactory evidence is reported that any existing liquefied petroleum gas equipment, system or installation is unsafe; provided, however, that all existing equipment shall be maintained in conformity with these regulations.



SUBCHAPTER 2. DEFINITIONS

13:52-2.1 Words and phrases defined

The following words and terms, when used in this Chapter, shall have the following meanings, unless the context clearly indicates otherwise.

“Alterations” means any changes in construction or design which affect the strength or safety of the equipment or installation.

“API” means American Petroleum Institute.

“Approved” means approved by the Superintendent, or his authorized representative, except as otherwise specified.

“ASA” means American Standards Association.

“ASME” means American Society of Mechanical Engineers.

“Bureau of Engineering and Safety” means Bureau of Engineering and Safety, Division of Labor, New Jersey Department of Labor and Industry.

“Cargo tank” means any tank designed to be permanently attached to any motor vehicle and in which liquefied petroleum gas is to be transported; a fuel tank used solely for the purpose of supplying fuel for the propulsion of a vehicle is not a cargo tank.

“Container assembly” means an assembly consisting essentially of the container and fittings for all container openings, including shutoff valves, liquid level gauging devices, safety relief devices and protective housings.

“Containers” means all vessels, such as tanks, cylinders or drums, used for transportation or storing liquefied petroleum gases.

“Cylinder” means a vessel having a capacity not exceeding that of 1,000 pounds of water under normal conditions.

“Dealer” means any person, firm, or corporation, dealing directly with consumers in installing equipment or containers, or any combination thereof, for the consumption of liquefied petroleum gas, excepting any person, firm, or corporation storing not over 100 pounds of gas at any one time or who handles no LP-Gas container of over 2½ pounds water capacity per container.

“Division” means the Division of State Police, New Jersey Department of Law and Public Safety.

“Division of Motor Vehicles” means the Division of Motor Vehicles, New Jersey Department of Law and Public Safety.

“Filled by volume” means the amount of liquefied petroleum gas in the vessel as determined by volumetric measurements.

“Filled by weight” means the net amount of liquefied petroleum gas in the vessel as determined by weight.

“Filling density” means the per cent ratio of weight of liquefied petroleum gas to the weight of water the vessel will hold at 60 degrees Fahrenheit.

“Fire resistant foundation” means foundation made of masonry, concrete or steel embedded in concrete.

“Gallons” includes U.S. Standard—1 U.S. Gallon—0.83 Imperial gallons—231 cubic inches—3.785 liters.

“Gas” means liquefied petroleum gases in either the liquid or gaseous state.

“ICC” means Interstate Commerce Commission.

“Liquefied petroleum gas” means any material in the liquid or gaseous phase which is composed predominantly of any of the following hydrocarbons, or mixtures of the same: propane, propylene, butanes, (normal butane or isobutane) and butylenes.

“Maximum allowable working pressure” means the internal working pressure for which the vessel was designed, or the maximum internal working pressure allowable according to the conditions of the vessel when last inspected, whichever is less.

“Mechanical Engineering Bureau” means Mechanical Engineering Bureau, Division of Labor, Department of Labor and Industry.

“Motor fuel tank” means a vessel used to supply liquefied petroleum gas to the motor of a mobile vehicle as herein defined.

“Mobile vehicle” means any easily movable, readily portable, or self-propelled vehicle driven by an internal combustion engine.

“Movable fuel storage tenders or farm carts” means containers not in excess of 1,200 gallons water capacity, equipped with wheels to be towed from one location of usage to another. They are basically nonhighway vehicles, but may occasionally be moved over public roads or highways. They are used as a fuel supply for farm tractors, construction machinery and similar equipment.

“Outage” means that portion of the vessel not permitted to be filled with liquid, and providing for the expansion of the liquid by increase in temperature.

“Point of delivery” means the end of the delivery hose or pipe where it is connected to the receiving vessel or fill line connected thereto.

“PSI” means pounds per square inch.

“Saddle” means that part of the supporting foundation upon which a horizontally installed vessel rests.

“Shall” indicates a mandatory requirement.

“Should” indicates a recommendation.

“Singular, plural” means the singular shall be construed to include the plural and the plural, the singular, unless the context otherwise indicates.

“Skid tank” means a portable tank used to transport or store liquefied petroleum gas and equipped with fixed skids, or with feet or lugs to which skids shall be attached when used to transport liquefied petroleum gas.

“System” means an assembly of equipment consisting essentially of the vessel or container; major devices such as vaporizer, relief valves, excess flow valves, regulators, and piping connecting such parts.

“Tank” means a vessel of more than 1,000 pounds water capacity (nominal) used for the storage, transportation, or utilization of liquefied petroleum gas.

“Tank motor vehicle” means any motor vehicle designed or used for the transportation of liquefied petroleum gases in a cargo tank.

“Trailer tank” means a transportation tank permanently installed on a trailer or semi-trailer.

“Vaporizer” means a device used to convert liquefied petroleum gas from the liquid to the gaseous state.

“Vaporizer-burner” means an integral vaporizer-burner unit, dependent upon the heat generated by the burner as the source of heat to vaporize the liquid used for dehydrators or dryers.

“Ventilation, adequate.” When specified for the prevention of fire during normal operation, ventilation shall be considered adequate when the concentration of the gas in a gas-air mixture does not exceed 25 per cent of the lower flammable limit.

“Vessel” means a container used for the storage, transportation, or utilization of liquefied petroleum gas.

SUBCHAPTER 3. GENERAL PROVISIONS

13:52-3.1 Safe operation

All liquefied petroleum gas equipment shall be installed and maintained in a safe operating condition and in conformity with the provisions of this Chapter.

13:52-3.2 Unauthorized use

No person, firm or corporation other than the owner and qualified persons who are authorized by the owner to do so, shall install, remove, connect, disconnect, sell, fill, refill, deliver, or permit to be delivered, or use in any manner any liquefied petroleum gas container or system.

13:52-3.3 Conflicting regulations

No municipality, or other political subdivision shall adopt or enforce any ordinance or regulation in conflict with the provisions of Chapter 139 Laws of 1950 or the requirements of this Chapter.

13:52-3.4 Variations

(a) When the Superintendent determines under such conditions as shall be specified that a variation from the requirements of any part of these regulations will not impair the safety of persons which would otherwise be secured by compliance with the said requirements, he may make, upon written application setting forth all pertinent facts and after investigation and hearing of interested parties as may be necessary, a variation of such requirements, in writing, specifying the conditions that shall provide for the safety of persons.

(b) Noncompliance with the conditions of variation shall automatically suspend the permitted variation as long as the state of noncompliance exists.

(c) Upon receipt of a complaint that a variation imperils the safety of persons which would otherwise be secured by compliance with these provisions, the Superintendent after due notice to the complainant and defendant and after hearing, may continue in force, suspend, revoke or modify the variation or its conditions.

(d) Where death, serious injury or excessive property damage appears to be attributable to a permitted variation, the Superintendent may immediately set aside any permitted variation.

13:52-3.5 Control of product in vessels

(a) No person shall charge or be permitted to charge liquefied petroleum gas into any vessel unless the allowable working pressure of the vessel is at least equal to that required by the provisions of this Chapter.

(b) A supplier of liquefied petroleum gas shall keep a record of each delivery on file for at least one year and shall make such records available to the Superintendent upon request.

13:52-3.6 Charging vessels

(a) No person shall charge or permit to be charged liquefied petroleum gas into any vessel unless there is conveniently posted at or near the vessel a valid permit when such permit is required by the provisions of this Chapter.

(b) No vessel shall be filled without the consent of the legal or registered owner.

13:52-3.7 Safe gas system design

All parts of liquefied petroleum gas systems not otherwise specifically provided for shall be designed and constructed to provide a degree of safety that is equivalent to that required for other parts of the system.

13:52-3.8 State Police notified

The State Police shall be notified in cases where serious injury or excessive property damage is involved within 24 hours of the occurrence.

SUBCHAPTER 4. APPROVAL OF PLANS**13:52-4.1 Approval of plans; submission of documents**

(a) A complete set of duplicate plans and specifications, together with a plot plan of the property line, buildings and tanks, shall be filed with the Superintendent for approval for any proposed installation or addition to existing installation with LP-gas containers of more than 2,000 gallons water capacity per container and for all container installations from which other containers will be filled.

(b) The Superintendent may require additional information on the plot plan showing location of buildings on adjoining property where in his opinion public welfare may be affected.

(c) Such plans and specifications must be approved before the commencement of any work or construction or installation and must be accompanied by the certification of the licensed professional engineer who prepared the drawings that the work will be installed under his supervision and in accordance with the approved plans and specifications and that the plans and specifications as filed conform in all respects to the provisions of this Chapter.

(d) The Superintendent shall issue a permit for the performance of work upon compliance with the provisions of this Chapter.

SUBCHAPTER 5. PERMIT TO OPERATE**13:52-5.1 Permit required**

(a) No owner shall use or cause to be used, any vessel or equipment for the storage, handling or utilization of liquefied petroleum gas without first securing a permit to operate such vessel or equipment from the Superintendent under the following conditions and modifications:

1. For new installations and systems;

2. For alterations to existing installations and systems;
3. Within six months after the effective date of these provisions for existing systems and installations.

13:52-5.2 Application for permit

Application shall be made to the Superintendent and the permit shall be issued when it shall appear that the applicant is reasonably qualified to transport and install containers, receptacles and equipment in a satisfactory and safe manner.

13:52-5.3 Authorization

No person, firm or corporation shall use or cause to be used, any motor vehicle, tank truck, tank semitrailer or tank truck-trailer, for the transportation of liquefied petroleum gas unless after complying with these provisions a permit to operate any such vehicle has first been secured from the Division of Motor Vehicles of the Department of Law and Public Safety; and provided, further, that no permit shall be required under this Section for any motor vehicle that is used for the transportation of liquefied petroleum gas, not operated or registered by an authorized dealer, in containers not larger than ten gallons water capacity each, with an aggregate capacity of 25 gallons, except when used as a motor fuel.

13:52-5.4 Inspection

The Superintendent shall not issue a permit to operate as required by Section 5.1 (Permit required) of this Chapter until an inspection has been made to determine if the equipment and installation complies with the requirements of these regulations. In lieu of such inspection, the Superintendent may accept a report from a licensed professional engineer certifying that the equipment and installation has been constructed strictly in accordance with the requirements of these regulations.

13:52-5.5 Duration of permit

The permit to operate shall expire upon the alteration or mechanical or fire damage of the vessel or equipment.

13:52-5.6 Exchange permitted

The permit to operate shall not expire because of the interchange or exchange of approved appliances intended for the same purpose.

13:52-5.7 Permit exceptions

(a) The permit to operate shall not be required for any installed system except in the case of:

1. Bulk plants;

2. Where the individual container exceeds 2,000 gallons water capacity; or
3. A container or containers from which other containers will be filled.

(c) In systems utilizing containers of over 2,000 gallons water capacity, each regulator, container valve, excess flow valve, gauging device and relief valve installed on or at the container shall have its corrections as to design, construction and performance determined by the Division.

(d) The Superintendent may accept as the equivalent of such inspection, approval and determination as required by subsections (a), (b) and (c) of this Section if the equipment or systems stated therein have been tested and listed by a nationally recognized testing laboratory.

SUBCHAPTER 6. GENERAL RULES

13:52-6.1 Applicability

This Subchapter shall be construed to establish basic rules and in addition shall specifically apply to the conditions described in Subchapters 7 through 12 and 14 of this Chapter, except as noted in this Subchapter.

13:52-6.2 Odorizing liquefied petroleum gas

(a) All liquefied petroleum gases shall be effectively odorized by an approved agent of such character as to indicate positively, by distinct odor, the presence of gas down to concentration in air of not over $\frac{1}{2}$ the lower limit of flammability.¹

(b) Odorization is not required if harmful in the use or further processing of the liquefied petroleum gas, or if odorization will serve no useful purpose as a warning agent in such use or further processing.

¹ The lower flammable limits of the more commonly used L.P. gases are: Propane 2.15 per cent; Butane 1.55 per cent. These figures represent volumetric percentages of gas in gas-air mixtures.

13:52-6.3 Minimum odorization

The odorization requirement of Section 6.2 (Odorizing liquefied petroleum gas) of this Chapter shall be considered to be met by the use of 1.0 pounds of ethyl mercaptan, 1.0 pounds of thiophane or 1.4 pounds of amyl mercaptan per 10,000 gallons of L.P. Gas; provided, however, that this listing of odorants and quantities shall not exclude the use of other odorants that meet the odorization requirements of Section 6.2 (Odorizing liquefied petroleum gas) of this Chapter.

13:52-6.4 Approval of equipment and systems

(a) Each system utilizing ICC containers shall have container valves, connectors, manifold valve assemblies and regulators approved by the Division.

(b) Each system for domestic or commercial use, or both, in which containers of 2,000 gallons water capacity or less are provided, other than those constructed in accordance with ICC specifications shall be inspected and approved by the Division.

13:52-6.5 Requirements for construction and original test of containers

(a) Containers used with systems embodied in Subchapters 8 through 12 and 14 of this Chapter except as provided in Section 9.3(a)(3) (Design pressure and classification of fuel supply containers), Section 10.2 (Construction of containers), and Section 11.2(a)(2) (Construction and marking) of this Chapter shall be designed, constructed and tested in accordance with the Unfired Pressure Vessel Code, and case interpretation and addenda, sponsored by either the American Society of Mechanical Engineers (ASME) or the American Petroleum Institute and the American Society of Mechanical Engineers (API-ASME) and¹ which meet the requirements of the New Jersey Boiler and Pressure Vessel Rules of the New Jersey Department of Labor and Industry. Adherence to applicable ASME Code Case Interpretations and Addenda shall be considered as compliance with the ASME Code.

1. Containers constructed according to the 1949 and earlier editions of the ASME Code do not have to comply with paragraphs U-2 to U-10 inclusive and U-19. Containers constructed according to paragraph U-70 and earlier editions are not authorized.

2. Containers constructed according to API-ASME Code do not have to comply with Section I or with appendix to Section I. Paragraphs W-601 to W-606 inclusive in the 1943 and earlier editions of the Code do not apply.

(b) The provisions of subsection (a) of this Section shall not be construed as prohibiting the continued use or reinstallation of containers constructed and maintained in accordance with the standards established for the Storage and Handling of Liquefied Petroleum Gases (no. 58) in effect at the time of fabrication.

(c) Containers used with systems embodied in Subchapter 7, Section 9.3(a)(3) (Design pressure and classification of fuel supply containers) of this Chapter, in Subchapter 10, except as provided in Section 10.2(b) (Construction of containers) and in Subchapter 11, except as provided in Section 11.2(a)(2) (Construction and marking of containers) of this Chapter, shall be constructed, tested, stamped and registered with the Bureau of Explosives in accordance with Interstate Commerce Commission Specifications effective at the date of their manufacture.

(d) A manufacturer's data report covering the construction of each direct-fired vaporizer (covered under Section 16.13 (Vaporizer and housing) of this Chapter) or each unfired pressure vessel (covered under Subchapter 8 (Type "B" Systems) of this Chapter) having a capacity of more than 37½ gallons or a volume of five cubic feet, shall be filed direct with the Mechanical Inspection Bureau of the Department of Labor and Industry, unless registered by the National Board of Pressure Vessel Inspectors. Each report shall be signed by a representative of the manufacturer and also by the authorized inspector who conducted the constructional shop inspections. Such authorized shop inspector shall be in the employ of a State agency or agency of a State subdivision which has adopted the applicable ASME Codes; or an inspector regularly employed by an insurance company who is authorized to inspect steam boilers and pressure vessels.

(e) A filing fee of \$2.00 is required by the Mechanical Engineering Bureau for each manufacturer's data report covering unfired Pressure Vessels as specified in subsection (b) of this Section and not registered with the National Board of Pressure Vessel inspectors. The fee is payable to the Commissioner of Labor and Industry by either the manufacturer, the owner, or the user.

(f) The interchanging of requirements of different codes, rules or specifications shall not be permitted.

(g) All portable and semiportable vessels shall be equipped with foot rings, skid rails, valve protecting caps or rings, or brackets to provide assurance that safety devices will be kept in proper position while the vessel contains liquefied petroleum gas.

(h) Welding to the shell, head or any other part of the container subject to internal pressure, shall be done in compliance with the code under which the tank was fabricated. Other welding is permitted only on saddle plates, lugs or brackets attached to the container by the tank manufacturer.

(i) Where repair or modification involving welding of ICC containers is required, the container shall be returned to a qualified manufacturer making containers of the same type, and the repair or modification made in compliance with ICC regulations.

¹ Construction of containers under the API-ASME Code is not authorized after July 1, 1961.

13:52-6.6 Markings on containers

(a) Each container covered in Section 6.5(a) (Requirements for construction and original test of containers) of this Chapter except as provided in Section 6.5(c) (Requirements for construction and original test of containers) of this Chapter shall be marked as specified in the following manner:

1. With a stamp identifying compliance with and other markings required by the rules of the code under which the container is constructed identifying compliance therewith, or with the stamping identifying compliance with, or other markings required by the Boiler Inspection Division of the Department of Labor and Industry, or with the stamp and other markings required by the National Board of Pressure Vessels inspectors;

2. With notation as to whether the container is designed for underground or aboveground installation, or both. If intended for both and different style hoods are provided, the marking shall indicate the proper hood for each type of installation;

3. With the name and address of the supplier of the system, or the trade name of the system;

4. With the water capacity of the container in pounds or gallons, U.S. Standard;

5. With the working pressure in p.s.i. gauge for which the container is designed;

6. With the wording "This container shall not contain a product having a vapor pressure in excess of—p.s.i. gauge at 100 degrees Fahrenheit;" (See N.J.A.C. 6.15 (a) Pressures inside buildings).

7. With the tare weight in pounds or other identified unit of weight for containers with a water capacity of 300 pounds or less;

8. With marking indicating the maximum level to which the container may be filled with liquid at temperatures between 20 degrees Fahrenheit and 130 degrees Fahrenheit, except on containers provided with fixed maximum level indicators or which are filled by weighing. Markings shall be in increments of not more than 20 degrees Fahrenheit. This marking may be located on liquid level gauging device;

9. With the outside surface area in square feet.

(b) Markings specified shall be on a metal name plate attached to the container and located in such a manner as to remain visible after the container is installed.

(c) When LP-gas and one or more other gases are stored or used in the same area, the containers shall be marked to identify their content. Marking shall be in compliance with American Standard 48.1-1954 "Method of Marking Portable Compressed Gas Containers to Identify the Material Contained."¹

¹ Available from Compressed Gas Association, Inc., 500 Fifth Avenue, New York, New York, 10036

13:52-6.7 Location of containers and regulating equipment

(a) Containers and first-stage regulating equipment, if used, shall be located outside of buildings, except under one or more of the following conditions:

1. In buildings used exclusively for container charging, vaporization, pressure reduction, gas mixing or distribution;
2. When portable use is necessary and in accordance with the provisions of Section 7.4 (Containers used inside) of this Chapter;
3. LP-gas tank vehicles parked or garaged in accordance with the provisions of Section 12.10 (Parking and garaging LP-gas tank vehicles) of this Chapter;
4. LP-gas-fueled stationary or portable engines in accordance with the provisions of Sections 9.11 (Stationary engines in buildings) and 9.12 (Portable engines in buildings) of this Chapter;
5. LP-gas fueled industrial trucks used in accordance with the provisions of Section 9.13 (Industrial trucks inside buildings) of this Chapter;
6. LP-gas fueled vehicles garaged in accordance with the provisions of Section 9.14 (Garaging LP gas-fueled vehicles) of this Chapter;
7. Containers awaiting use or resale when stored in accordance with the provisions of Subchapter 13 (Storage of Containers) of this Chapter.

(b) Each individual container shall be located with respect to the nearest important building or group of buildings or line of adjoining property which may be built upon in accordance with the following table:

MINIMUM DISTANCES

Water Capacity Per Container	Containers		Between containers
	Under-ground	Above-ground	
Less than 125 gallons	10 feet	None	None
125 to 500 gallons	10 feet	10 feet	3 feet
501 to 2,000 gallons	25 feet*	25 feet*	3 feet
2,001 to 30,000 gallons	50 feet	50 feet	5 feet
30,001 to 70,000 gallons	50 feet	75 feet	¼ of sum of adjacent containers diameters
70,001 to 90,000 gallons	50 feet	100 feet	

* Note: The above distance requirements may be reduced to not less than ten feet for a single container of 1,200 gallons water capacity or less, providing such a container is at least 25 feet from any other LP-gas container of more than 125 gallons water capacity.

(c) Containers installed for use shall not be stacked one above the other.

(d) In cases of bulk storage in heavily populated or congested areas, the Superintendent shall determine restrictions of individual tank capacity, total storage, and distance to line of adjoining property which may be built upon and other reasonable protective methods.¹

(e) In the case of buildings devoted exclusively to gas manufacturing and distributing operations the distances specified in subsection (b) of this Section may be reduced; provided, that in no case shall containers of capacity exceeding 500 gallons be located closer than ten feet to the gas manufacturing and distributing buildings.

(f) Readily ignitable material such as weeds and long dry grass shall be removed within ten feet of any container.

(g) The minimum separation between liquefied petroleum gas containers and flammable liquid tanks shall be 20 feet, and the minimum separation between a container and the center line of the dike shall be ten feet.

(h) The foregoing provisions shall not apply when liquefied petroleum gas containers of 125 gallons or less capacity are installed adjacent to Class III flammable liquid tanks of 275 gallons or less capacity.

(i) Suitable means shall be taken to prevent the accumulation of flammable liquids under adjacent liquefied petroleum gas containers, such as by diking, diversion curbs or grading.

(j) Where dikes are used with flammable liquid tanks, no liquefied petroleum gas containers shall be located within the diked area.

¹ Generally, aggregate storage of 2,000 gallons water capacity or more is considered bulk storage within the intent of subsection (d) of this Section.

13:52-6.8 Container valves and accessories

(a) Valves, fittings and accessories connected directly to the container including primary shut-off valves shall have a rated working pressure of at least 250 p.s.i.g. and shall be of material and design suitable for LP-gas service. Cast iron shall not be used for container valves, fittings and accessories. The use of container valves made of malleable or nodular iron (ASTM-A47-52 or A395-56T) is not prohibited by these provisions.

(b) Connections to containers, except safety relief connections, liquid level gauging devices and plugged openings shall have shutoff valves located as close to the container as practicable (except as provided in subsection (e) of this Section).

(c) Excess flow valves where required by these regulations shall close automatically at the rated flows of vapor or liquid as specified by the manufacturer. The connections or line including valves, fittings, and similar parts being protected by an excess flow valve shall have a greater capacity than the rated flow of the excess flow valve.

(d) Liquid level gauging devices which are so constructed that outward flow of container contents shall not exceed that passed by a Number 54 drill opening, need not be equipped with excess flow valves.

(e) Openings from container or through fittings attached directly on the container to which the pressure gauge connection is made need not be equipped with shutoff or excess flow valves if the openings are restricted to not larger than Number 54 drill size openings.

(f) Except as provided in Section 7.4(a)(2) (Containers and equipment used inside buildings or structures) of this Chapter, excess flow and back pressure check valves where required by these regulations shall be located inside the container or at a point outside where the line enters the container. In the latter case, installation shall be made in such manner that any undue strain beyond the excess flow or back pressure check valve will not cause breakage between the container and such valve. (See N.J.A.C. 13:52-12.1 et seq. for tank truck requirements.)

(g) Excess flow valves shall be designed with a by-pass, not to exceed a Number 60 drill size opening to allow equalization of pressures.

(h) Containers of more than 30 gallons water capacity and less than 2,000 gallons water capacity filled on a volumetric basis, and manufactured after December 1, 1963, shall be equipped for filling into the vapor space.

13:52-6.9 Piping, including pipe, tubing and fittings

(a) Pipe, except as provided in Sections 9.5(f), 10.10, 11.8 and 12.4(c)3 of this Chapter, shall be wrought iron or steel (black or galvanized), brass, copper, or aluminum alloy. Aluminum alloy pipe shall be at least Schedule 40 in accordance with American Standard Specification for Aluminum Alloy Pipe, H 38.7 (ASTM B-241) (except that the use of alloy 5456 is prohibited) and shall be suitably marked at each end of each length indicating compliance with American Standard Specifications. Aluminum alloy pipe shall be protected against external corrosion when it is in contact with dissimilar metals other than galvanized steel, or its location is subject to repeated wetting by such liquids as water (except rain water), detergents, sewage or leaking from other piping, or it passes through flooring, plaster, masonry, or insulation. Galvanized sheet steel or pipe, galvanized inside and out, may be considered suitable protection. The maximum nominal pipe size for aluminum pipe shall be 3/4 inch and shall not be used for pressures exceeding 20 p.s.i.g. Aluminum alloy pipe shall not be installed within six inches of the ground.

1. Vapor piping with operating pressures not exceeding 125 p.s.i.g. shall be suitable for a working pressure of at least 125 p.s.i.g. Pipe shall be at least Schedule 40 (ASTM A-53, Grade B Electrical Resistance Welded and Electric Flash Welded Pipe or equal).

2. Vapor piping with operating pressures over 125 p.s.i.g. and all liquid piping shall be suitable for a working pressure of at least 250 p.s.i.g. Pipe shall be at least Schedule 80 if joints are threaded, or threaded and backwelded. At least Schedule 40 (ASTM A-53 Grade B Electric Resistance Welded and Electric Flash Welded Pipe or equal) shall be used if joints are welded and flanged.

(b) Tubing shall be seamless and of copper, brass, steel or aluminum alloy. Copper tubing shall be of type K or L or

equivalent as covered in American Standard Specification for Seamless Copper Water Tube, H 23.1 (ASTM B-88). Aluminum alloy tubing shall be of Type A or B or equivalent as covered in Specification ASTM B-307 and shall be suitably marked every 18 inches indicating compliance with ASTM Specifications. The minimum wall thickness of copper tubing and aluminum alloy tubing shall be as specified below:

WALL THICKNESS OF COPPER TUBING ¹

Standard Size Inches	Nominal O.D. Inches	Wall Thickness Inches	
		Type K	Type L
1/4	0.375	0.035	0.030
3/8	0.500	0.049	0.035
1/2	0.625	0.049	0.040
5/8	0.750	0.049	0.042
3/4	0.875	0.065	0.045
1	1.125	0.065	0.050
1 1/4	1.375	0.065	0.055
1 1/2	1.625	0.072	0.060
2	2.125	0.083	0.070

WALL THICKNESS OF ALUMINUM ALLOY TUBING ²

Outside Diameter Inches	Wall Thickness Inches	
	Type A	Type B
3/8	0.035	0.049
1/2	0.035	0.049
5/8	0.042	0.049
3/4	0.049	0.058

Note: The standard size by which tube is designated is 1/8 inch smaller than its nominal outside diameter.

Aluminum alloy tubing shall be protected against external corrosion when it is in contact with dissimilar metals other than galvanized steel, or its location is subject to repeated wetting by liquids such as water (except rain water), detergents, sewage or leakage from other piping, or it passes through flooring, plaster, masonry, or insulation. Galvanized sheet steel or pipe, galvanized inside and out, may be considered suitable protection. The maximum outside diameter for aluminum alloy tubing shall be 3/4 inch and shall not be used for pressures exceeding 20 PSIG. Aluminum alloy tubing shall not be installed within six inches of the ground.

(c) In systems where the gas in liquid form without pressure reduction enters the building (See Section 6.15 (Pressures inside buildings) of this Chapter) only heavy-walled seamless brass or copper tubing with an internal diameter not greater than 3/2 inch and a wall thickness of not less than 3/4 inch shall be used. This requirement shall not apply to research and experimental laboratories, buildings or separate fire divisions of buildings used exclusively for housing internal combustion engines, nor to commercial gas plants or bulk stations where containers are charged, nor to industrial vaporizer buildings.

(d) Pipe joints may be screwed, flanged, welded, soldered or brazed with a material having a melting point exceeding 1000 degrees Fahrenheit. Joints on seamless copper, brass, steel or aluminum alloy gas tubing shall be made by means of approved gas tubing fittings, or soldered or brazed with a material having a melting point exceeding 1000 degrees Fahrenheit.

(e) For operating pressures of 125 p.s.i.g. or less, fittings shall be designed for a pressure of at least 125 p.s.i.g., except for tank truck requirements. For operating pressures above 125 p.s.i.g., fittings shall be designed for a minimum of 250 p.s.i.g. (See N.J.A.C. 12.4(c)(2) for design and construction requirements.)

(f) The use of threaded cast iron pipe fittings, such as ells, tees, crosses, couplings and unions is prohibited. Aluminum alloy fittings shall be used with aluminum alloy pipe and tubing. Insulated fittings shall be used where aluminum alloy pipe or tubing connects with a dissimilar metal.

(g) Strainers, regulators, meters, compressors, pumps, and similar devices are not considered as pipe fittings. This does not prohibit the use of malleable, nodular or higher strength gray iron for these devices.

(h) All materials such as valve seats, packing, gaskets, diaphragms, and similar equipment shall be of such quality as to be resistant to the action of liquefied petroleum gas under the service conditions to which they are subjected.

(i) All piping, tubing or hose shall be tested after assembly and proved free from leaks at not less than normal operating pressures. After installation piping and tubing of all domestic and commercial systems shall be tested and proved free of leaks using a monometer or equivalent device that will indicate a drop in pressure. Test shall not be made with a flame.

(j) Provision shall be made for expansion, contraction, jarring and vibration, and for settling. This may be accomplished by flexible connections.

(k) Piping outside buildings may be buried, aboveground, or both, but shall be well supported and protected against physical damage. Where soil conditions warrant, all piping shall be protected against corrosion. Where condensation may occur, the piping shall be pitched back to the container, or suitable means shall be provided for vaporization of the condensate.

¹ Based on data in American Standard Specification for Seamless Copper Water Tube, H 23.1 (ASTM B-88).

² Based on data in Standard Specification for Aluminum-Alloy Drawn Seamless Coiler Tubes for Special Purpose Applications ASTM-B307.

13:52-6.10 Hose specifications

(a) Hose shall be fabricated of materials that are resistant to the action of LP-gas in the liquid and vapor phases. If wire braid is used for reinforcing the hose, it shall be of corrosion resistant material such as stainless steel.

(b) Hose subject to container pressure shall be marked "LP-gas" or "LPG" at not greater than ten foot intervals.

(c) Hose subject to container pressure shall be designed for a bursting pressure of not less than 1250 p.s.i.g.

(d) Hose subject to container pressure shall have its correctness as to design, construction and performance determined by:

1. Listing by Underwriters' Laboratories, Inc.; or
2. Listing by a nationally recognized testing laboratory; or
3. Approval by the authority having jurisdiction.

(e) Hose subject to container pressure shall be capable of withstanding, without leakage, a test pressure of not less than 500 p.s.i.g.

(f) Hose and hose connections on the low pressure side of the regulator or reducing valve shall be designed for a bursting pressure of not less than 125 p.s.i.g. or five times the set pressure of the relief devices protecting that portion of the system, whichever is higher.

(g) Hose may be used on the low pressure side of regulators to connect to other than domestic and commercial gas appliances under the following conditions:

1. The appliances connected with hose shall be portable and need a flexible connection.
2. The hose shall be of the minimum length, but shall not exceed six feet except as provided in Section 7.4(a)(7) (Containers and equipment used inside buildings) of this Chapter, and shall not extend from one room to another, nor pass through any walls, partitions, ceilings or floors. The hose shall not be concealed from view of ceilings or floors. Such hose shall not be concealed from view or used in a concealed location.
3. The hose shall be approved and shall not be used where it is likely to be subjected to temperatures above 125 degrees Fahrenheit. The hose shall be securely connected to the appliance and the use of rubber slip ends shall not be permitted.

4. The shutoff valve for an appliance connected by hose shall be in the metal pipe or tubing and not at the appliance end of the hose. When shutoff valves are installed close to each other, precautions shall be taken to prevent operation of the wrong valve.

5. Hose used for connecting to wall outlets shall be protected from physical damage.

13:52-6.11 Safety devices

(a) Every container except those constructed in accordance with ICC specifications and every vaporizer (except motor fuel vaporizers described in Section 6.13(b)(3) (Vaporizer and housing) and Subchapter 8 (Type "B" Systems) of this Chapter) whether heated by artificial means or not, shall be provided with one or more safety relief valves of spring-loaded or equivalent type.

1. These valves shall be arranged to afford free vent to the outer air with discharge not less than five feet horizontally away from any opening into the building which is below the discharge.

2. The rate of the discharge shall be in accordance with the requirements of the Tables set forth in Sections 6.12, 6.13(a)(5), and 9.7(b) of this Chapter.

(b) Container and vaporizer safety relief valves shall be set to start-to-discharge as follows, with relation to the design pressure of the container:

	Minimum	Maximum
ASME Code; Paragraph U-68, U-69—1949 and earlier editions	100 per cent	125 per cent *
ASME Code; Paragraph U-200, U-201—1949 edition	88 per cent	100 per cent *
ASME Code—1950, 1952, 1956, 1959, 1962 and 1965 editions	88 per cent	100 per cent *
API—ASME Code—all editions	88 per cent	100 per cent *
ICC	As approved by Bureau of Explosives	

* Manufacturers of safety relief valves are allowed a plus tolerance not exceeding 10 per cent of the set pressure marked on the valve.

(c) Safety relief devices used with systems employing containers other than those constructed according to ICC specifications shall be so constructed as to discharge at not less than the rates shown in Table 1 set forth in Section 6.12 (Minimum required rate of discharge for safety relief valves on containers) of this Chapter, before the pressure is in excess of 120 per cent of the maximum (not including the ten per cent referred to in subsection (b) of this Section) permitted to start to discharge pressure setting of the device.

(d) Safety relief valves shall be so arranged that the possibility of tampering will be minimized. If pressure setting or adjustment is external, the relief valves shall be provided with suitable means for sealing adjustment pressure vessel in order to prevent the safety valves opening.

(e) In certain locations sufficiently sustained high temperatures prevail which will require the use of a lower vapor pressure product to be stored or the use of a higher designed pressure vessel in order to prevent the safety valves opening as the result of these temperatures. As an alterna-

tive the tanks may be protected by cooling devices such as spraying, shading or other effective means.

(f) Shutoff valves shall not be installed between the safety relief device and the container, or the equipment or piping to which the safety relief device is connected except that a shutoff valve may be used where the arrangement of this valve is such that full required capacity flow through the safety relief device is always afforded.¹

(g) Safety relief valves shall have direct communication with the vapor space of the container at all times except as permitted in Section 12.6(j)1 (Loading and unloading of vehicles) of this Chapter.

(h) Each container safety relief valve used with systems covered by Subchapters 8 through 12 and 14 of this Chapter except as provided in Section 9.3(a)(3) (Design pressure and classification of fuel supply containers) and 10.2(a) (Construction of containers) of this Chapter shall be plainly and permanently marked with the following:

1. "Container Type" of the pressure vessel on which the valve is designed to be installed;
2. The pressure in p.s.i. gauge at which the valve is set to start to discharge;
3. The actual rate of discharge of the valve in cubic feet per minute of air at 60 degrees Fahrenheit and 14.7 pounds per square inch, absolute; and
4. The manufacturer's name and catalog number, for example; T-200-25-4050 air indicating that the valve is suitable for use on A Type 200 container, that it is set to start to discharge at 250 P.S.I. gauge and that its rate of discharge is 4050 cubic feet per minute of air as determined in Table 1.

(i) Valves not marked "air" are flow-rated in LP-gas and can be converted to their air capacity ratings by applying the air conversion factors given in the table following Table 1.

(j) Frequent testing of safety relief valves, as would be required where there is a probable increase or decrease of the releasing pressure of the valve due to clogging, sticking, corrosion or exposure to elevated temperatures, is not necessary for such valves on liquefied petroleum gas containers for the following reasons:

1. The gases are so-called "sweet gases", that is, they have no corrosive effects on the metal of the container or valve; the valves are constructed of materials not readily subject to corrosion and are installed in pressure vessels so as to be protected against the weather. Further, the temperature variations are not sufficient to bring about any permanent set of the valve springs. Another reason is that the gases are odorized and instant warning is given of any escape of gas. Although general storage of these gases has been on a widespread scale for more than 20

years, industry experience has not shown any case of these safety valves not functioning properly.

2. It is recognized, however, that like all mechanical devices, these valves cannot be expected to remain in reliable condition forever, hence it is suggested that in the case of containers exceeding 2,000 gallons water capacity they be tested at approximately five-year intervals. When the valve is of type necessitating removal for testing, the container must first be emptied. When the type of valve permits, testing may be accomplished by an external lifting device equipped with an indicator to show the pressure equivalent at which it opens.

(k) Safety relief valve assemblies, including their connections, shall be of sufficient size so as to provide the rate of flow required for the container on which they are installed.

(l) A hydrostatic relief valve shall be installed between each pair of shutoff valves on liquefied petroleum gas liquid piping so as to relieve into a safe atmosphere. The start-to-discharge pressure setting of such relief valves shall not be in excess of 500 p.s.i.g. The minimum setting on relief valves installed in piping connected to other than ICC containers shall not be lower than 140 per cent of the container relief valve setting and in piping connected to ICC containers not lower than 400 p.s.i.g. Such a relief valve should not be installed in the pump discharge piping if the same protection can be provided by installing the relief valve in the suction piping. The start-to-discharge pressure setting of such a relief valve, if installed on the discharge side of the pump, shall be greater than the maximum pressure permitted by the recirculation device in the system.

(m) The discharge from any safety relief device shall not terminate in or beneath any building, except relief devices covered by Section 6.7(a)1 through 7 (Location of containers and regulating equipment), by Section 7.3(a) (Containers and regulating equipment installed outside of buildings), and by Section 7.4 (Containers and equipment used inside buildings) of this Chapter.

¹The above exception is made to cover such cases as a three-way valve installed under two safety relief valves, each of which has the required rate of discharge and is so installed as to allow either of the safety relief valves to be closed off but does not allow both safety valves to be closed off at the same time. Another exception may be where two separate relief valves are installed with individual shutoff valves. In this case the two shutoff valve stems shall be mechanically interconnected in a manner which will allow full required flow of one relief valve at all times.

13:52-6.12 Minimum required rate of discharge for safety relief valves on containers

The following table illustrates the minimum required rate of discharge, in cubic feet per minute, of air at 120 per cent of the maximum permitted start-to-discharge pressure for safety relief valves to be used on containers other than those constructed in accordance with ICC specifications:

Table 1

Surface Area Sq. Ft.	Flow Rate CFM Air
20 or less	626
25	751
30	872
35	990
40	1100
45	1220
50	1330
55	1430
60	1540
65	1640
70	1750
75	1850
80	1950
85	2050
90	2150
95	2240
100	2340
105	2440
110	2530
115	2630
120	2720
125	2810
130	2900
135	2990
140	3080
145	3170
150	3260
155	3350
160	3440
165	3530
170	3620
175	3700
180	3790
185	3880
190	3960
195	4050
200	4130
210	4300
220	4470
230	4630
240	4800
250	4960
260	5130
270	5290
280	5450
290	5610
300	5760
310	5920
320	6080
330	6230
340	6390
350	6540
360	6690
370	6840
380	7000
390	7150
400	7300
450	8040
500	8760
550	9470
600	10170

Surface Area Sq. Ft.	Flow Rate CFM Air
650	10860
700	11550
750	12220
800	12880
850	13540
900	14190
950	14830
1000	15470
1050	16100
1100	16720
1150	17350
1200	17960
1250	18570
1300	19180
1350	19780
1400	20380
1450	20980
1500	21570
1550	22160
1600	22740
1650	23320
1700	23900
1750	24470
1800	25050
1850	25620
1900	26180
1950	26750
2000	27310

Surface Area = Total outside surface area of container in square feet.

When the surface area is not stamped on the nameplate or when the marking is not legible, the area can be calculated by using one of the following formulas:

- (1) Cylindrical container with hemispherical heads
Area = Overall length × outside diameter × 3.1416;
- (2) Cylindrical container with other than hemispherical heads
Area = (Overall length ± 0.3 outside diameter) × outside diameter × 3.1416;

NOTE: This formula is not exact, but will give results within the limits of practical accuracy for the sole purpose of sizing relief valves.

- (3) Spherical container Area = Outside diameter squared × 3.1416.

Flow Rate-CFM Air = Required flow capacity in cubic feet per minute of air at standard conditions, 60 degrees Fahrenheit and atmospheric pressure (14.7 p.s.i.a.).

The rate of discharge may be interpolated for intermediate values of surface area. For containers with total outside surface area greater than 2,000 square feet, the required flow rate can be calculated using the formula, Flow Rate-CFM Air = 53.632 A degrees .82.

A = total outside surface area of the container in square feet.

Valves not marked "Air" have flow rate marking in cubic feet per minute of liquefied petroleum gas. These can be converted to ratings in cubic feet per minute of air by multiplying the liquefied petroleum gas ratings by the factors listed below. Air flow ratings can be converted to ratings in cubic feet per minute of liquefied petroleum gas by dividing the air ratings by the factors listed below.

Air Conversion Factors

Container Type	100	125	150	175	200
Air Conversion Factor	1.162	1.142	1.113	1.078	1.010

13:52-6.13 Vaporizer and housing¹

(a) Indirect fired vaporizers utilizing steam, water or other heated medium shall be constructed and installed as follows:

1. Vaporizers shall be constructed in accordance with the requirements of the rules of the Mechanical Inspection Bureau of the New Jersey Department of Labor and Industry and shall permanently be marked as follows: with the code marking signifying the specifications to which vaporizer is constructed; with the allowable working pressure and temperature for which the vaporizer is designed; with sum of the outside surface area and the inside heat exchange surface expressed in square feet (see Table 2); with the name or symbol of the manufacturer.

2. The following vaporizers are exempt from certified construction shop inspection but must have an identifying mark and be stamped or tagged with the manufacturer's name, maximum working pressure, temperature, manufacturer's serial number, year built:

Vaporizers having an inside volume of five cubic feet or less and designed for pressures of 250 p.s.i. gauge or less; vaporizers having an inside volume of one and one half cubic feet or less and designed for pressures over 250 p.s.i. gauge.

3. Heating or cooling coils shall not be installed inside a storage container.

4. Vaporizers may be installed in buildings, rooms, sheds, or lean-tos used exclusively for gas manufacturing or distribution, or in other structures of light, fire resistive construction or equivalent, well ventilated near the floor line and roof.

5. Vaporizers shall have at or near the discharge, a safety relief valve providing a minimum rate of discharge as indicated in this Table 2 except as provided in Section 8.4(e)1 (Safety devices) of this Chapter:

Table 2

Table illustrating the minimum required rate of discharge for safety relief valves for liquefied petroleum gas vaporizers (steam heated, water heated and direct fired).

The minimum required rate of discharge for safety relief valves shall be determined as follows:

Obtain the total surface area by adding the surface area of vaporizer shell in square feet directly in contact with LP-gas and the heat exchange surface area in square feet directly in contact with LP-gas.

Obtain the minimum required rate of discharge in cubic feet of air per minute, at 60 degrees Fahrenheit and 14.7 p.s.i.a. from Table 1 set forth in Section 6.12 (Minimum required rate of discharge for safety relief valves on containers) of this Chapter for this total surface area.

6. The heating medium lines into and leaving the vaporizer shall be provided with suitable means for preventing the flow of gas into heat systems in the event of tube rupture in the vaporizer. Vaporizers shall be provided with suitable automatic means to prevent liquid passing through vaporizers to the gas discharge piping.

7. The device that supplies the necessary heat for producing steam, hot water, or other heating medium may be installed in a building, compartment, room or lean-to which shall be ventilated near the floor line and roof to the outside. This device location shall be separated from all compartments or rooms containing liquefied petroleum gas vaporizers, pumps and central gas mixing devices by a wall of substantially fire-resistant material and vapor-tight construction. This requirement does not apply to the domestic water heaters which may supply heat for a vaporizer in a domestic system.

8. Gas-fired heating systems supplying heat exclusively for vaporization purposes shall be equipped with automatic safety devices to shut off the flow of gas to main burners, if the pilot light should fail.

9. Vaporizers may be an integral part of a fuel storage container directly connected to the liquid section or gas section or both.

10. Vaporizers shall not be equipped with fusible plugs.

11. Vaporizer houses shall not have unprotected drains to sewers or sump pits.

(b) Atmospheric vaporizers employing heat from the ground or surrounding air shall be installed as follows:

1. Buried underground; or
2. Located inside building close to a point at which pipe enters the building provided capacity of unit does not exceed one quart;
3. Vaporizers of less than one-quart capacity heated by the ground or surrounding air may not be required to be equipped with safety relief valves provided that it can be demonstrated to the Superintendent that the assembly is safe without safety-relief valves;

4. Vaporizers designed primarily for domestic service shall be protected against tampering and physical damage.

(c) Direct gas-fired vaporizers shall be constructed, stamped, and installed as follows:

1. In accordance with the ASME Power Boiler Code and the New Jersey Steam Boiler Inspection Regulations, and marked with:

- i. Name of manufacturer;
- ii. Rated Btu input through the burners;
- iii. Area of the heat exchangers surface in square feet;
- iv. Outside surface of the vaporizer in square feet; and
- v. Maximum vaporizing capacity in gallons per hour.

2. Vaporizers may be connected to the liquid section or the vapor section of the storage container, or both; but in any case there shall be at the container a manually-operated valve in each connection to permit complete shutting off when desired, of all flow of vapor or liquid from container to vaporizer.

- i. Vaporizers with capacity not exceeding 35 gallons per hour shall be located at least five feet from container shutoff valves;
- ii. Vaporizers having capacity of more than 35 gallons but not exceeding 100 gallons per hour shall be located at least ten feet from the container shutoff valves;
- iii. Vaporizers having a capacity greater than 100 gallons per hour shall be located at least 15 feet from container shutoff valves.

3. Vaporizers may be installed in buildings, rooms, housings, sheds, or lean-tos used exclusively for vaporizing or mixing of liquefied petroleum gas. Vaporizing housing structures shall be of noncombustible construction, well ventilated near the floor line and the highest point of the roof: (See Section 6.11(a)1 (Safety devices) of this Chapter for venting of relief valves).

4. Vaporizers shall have at or near the discharge, a safety relief valve providing an effective rate of discharge in accordance with the Table 2 set forth in this Section. Relief valves shall be so located as not to be subjected to temperatures in excess of 140 degrees Fahrenheit.

5. Vaporizers shall be provided with means for manually turning off the gas to the main burner and pilot.

6. Vaporizers shall be equipped with automatic safety devices to shut off the flow of gas to the main burners if the pilot light should fail. When flow through the pilot exceeds 2,000 Btu per hour, the pilot also shall be equipped with an automatic safety device to shut off the flow of gas to the pilot should the pilot flame be extinguished.

7. Pressure regulating the pressure-reducing equipment if located within ten feet of a direct fired vaporizer shall be separated from the open flame by a substantially airtight noncombustible partition or partitions.

8. Except as provided in paragraph 3 of this subsection, the following minimum distances shall be maintained between direct-fired vaporizers and nearest important buildings or group of buildings or line of adjoining property which may be built upon:

- i. Ten feet for vaporizers having a capacity of 15 gallons per hour or less vaporizing capacity;
- ii. 25 feet for vaporizers having a vaporizing capacity of 16 to 100 gallons per hour;
- iii. 50 feet for vaporizers having a vaporizing capacity exceeding 100 gallons per hour.

9. Direct-fired vaporizers shall not raise the product pressure above the design pressure of the vaporizer equipment nor shall they raise the product pressure within storage container above the pressure shown in the second column of the Table in Section 8.2(a) (Design pressures) of this Chapter.

10. Vaporizers shall not be equipped with fusible plugs.

11. Vaporizer shall not have unprotected drains to sewers or sump pits.

(d) Direct gas-fired tank heaters shall be constructed and installed as follows:

- 1. Direct gas-fired tank heaters, and tanks to which they are applied, shall only be installed above ground.
- 2. Tank heaters shall be permanently marked with the name of the manufacturer, the rated Btu input to the burner, and the maximum vaporizing capacity in gallons per hour.
- 3. Tank heaters may be an integral part of a fuel storage container directly connected to the container liquid section, or vapor section, or both.
- 4. Tank heaters shall be provided with a means for manually turning off the gas to the main burner and pilot.
- 5. Tank heaters shall be equipped with an automatic safety device to shut off the flow of gas to main burners, if the pilot light should fail. When the flow through the pilot exceeds 2000 Btu per hour, the pilot also shall be equipped with an automatic safety device to shut off the

flow of gas to the pilot should the pilot flame be extinguished.

6. Pressure-regulating and pressure-reducing equipment if located within ten feet of a direct-fired tank heater shall be separated from the open flame by a substantially airtight noncombustible partition.

7. The following minimum distances shall be maintained between a storage tank heated by a direct fired tank heater and nearest important building or group of buildings on line of adjoining property which may be built upon:

- i. Ten feet for storage containers of less than 500 gallons capacity;
- ii. 25 feet for storage containers of 500 to 1,200 gallons capacity;
- iii. 50 feet for storage containers of over 1,200 gallons capacity.

8. No direct-fired tank heater shall raise the product pressure within the storage container over 75 per cent of the pressure as set forth in the second column of the Table in Section 8.2(a) (Design pressure) of this Chapter.

(e) The vaporizer section of vaporizer-burners used for dehydrators or dryers shall be located outside of buildings. They shall be constructed and installed as follows:

- 1. Vaporizer-burners shall have a minimum design pressure of 250 PSIG with a factor-of-safety of five.
- 2. Manually-operated positive shutoff valves shall be located at the containers to shut off all flow to the vaporizer-burners.
- 3. Minimum distances between storage containers and vaporizer-burners shall be as follows:

Water Capacity Per Container	Minimum Distance
Less than 501 gallons	10 feet
501 to 2,000 gallons	25 feet
Over 2,000 gallons	50 feet

4. The vaporizer section of vaporizer-burners shall be protected by a hydrostatic relief valve. The relief valve shall be located so as not to be subjected to temperatures in excess of 140 degrees Fahrenheit. The start-to-discharge pressure setting shall be such as to protect the components involved, but not less than 250 p.s.i.g. The discharge shall be directed upward and away from component parts of the equipment and away from operating personnel.

5. Vaporizer-burners shall be provided with means for manually turning off the gas to the main burner and pilot.

6. Vaporizer-burners shall be equipped with automatic safety devices to shut off the flow of gas to the main burner and pilot in the event the pilot is extinguished. (See NFPA Number 93).

7. Pressure-regulating and control equipment shall be located or protected so that the temperatures surrounding this equipment shall not exceed 140 degrees Fahrenheit except that equipment components may be used at higher temperatures if designed to withstand such temperatures.

8. Pressure regulation and control equipment when located downstream of the vaporizer shall be designed to withstand the maximum discharge temperature of the vapor.

9. The vaporizer section of vaporizer-burners shall not be provided with fusible plugs.

10. Vaporizer coils or jackets shall be made of ferrous metal or high temperature alloys.

11. Equipment utilizing vaporizer-burners shall be equipped with automatic shutoff devices upstream and downstream of the vaporizer section connected so as to operate in applicable, insufficient air flow (see NFPA Number 93).

¹This Section 6.13 does not apply to motor fuel vaporizers, (see Section 9.8 (Vaporizers) of this Chapter), nor to integral vaporizer-burners used for crop dryers, weed burners, tar kettles, or other similar purposes.

13:52-6.14 Filling densities

(a) The "filling density" is defined as the per cent ratio of the weight of the gas in a container to the weight of water the container will hold at 60 degrees Fahrenheit. All containers shall be filled according to the following filling densities.

MAXIMUM PERMITTED FILLING DENSITY

Specific Gravity at 60°	Aboveground containers		Underground Containers all Capacities
	0 to 1200 Total Water Cap.	Over 1200 Gals. Total Water Cap.	
.473-480	38%	41%	42%
.481-488	39	42	43
.489-495	40	43	44
.496-503	41	44	45
.504-510	42	45	46
.511-519	43	46	47
.520-527	44	47	48
.528-536	45	48	49
.537-544	46	49	50
.545-552	47	50	51
.553-560	48	51	52
.561-568	49	52	53
.569-576	50	53	54
.577-584	51	54	55
.585-592	52	55	56
.593-600	53	56	57
.601-608	54	57	58
.609-617	55	58	59
.618-626	56	59	60
.627-634	57	60	61

(b) The maximum liquid volume in per cent of the total container capacity may be determined for liquefied petroleum gases at any liquid temperature by the use of the following method: The quantity of gas which may be placed in a container is dependent upon the temperature of the liquid in the container and the maximum permitted filling density in addition to the size of the container.

1. The filling density depends on the size of the container, whether it is installed aboveground or underground and the specific gravity at 60 degrees Fahrenheit of the LP-gas placed in the container. Filling density values for these conditions are given in subsection (a) of this Section. Since the temperature of the liquid in the container is seldom exactly 60 degrees Fahrenheit, it is necessary to measure the actual liquid temperature and then obtain a correction factor from the attached table and insert this in the following formula. The average liquid temperature may be obtained by one of two ways. One procedure is to measure the liquid temperature in the container after the container is almost filled to its permissible liquid content. This is secured by inserting a thermometer into a thermometer well installed in the container so as to be in the liquid. The other procedure can only be used if the container is essentially empty prior to filling. In this case, the liquid temperature is measured by a thermometer placed in a thermometer well or other device installed in the filling line at a place near the container. The temperature should be read at intervals and averaged.

2. Knowing the filling density, the liquid specific gravity at 60 degrees Fahrenheit of the product to be placed in the container, the correction factor for the temperature of the liquid in the container, and the container capacity, the maximum quantity that can be placed in a container is determined as follows:

$$V = D/G \times F$$

Where:

- V = Maximum liquid volume (in per cent of total container capacity) which shall be placed in a container when the liquid temperature is T.
- D = filling density from subsection (a) of this Section in per cent.
- G = specific gravity of LP-gas at 60 degrees Fahrenheit placed in container.
- F = correction factor from following Table for correcting liquid volume from 60 degrees Fahrenheit to volume at temperature T. The correction factor is obtained by finding the specific gravity at 60 degrees Fahrenheit (G) in the column at the top of the Table and coming down this column till the actual liquid temperature T is found. The correction factor corresponding to this specific gravity and temperature is then read. Interpolation is permitted.
- T = temperature of liquid LP-gas in container in degrees Fahrenheit.

After obtaining V from the above formula the actual maximum gallons, Q_t, of the LP-gas which may be placed in a container is obtained by multiplying the water capacity of the container by V/100
Where:

$$Q_t = \text{actual gallons at liquid temperature, T.}$$

Example:

Assume an aboveground container with 10,000 gallons water capacity;

Propane with a specific gravity of 0.508 at 60 degrees Fahrenheit to be placed in container;

Filling density from subsection (a) of this Section for aboveground container having a capacity greater than 1,200 gallons in which a product having a specific gravity at 60 degrees Fahrenheit of 0.508 is to be placed is 45 per cent.

To determine maximum quantity (Q) that may be placed in container when the liquid temperature is 60 degrees Fahrenheit:

$$Q_{60 F} = 45 \times 10,000/0.508 \times 100 = 8,860 \text{ gallons}$$

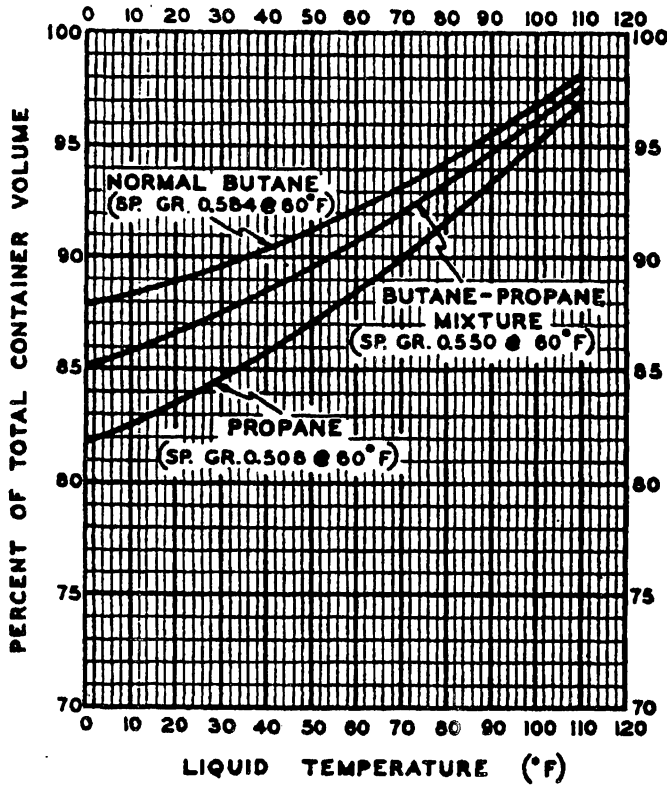
When liquid temperature is 82 degrees Fahrenheit find correction factor in the Table on next page for specific gravity at 60 degrees Fahrenheit of 0.508 and a liquid temperature of 82 degrees Fahrenheit which is 0.963.

$$Q_{82 F} = 45 \times 10,000/0.508 \times 0.963 \times 100 = 9,200 \text{ gallons}$$

3. Liquid volume correction factor:

SPECIFIC GRAVITIES AT 60° F., 60° F.												
Observed Temperature Degrees Fahrenheit	0.500	0.505	0.510	0.515	0.520	0.525	0.530	0.535	0.540	0.545	0.550	0.555
VOLUME CORRECTION FACTORS												
60	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
61	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
62	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
63	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
64	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
65	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
66	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
67	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
68	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
69	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
70	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
71	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
72	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
73	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
74	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
75	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
76	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
77	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
78	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
79	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
80	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
81	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
82	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
83	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
84	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
85	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
86	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
87	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
88	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
89	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
90	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
91	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
92	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
93	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
94	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
95	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
96	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
97	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
98	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
99	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
100	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

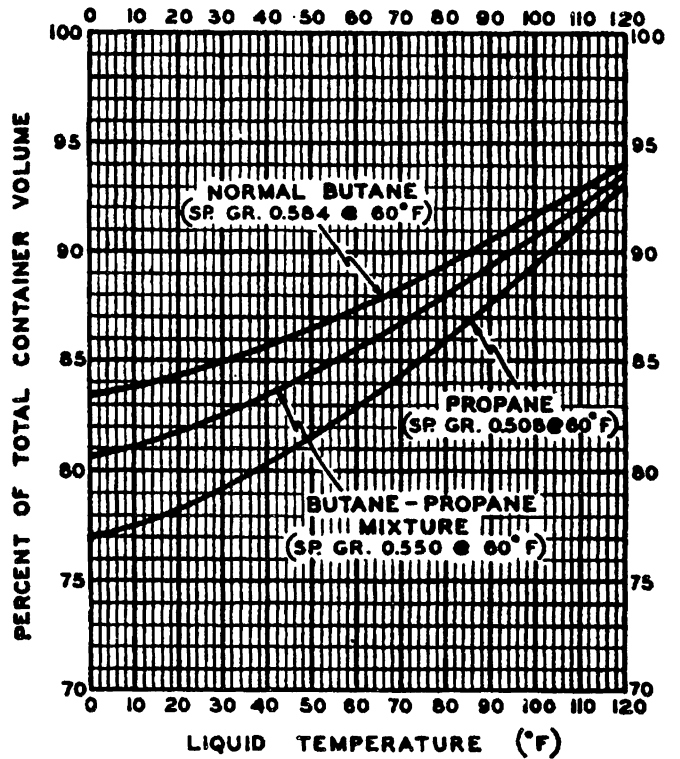
4. The maximum filling levels for aboveground containers with over 1,200 gallons water capacity can be determined by use of the following graph.¹



Maximum Filling Level for Aboveground Containers (Over 1200 Gallons Water Capacity)

Note: This graph applies solely to the product having the specific gravity shown.

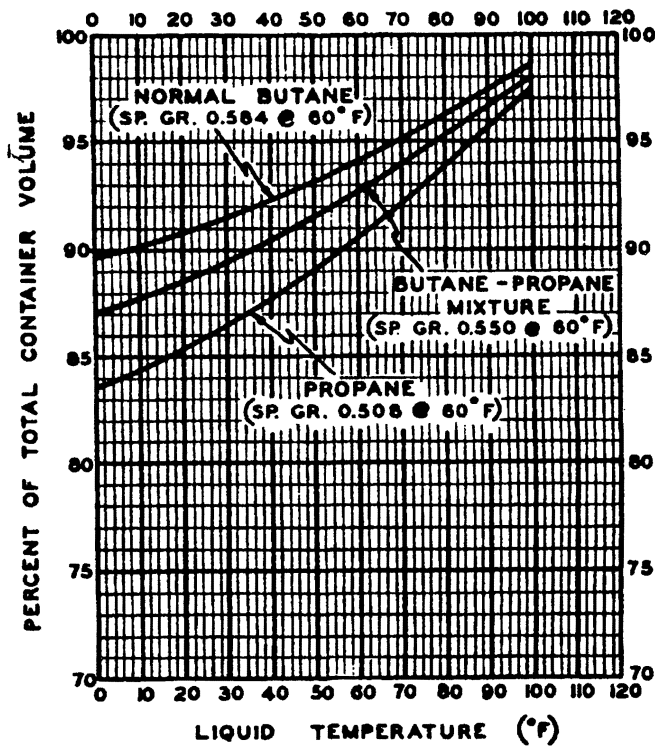
5. The maximum filling level for aboveground containers with 0-1,200 gallons water capacity can be determined by use of the following graph.²



Maximum Filling Level for Aboveground Containers (0-1200 Gallons Water Capacity)

Note: This graph applies solely to the product having the specific gravity shown.

6. The maximum filling level for underground containers may be determined by use of the following graph:³



Maximum Filling Level for Underground Containers

Note: This graph applies solely to the product having the specific gravity shown.

(c) The maximum liquid volume in per cent of total container capacity shown in the Table contained in this subsection may be used in lieu of the allowable filling densities shown in subsection (a) of this Section to determine the maximum quantity that may be placed in a container.

Table 3

The following Table illustrates the alternate permitted maximum liquid volumes in per cent of total container capacity, for filling containers up to 1,200 gallons total water capacity as specified in subsection (a) of this Section:

	Aboveground containers liquid temperature assumed to be 40 degrees Fahrenheit	Underground containers liquid temperature assumed to be 50 degrees Fahrenheit
Propane (approx. sp. gr. 0.51)	80	89
Mixtures (approx. sp. gr. 0.55)	83	91
Butane (approx. sp. gr. 0.58)	86	93

(d) Except as provided in subsection (e) of this Section, any container, including mobile cargo tanks and portable tank containers, regardless of size or construction, shipped under ICC jurisdiction or constructed in accordance with ICC specifications shall be filled according to ICC requirements.

(e) Portable containers not subject to ICC jurisdiction (such as, but not limited to, motor fuel containers on

industrial and lift trucks, and farm tractors covered in Subchapter 9 (Type "C" Systems) of this Chapter or containers recharged at the installation) may be filled either by weight, or by volume using a fixed length dip tube gauging device.

¹ This graph applies solely to the product having the specific gravity shown.

² This graph applies solely to the product having the specific gravity shown.

³ This graph applies solely to the product having the specific gravity shown.

13:52-6.15 Pressures inside buildings

(a) Gas for fuel purposes in either the liquid or vapor phase shall not be piped into any building at pressures in excess of 20 p.s.i.g. except as follows:

1. Buildings used exclusively to house equipment for vaporization, pressure reduction, gas mixing or distribution;
2. Buildings or separate fire divisions of buildings, used exclusively to house internal combustion engines or industrial laboratories;
3. Buildings or separate fire division of buildings, used exclusively for research and experimental laboratories; and
4. Buildings, structures, or equipment under construction or repair.

(b) Portable containers shall not be taken into buildings except as provided in Section 6.7(a) (Location of containers and regulating equipment) of this Chapter.

13:52-6.16 Transfer of liquids

(a) At least one attendant shall remain close to the transfer connection from the time the connections are first made until they are finally disconnected, during the transfer of the product.

(b) Containers shall be filled or used only upon authorization of the owner.

(c) Gas or liquid shall not be vented to the atmosphere to assist in transferring contents of one container to another, except that this shall not preclude the use of listed pumps utilizing LP-gas in the vapor phase as a source of energy and venting that gas to the atmosphere at a rate not to exceed that from a Number 31 drill size opening and provided that the venting and liquid transfer shall be located not less than 50 feet from the nearest important building.

(d) Fuel supply containers shall be gauged and charged only in the open air or in buildings especially provided for that purpose.

(e) The maximum vapor pressure of the product at 100 degrees Fahrenheit which may be transferred into a container shall be in accordance with the provisions of Sections 8.2(a), 9.3(a), 12.4(a), and 14.2(a), of this Chapter. (For ICC containers use ICC requirements).

(f) Marketers and users shall exercise precaution to assure that only those gases for which the system is designed, examined, and listed, are employed in its operation, particularly with regard to pressures.

(g) Pumps or compressors shall be designed for use with LP-gas. When compressors are used they shall normally take suction from the vapor space of the container being filled and discharge to the vapor space of the container being emptied.

(h) Pumping systems, when equipped with a positive displacement pump, shall include a recirculating device which shall limit the differential pressure on the pump under normal operating conditions to the maximum differential pressure rating of the pump. The discharge of the pumping system shall be protected so that pressure does not exceed 350 p.s.i.g. If a recirculation system discharges into the supply tank and contains a manual shutoff valve, an adequate secondary safety recirculation system shall be incorporated which shall have no means of rendering it inoperative. Manual shutoff valves in recirculation systems shall be kept open except during an emergency or when repairs are being made to the system.

(i) Containers manufactured in accordance with specification of the ICC and authorized by ICC regulations as a "single trip" or "nonrefillable container" shall not be refilled or reused in LP-gas service.

(j) When hose is to be used for transferring liquid from one container to another, wet hose is recommended. Such hose shall be equipped with suitable shutoff valves at discharge end. Provision shall be made to prevent excessive hydrostatic pressure in the hose.

(k) When necessary, unloading piping or hoses shall be provided with suitable bleeder valves for relieving pressure before disconnection.

(l) Agricultural air-moving equipment, including crop dryers, shall be shut down when supply containers are being filled unless the air intakes and sources of ignition on the equipment are located 50 feet or more from the container.

(m) Agricultural equipment employing open flames or equipment with integral containers, such as flame cultivators, weed burners, and in addition, shall be shut down during refueling. (See N.J.A.C. 9.2(e) for General provisions for type "C" Systems.)

(n) Filling of fuel containers for industrial trucks or motor vehicles from industrial bulk storage containers shall be performed not less than 10 feet from the nearest important masonry-walled building or not less than 25 feet from the nearest important building of other construction and, in any event, not less than 25 feet from any building opening. For service stations, see Subchapter 14 (Liquefied Petroleum Gas Service Stations).

(o) Filling of portable containers, containers mounted on skids, fuel containers on farm tractors or similar applications, from storage containers used in domestic or commercial service, shall be performed not less than 50 feet from the nearest important building.

(p) Filling of containers in trailer courts shall be in accordance with the provisions of Section 10.13 (Charging of containers) of this Chapter.

13:52-6.17 Tank car or transport truck unloading points and operations

(a) The track of tank car siding shall be relatively level.

(b) A "Tank car connected" sign, as covered by ICC rules, shall be installed at the active end or ends of the siding while the tank car is connected for unloading.

(c) While cars are on sidetrack for unloading, the wheels at both ends shall be blocked on the rails. (See subsection (j) of N.J.A.C. 12.3 as to transport truck loading.)

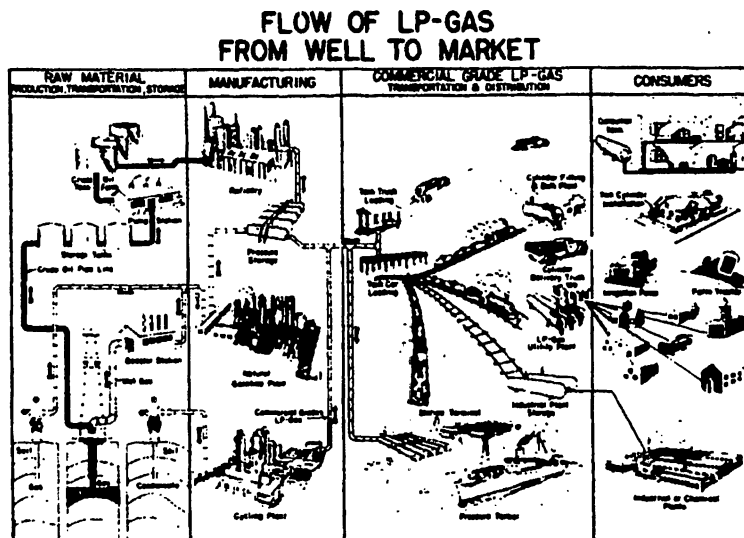
(d) A man shall be in attendance at all times, while the tank car, or trucks are being unloaded.

(e) The pipeline to which the unloading hoses are connected shall be equipped with a back flow check valve to prevent discharge of the liquefied petroleum gas from the receiving container and line in case of line hose and fittings rupture.

(f) The tank car or transport truck unloading point should be located with due consideration to the following factors:

1. Proximity to railroads and highway traffic;
2. The distance of the unloading point from adjacent property;
3. Buildings on the installer's property;
4. Nature of occupancy;
5. Topography;
6. Type of construction of buildings;
7. Number of tank cars or transport trucks that may be safely unloaded at one time; and
8. Frequency of unloading.

(g) Where practical, the distance of the unloading point should conform to the distances set out in Section 6.7(b) (Location of containers and regulating equipment) of this Chapter except that lesser distances may be used if approved.

**13:52-6.18 Instructions**

Personnel performing installation, operation and maintenance work shall be properly trained in such functions.

13:52-6.19 Release of LP-gas into atmosphere

Liquefied petroleum gas shall not be needlessly released into the atmosphere.

13:52-6.20 LP-gas as propellant

Liquefied petroleum gas shall not be used in place of compressed air as a propellant in paint spray guns or other similar applications where a hazard may be created.

13:52-6.21 Electrical equipment and other sources of ignition

(a) Electrical equipment and wiring shall be of a type specified by and shall be installed in accordance with the National Electrical Code, NFPA No. 70 (USA Standard C1) for ordinary locations except that fixed electrical equipment in classified areas shall comply with the provisions of Section 6.22 (Fixed electrical equipment in classified areas) of this Chapter.

(b) Open flames or other sources of ignition shall not be permitted in vaporizer rooms (except those housing direct-fired vaporizers), pump houses, container charging rooms or other similar locations. Direct-fired vaporizers shall not be permitted in pump houses or container charging rooms.

(c) Liquefied petroleum gas storage containers do not require lightning protection (see NFPA No. 78, Lightning Protection Code).

(d) Since liquefied petroleum gas is contained in a closed system of piping and equipment, the system need not be electrically conducive or electrically bonded for protection against static electricity (see NFPA No. 77M, Static Electricity).

(e) Open flames (except as provided for in Section 6.13 (Vaporizer and Housing) of this Chapter) cutting or welding, portable electric tools and extension lights capable of igniting LP-gas, shall not be permitted within classified areas specified in the table set out in Section 6.22(a) of this Chapter unless the LP-gas facilities have been freed of all liquid and vapor, or special precautions observed under carefully controlled conditions.

13:52-6.22 Fixed electrical equipment in classified areas

(a) Fixed electrical equipment and wiring installed within classified areas specified in the following table shall comply with the table and shall be installed in accordance with the National Electrical Code, NFPA No. 70 (USA Standard C1). This provision does not apply to fixed electrical equipment at residential or commercial installations of LP-gas systems or to systems covered by Subchapters 9, 10, and 11.

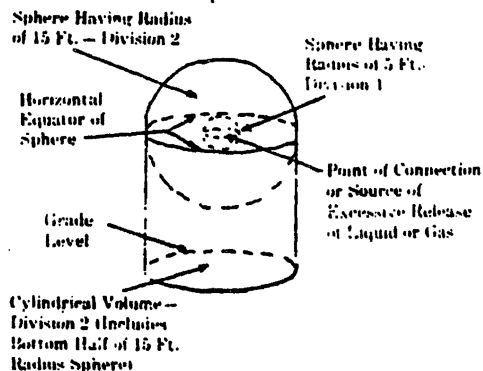
TABLE

Part	Location	Extent of Classified Area*	Equipment shall be suitable for National Electrical Code, Class 1, Group D**
A	Storage containers other than ICC cylinders.	Within 15 feet in all directions from connections, except connections otherwise covered in Table.	Division 2
B	Tank vehicle and tank car loading and unloading***	Within 5 feet in all directions from connections regularly made or disconnected for product transfer.	Division 1
		Beyond 5 feet but within 15 feet in all directions from a point where connections are regularly made or disconnected and within the cylindrical volume between the horizontal equator of the sphere and grade. (See Figure 1)	Division 2
C	Gauge vent openings other than those on ICC cylinders.	Within 5 feet in all directions from point of discharge	Division 1
		Beyond 5 feet but within 15 feet in all directions from point of discharge.	Division 2
D	Relief valve discharge other than those on ICC cylinders.	Within direct path of discharge	Division 1 Note: Fixed electrical equipment should preferably not be installed
		Within 5 feet in all directions from point of discharge.	Division 1
		Beyond 5 feet but within 15 feet in all directions from point of discharge except within the direct path of discharge.	Division 2
E	Pumps, compressors, gas-air mixers and vaporizers other than direct fired. Indoors without ventilation.	Entire room and any adjacent room not separated by a gas tight partition.	Division 1
		Within 15 feet of the exterior side of any exterior wall or roof that is not vaportight or within 15 feet of any exterior opening.	Division 2

Part	Location	Extent of Classified Area*	Equipment shall be suitable for National Electrical Code, Class 1, Group D**
	Indoors with adequate ventilation.	Entire room and any adjacent room not separated by a gastight partition.	Division 2
	Outdoors in open air at or above grade.	Within 15 feet in all directions from this equipment and within the cylindrical volume between the horizontal equator of the sphere and grade (See Figure 1)	Division 2
F	Pits or trenches containing or located beneath LP-gas valves, pumps, compressors, regulators, and similar equipment. Without mechanical ventilation.	Entire pit or trench	Division 1
		Entire room and any adjacent room not separated by a gastight partition.	Division 2
		Within 15 feet in all directions from pit or trench when located outdoors.	Division 2
	With adequate mechanical ventilation.	Entire pit or trench.	Division 2
		Entire room and any adjacent tight partition.	Division 2
		Within 15 feet in all directions from pit or trench when located outdoors.	Division 2
G	Container Filling		
	Indoors without ventilation	Entire room	Division 1
	Indoors with adequate ventilation****	Within 5 feet in all directions from connections regularly made or disconnected for product transfer.	Division 1
		Beyond 5 feet and entire room.	Division 2
	Outdoors in open air	Within 5 feet in all directions from connections regularly made or disconnected for product transfer.	Division 1
		Beyond 5 feet but within 15 feet in all directions from a point where connections are regularly made or disconnected and within the cylindrical volume between the horizontal equator of the sphere and grade. (See Figure 1)	Division 2
H	Service Station Dispensing Units.	Entire space within dispenser enclosure, and 18 inches horizontally from enclosure	Division 1

Part	Location	Extent of Classified Area*	Equipment shall be suitable for National Electrical Code, Class 1, Group D
		exterior up to an elevation 4 feet above dispenser base. Entire pit or open space beneath dispenser.	
		Up to 18 inches abovegrade within 20 feet horizontally from any edge of enclosure. Note: For pits within this area, see Part F of this table.	Division 2
I	Special Buildings or rooms for storage of portable containers.	Entire room.	Division 2
J	Pipelines and connections containing operational bleeds, drips, vents or drains.	Within 5 feet in all directions from point of discharge. Beyond 5 feet from point of discharge, same as Part E of this table.	Division 1

- * The classified area shall not extend beyond an unpierced wall, roof, or solid vaportight partition.
- ** See Article 500—"Hazardous Locations" in NFPA No. 70 (USA Standard C1) for definitions of Classes, Groups and Divisions.
- *** When classifying extent of hazardous area, consideration shall be given to possible variations in the spotting of tank cars and tank vehicles at the unloading points and the effect these variations of actual spotting point may have on the point of connection.
- **** Ventilation, either natural or mechanical, is considered adequate when the concentration of the gas in a gas-air mixture does not exceed 25 per cent of the lower flammable limit under normal operating conditions.



(b) Electrical equipment installed on LP-gas cargo vehicles shall comply with Subchapter 12 (Transportation) of this Chapter.

13:52-6.23 Liquid level gauging device

(a) Each container manufactured after December 31, 1965 and filled on a volumetric basis shall be equipped with a fixed liquid level gauge to indicate the maximum permitted filling level as provided in subsection (f) of this Section. When a variable liquid level gauge is also provided, the fixed liquid level gauge will also serve as a means for checking the variable gauge. These gauges shall be used in charging containers as required in Section 6.14 (Filling densities) of this Chapter.

(b) All variable gauging devices shall be arranged so that the maximum liquid level for butane, for a 50-50 mixture of butane and propane, and for propane to which the container may be charged is readily determinable.

1. The markings indicating the various liquid levels from empty to full shall be on the system nameplate or gauging device or part may be on the system nameplate and part on the gauging device.
2. Dials of magnetic or rotary gauges shall show whether they are for cylindrical or spherical containers and whether for aboveground or underground service.

3. The dials of gauges intended for use only on above-ground containers of over 1,200 gallons water capacity shall be so marked. (See N.J.A.C. 6.14).

(c) Gauging devices that require bleeding of the product to the atmosphere as with the rotary tube, fixed tube and slip tube, shall be so designed that the bleed valve maximum opening is not larger than a Number 54 drill size, unless provided with excess flow valve.

(d) Gauging devices shall have a design working pressure of at least 250 pounds per square inch gauge.

(e) Length of tube or position of fixed liquid level gauge shall be designed to indicate the maximum level to which the container may be filled for the product contained. This level shall be based on the volume of the product at 40 degrees Fahrenheit at its maximum permitted filling density for aboveground containers and at 50 degrees Fahrenheit for underground containers. The method for calculating filling point for which fixed liquid level gauge shall be designed shall be in accordance with the following:

1. Method of calculating maximum volume of liquefied petroleum gas which can be placed in a container for which length of fixed dip tube is set.

2. It is impossible to set out in a table the length of a fixed dip tube for various capacity tanks because of the varying tank diameters and lengths and because the tank may be installed either in a vertical or horizontal position. Knowing the maximum permitted filling volume in gallons, however, the length of the fixed tube can be determined by the use of a strapping table obtained from the container manufacturer. The length of the fixed tube should be such that when its lower end touches the surface of the liquid in the container, the contents of the container will be the maximum permitted volume as determined by the following formula:

3. Formula for determining maximum volume of liquefied petroleum gas for which a fixed length of dip tube shall be set:

$$\frac{\text{Water Cap. (Gals.) of Container}^* \times \text{Filling Density}^{**}}{\text{Sp. Gr. of Liquefied Petroleum Gas}^* \times \text{Volume Correction Factor}^{***} \times 100} = \text{Maximum Volume of Liquefied Petroleum Gas}$$

* Measured at 60 degrees Fahrenheit.
 ** From Section 6.14 (Filling densities) of this Chapter.
 *** For aboveground containers the liquid temperature is assumed to be 40 degrees Fahrenheit and for underground containers the liquid temperature is assumed to be 50 degrees Fahrenheit. To correct the liquid volumes at these temperatures to 60 degrees Fahrenheit the following factors shall be used:

Specific Gravity	Volume Correction Factors	
	Aboveground	Underground
.500	1.033	1.017
.510	1.031	1.016
.520	1.029	1.015
.530	1.028	1.014
.540	1.026	1.013
.550	1.025	1.013
.560	1.024	1.012
.570	1.023	1.011
.580	1.021	1.011
.590	1.020	1.010

Example

Assume a 100-gallon total water capacity tank for above-ground storage of propane having a specific gravity of 0.510 at 60 degrees Fahrenheit.

$$\frac{100 \text{ (gallons)} \times 42 \text{ (Filling Density from 6.14(a))}}{0.510 \times 1.031 \text{ (Correction Factor from Table in (2) above)} \times 100} = 4200 \div 52.6$$

79.8 gallons propane, the maximum amount permitted to be 4200 = placed in a 100-gallon total water capacity aboveground 52.6 container equipped with a fixed dip tube.

4. The maximum volume of liquefied petroleum gas which can be placed in a container when determining the length of the dip tube expressed as a percentage of total water content of the container is calculated by the following formula:

$$\frac{\text{Maximum Volume of liquefied petroleum gas (From Formula in (2) above)} \times 100}{\text{Total water content of container in gallons}} = \text{Maximum per cent of liquefied petroleum gas}$$

5. The maximum weight of liquefied petroleum gas which may be placed in a container for determining the length of a fixed dip tube is determined by multiplying the maximum volume of liquefied petroleum gas obtained by the formula in paragraph 3 of this Section by the pounds of liquefied petroleum gas in a gallon at 40 degrees Fahrenheit for aboveground and at 50 degrees Fahrenheit for underground containers. For example typical pounds per gallon are specified below:

	Aboveground pounds per gallon	Underground pounds per gallon
Propane	4.37	4.31
N Butane	4.97	4.92

(f) Fixed liquid level gauges used on containers other than ICC containers shall be stamped on the exterior of the gauge with the letters "DT" followed by the vertical distance (expressed in inches and carried out to one decimal place) from the top of container to the end of the dip tube or to the centerline of the gauge when it is located at the maximum permitted filling level. For ICC containers the stamping shall be placed both on the exterior of the gauge and on the container. On aboveground or cargo containers where the gauges are positioned at specific levels, the marking may

be specified in per cent of total tank contents and the marking shall be stamped on the container.

(g) Gauge glasses of the columnar type shall be restricted to filling plants where the fuel is withdrawn in the liquid phase only. They shall be equipped with valves having metallic handwheels, with excess flow valves, and with extra heavy glass adequately protected with a metal housing applied by the gauge manufacturer. They shall be shielded against the direct rays of the sun. Gauge glasses of the columnar type are prohibited on tank trucks, and on motor fuel tanks, and on containers used in domestic, commercial and industrial installations.

(h) Gauging devices of the float or equivalent type which do not require flow for their operation and having connections extending to a point outside the container do not have to be equipped with excess flow valves, provided the piping and fittings are adequately designed to withstand the container pressure and are properly protected against mechanical damage and breakage.

13:52-6.24 Requirements for appliances

(a) Except as provided in subsections (b) and (c) of this Section and in Section 7.4(a)(9) of this Chapter, LP-gas appliances shall be approved.

(b) In cases where no applicable standard has been developed for a given class of appliance or accessory, approval of the Superintendent may be required before the appliance or accessory is installed.

(c) Any appliance that was originally manufactured for operation with a gaseous fuel other than LP-gas and is in good condition may be used with LP-gas only after it is properly converted, adapted and tested for performance with LP-gas before the appliance is placed in use.

(d) Unattended heaters used inside buildings for the purpose of animal or poultry production or care shall be equipped with an approved automatic device designed to shut off the flow of gas to the main burners, and pilot, if used, in the event of flame extinguishment. For domestic appliances in buildings, see NFPA, number 54, (ASA Z21.30), Standard for the installation of gas appliances and gas piping. For heaters used in the drying of agricultural products, see NFPA, Number 93, Standard for dehydrators and dryers for agricultural products.

SUBCHAPTER 7. TYPE "A" SYSTEMS

13:52-7.1 Applicability

(a) The provisions of this Subchapter are specifically applicable to those systems that utilize containers for liquefied petroleum gas that are constructed in accordance with the specifications set forth in the regulations of the Interstate Commerce Commission for the transportation of explosives and other dangerous articles by motor freight and is especially descriptive of "Bottle Gas" cylinder systems.

(b) Each system shall be deemed to include the container base or bracket, containers, container valves, connectors, manifold valve assembly, regulators and relief valves.

(c) The provisions of Subchapter 6 (General Rules) of this Chapter apply in their entirety to the requirements of this Subchapter, except as otherwise specified.

13:52-7.2 Marking of containers

(a) Containers shall be marked in accordance with the ICC regulations referred to in Section 7.1 (Applicability) of this Chapter. Additional markings not in conflict with ICC requirements shall be permitted.

(b) Except as provided in subsection (c) of this Section, each container shall be marked with its minimum water capacity in pounds or other identified unit of weight.

(c) If a container is filled and maintained only by the owner or his representative and if the water capacity of each container is identified by a code, compliance with the requirements of subsection (b) of this Section is not required.

(d) Each container shall be marked with its tare weight in pounds or other identified unit of weight, including all permanently attached fittings, but not the cap.

13:52-7.3 Containers and regulating equipment installed outside buildings or structures

(a) Containers shall not be buried below ground. This, however, shall not prohibit the installation in a compartment or recess below grade level, such as a niche in a slope or terrace wall which is used for no other purpose; provided, that the container and regulating equipment are not in contact with the ground and the compartment or recess is drained and ventilated horizontally to the outside air from its lowest level, with the outlet at least three feet away from any building opening which is below the level of the outlet. Except as provided in Section 6.11(m) (Safety devices) of this Chapter, the discharge from safety relief valves shall be located not less than three feet horizontally away from any building opening which is below the level of the discharge. Discharge from any safety device shall not terminate in any building, nor beneath any building.

(b) Containers shall be set upon firm foundation or otherwise firmly secured. The possible effect of settlement on the outlet piping shall be guarded against by a flexible connection or special fitting.

13:52-7.4 Containers and equipment used inside buildings or structures

(a) When operational requirements make portable use of containers necessary and their location outside of buildings or structures is impracticable, containers and equipment are permitted to be used inside of buildings or structures in accordance with paragraphs 1 through 13 of this subsection, and, in addition, any other provisions of this Section which are applicable to the particular use or occupancy.

1. "Containers in use" shall mean connected for use.

2. Systems utilizing containers having a water capacity greater than 2½ pounds (nominal one pound LP-gas capacity) shall be equipped with excess flow valves. Such excess flow valves shall be either integral with the container valves or in the connections to the container valve outlets. In either case, an excess flow valve shall be installed in such a manner that any undue strain beyond the excess flow valve will not cause breakage between the container and the excess flow valve. The installation of excess flow valves shall take into account the type of protection provided. (See paragraph 4 of this subsection.)

3. Regulators, if used, shall be either directly connected to the container valves or to manifolds connected to the container valves. The regulator shall be suitable for use with LP-gas. Manifolds and fittings connecting containers to pressure regulator inlets shall be designed for at least 250 p.s.i.g. service pressure.

4. Valves on containers having a water capacity greater than 50 pounds (nominal 20 pounds LP-gas capacity) shall be protected while in use.¹ (See N.J.A.C. 7.5(c) Container valves and accessories.)

5. Containers shall be marked in accordance with the requirements of Section 6.6(c) (Marking of containers) and Section 7.2 (Marking of containers) of this Chapter.

6. Pipe or tubing shall conform to the requirements of Section 6.9 (Piping, including pipe, tubing and fittings) of this Chapter except that aluminum pipe or tubing shall not be used. (See paragraph 7 of this subsection.)

7. Hose shall be designed for a working pressure of at least 250 PSIG. Hose and hose connections shall have their correctness as to design, construction and performance determined by listing by Underwriters' Laboratories, Inc.; listing by a nationally recognized testing agency; or approval by the authority having jurisdiction. The hose length may exceed the length specified in Section 6.10(g)(2) (Hose specifications) of this Chapter, but shall be as short as practicable. Hose shall be long enough to permit compliance with spacing provisions of this Section

without kinking or straining or causing hose to be so close to a burner as to be damaged by heat.

8. Portable heaters, including salamanders, shall be approved.

9. Portable heaters, including salamanders, shall be equipped with an approved automatic device designed to shut off the flow of gas to the main burner and pilot, if used, in the event of flame extinguishment. Heaters having inputs above 75,000 Btu per hour shall be equipped with either a pilot which must be lighted and proved before the main burner fuel can be turned on, or an electric ignition system. Heaters manufactured prior to May 1, 1967 may be used if equipped with the approved automatic shutoff device only.

10. Containers, regulating equipment, manifolds, pipe, tubing and hose shall be located so as to minimize exposure to abnormally high temperatures (such as may result from exposure to convection or radiation from heating equipment), physical damage or tampering by unauthorized persons.

11. Heat-producing equipment shall be located and used so as to minimize the possibility of ignition of combustibles.

12. Containers having a water capacity greater than 2½ pounds (nominal one pound LP-gas capacity) connected for use, shall stand on a firm and substantially level surface and, when necessary, shall be secured in an upright position.

13. Containers, including the valve protective devices, shall be installed so as to minimize the probability of impingement of discharge of safety relief devices upon containers.

(b) Small containers having a maximum water capacity of 2½ pounds (nominal one pound LP-gas capacity) are permitted to be used inside of buildings as part of self-contained hand torch assemblies or similar appliances.

(c) Containers having a maximum water capacity of 12 pounds (nominal five pounds LP-gas capacity) are permitted to be used temporarily inside of buildings for public exhibition or demonstration purposes, including use for classroom demonstrations.

(d) Where buildings frequented by the public are involved, containers shall comply with the following requirements:

1. When buildings frequented by the public are open to the public, containers are permitted to be used for repair or minor renovation, as follows:

i. The maximum water capacity of individual containers shall be 50 pounds (nominal 20 pounds LP-gas capacity).

ii. The number of LP-gas containers shall not exceed the number of workmen assigned to using the LP-gas.

iii. Containers having a water capacity greater than 2½ pounds (nominal one pound LP-gas capacity) shall not be left unattended in the buildings.

2. When buildings frequented by the public are not open to the public, containers are permitted to be used for repair or minor renovation, as follows: The provisions of subsection (e) of this Section shall apply except that containers having a water capacity greater than 2½ pounds (nominal one pound LP-gas capacity) shall not be left unattended in such buildings.

(e) Containers and equipment permitted to be used in buildings or structures under construction or undergoing major renovation shall be subject to the requirements of the Bureau of Engineering and Safety, Department of Labor and Industry (see Construction Safety Code).

(f) Containers are permitted to be used in industrial occupancies for processing, research or experimental purposes as follows:

1. The maximum water capacity of individual containers shall be 245 pounds (nominal 100 pounds LP-gas capacity).

2. Containers connected to a manifold shall have a total water capacity not greater than 735 pounds (nominal 300 pounds LP-gas capacity) and not more than one such manifold may be located in the same room unless separated at least 20 feet from a similar unit.

3. The amount of LP-gas in containers for research and experimental use shall be limited to the smallest practical quantity.

4. All manufacturing establishments shall be subject to the requirements of the Bureau of Engineering and Safety, Department of Labor and Industry.

(g) Containers are permitted to be used in industrial occupancies with essentially noncombustible contents where portable equipment for space heating is essential and where a permanent heating installation is not practical, as follows:

1. Containers and heaters shall comply with and be used in accordance with the provisions of subsection (e) of this Section.

2. All manufacturing establishments shall be subject to the requirements of the Bureau of Engineering and Safety, Department of Labor and Industry.

(h) Containers are permitted to be used in buildings for temporary emergency heating purposes, if necessary to prevent damage to the buildings or contents, when the permanent heating system is temporarily out of service, as follows:

1. Containers and heaters shall comply with and be used in accordance with the provisions of subsection (e) of this Section.

2. The temporary heating equipment shall not be left unattended.

3. All manufacturing establishments shall be subject to the requirements of the Bureau of Engineering and Safety, Department of Labor and Industry.

(i) Containers are permitted to be used in educational and institutional laboratory occupancies for research or experimental purposes, but not in classrooms, as follows:

1. The maximum water capacity of individual containers shall be 50 pounds (nominal 20 pounds LP-gas capacity when used in educational occupancies), and 12 pounds (nominal five pounds LP-gas capacity) when used in institutional occupancies.

2. If more than one container is located in the same room, the containers shall be separated by at least 20 feet.

3. Containers not connected for use shall be stored in accordance with the provisions of Subchapter 13 (Storage of Containers) of this Chapter, except that they shall not be stored in a laboratory room.

(j) Containers are permitted to be used temporarily in buildings for training purposes related in installation and use of LP-gas systems, as follows:

1. The maximum water capacity of individual containers shall be 245 pounds (nominal 100 pounds LP-gas capacity), but the maximum quantity of LP-gas that may be placed in each container shall be 20 pounds.

2. If more than one container is located in the same room, the containers shall be separated by at least 20 feet.

3. The training location shall be acceptable to the authority having jurisdiction.

4. Containers shall be removed from the building when the training class has terminated.

¹ The conventional closed top screw-on caps, normally used to protect cylinder valves in storage, transit, and while being placed into position, do not protect the container valves while in use.

13:52-7.5 Container valves and accessories

(a) Valves in the assembly of multiple container systems shall be arranged so that replacement of containers can be made without shutting off the flow of gas in the system. This provision is not to be construed as requiring an automatic changeover device.

(b) Regulators and low pressure relief devices shall be rigidly attached to the cylinder valves, cylinders, supporting standards, the building walls, or otherwise rigidly secured, and shall be so installed that the elements will not affect their operation.¹

(c) Valves and connections to the containers shall be protected while in transit, in storage, and while being moved into final utilization, as follows:

1. By setting into recess of container to prevent possibility of their being struck if container is dropped upon a flat surface; or
2. By ventilated cap or collar, fastened to container. The cap or collar shall be capable of withstanding a blow from any direction equivalent to that of a 30-pound weight dropped four feet. Construction must be such that a blow will not be transmitted to valve or other connection.

(d) When the containers are not connected to the system, the outlet valves shall be kept tightly closed or plugged, even though the containers are considered empty.

(e) Containers having a water capacity in excess of 50 pounds (approximately 21 pounds LP-gas capacity), recharged at the installation, shall be provided with excess flow or backflow check valves to prevent the discharge of container contents in case of failure of the filling or equalizing connection. (See N.J.A.C. 6.8(h) Container valves and accessories.)

¹ The use of other than frangible shank-type locks is not desirable because it prevents access to gas controls in case of emergency.

13:52-7.6 Safety devices

(a) Containers shall be provided with safety devices as required by Interstate Commerce Commission regulations.

(b) A final stage regulator of an LP-gas system (excluding any appliance regulator) shall be equipped on the low pressure side with a relief valve which is set to start to discharge within the limits specified in the following table:

Regulator Delivery Pressure	Minimum	Maximum
1 p.s.i.g. or less	200 per cent	300 per cent
Above 1 p.s.i.g. but not over 3 p.s.i.g.	140 per cent	200 per cent
Above 3 p.s.i.g.	125 per cent	200 per cent

(c) When a regulator or pressure relief valve is used inside a building for other than purposes specified in paragraphs 1 through 7 of subsection (a) of Section 6.7 (Location of containers and regulating equipment) of this Chapter, the relief valve and the space above the regulator and relief valve diaphragms shall be vented to the outside air with the discharge outlet located not less than three feet horizontally away from any building opening which is below the discharge. (These provisions do not apply to individual appliance regulators when protection is otherwise provided (See NFPA No. 54), nor to the safety relief devices discussed in Section 6.11(m) (Safety devices) nor to the equipment regulated by Section 7.4 (Containers and equipment used inside buildings) of this Chapter. In buildings devoted exclusively to gas distribution purposes, the space above the diaphragm need not be vented to the outside.

13:52-7.7 Reinstallation of containers

Containers shall not be reinstalled unless they are requalified in accordance with currently effective regulations of the Interstate Commerce Commission.

13:52-7.8 Permissible product

A product shall not be placed in a container marked with a service pressure less than $\frac{1}{2}$ of the maximum vapor pressure of the product at 130 degrees Fahrenheit.

SUBCHAPTER 8. TYPE "B" SYSTEMS

13:52-8.1 Applicability

The provisions of this Subchapter apply specifically to systems utilizing storage containers other than those constructed in accordance with Interstate Commerce Commission specifications. All basic rules apply to this Subchapter unless otherwise noted in the General Rules. (See N.J.A.C. 13:52-9.1 et seq., 13:52-10.1 et seq., 13:52-11.1 et seq., 13:52-14.1 et seq.)

13:52-8.2 Design pressure and classification of storage containers

Storage containers¹ shall be designed and classified as follows:

Container Type	For Gases w/Vapor Pres. Not to Exceed Lb/Sq. In. Gauge at 100F (37.8C)	Minimum Design Pressure of Container Lb. Per Sq. In. Gauge	
		1949 & Earlier Editions ASME Code (Par. U-68, U-69)	1949 Edition of ASME Code (Par. U-200, U-201); 1950, 1952, 1956, 1959, 1962 & 1965 Editions ASME Code; All Editions of API-ASME Code***
80*	80*	80*	100*
100	100	100	125
125	125	125	156
150	150	150	187
175	175	175	219
200**	215	200	250

* New storage containers of the 80 type have not been authorized since December 31, 1947.

** Container type may be increased by increments of 25. The minimum design pressure of containers shall be 100 per cent of the container type designation when constructed under 1949 or earlier editions of ASME Code (Par. U-68 and U-69). The minimum design pressure of container shall be 125 per cent of the container type designation when constructed under (1) the 1949 ASME Code (Par. U-200 and U-201), (2) 1950, 1952, 1956, 1962 and 1965 editions of the ASME Code and (3) all editions of the API-ASME Code.

*** Construction of containers under the API-ASME Code is not authorized after July 1, 1961.

¹ Because of low soil temperature usually encountered, and the insulating effect of the earth, the average vapor pressure of products stored in underground containers will be materially lower than when stored aboveground. This reduction in actual operating pressure thus provides a substantial corrosion allowance for these containers when installed underground.

13:52-8.3 Container valves and accessories, filler pipes and discharge pipes

(a) The filling pipe inlet terminal shall not be located inside a building. For containers with a water capacity of 125 gallons or more, terminals shall be located not less than ten feet from any building (See Section 6.7(b) (Location of containers and regulating equipment) of this Chapter) and preferably not less than five feet from any driveway, and shall be located in a protective housing built for the purpose.

(b) The filling connection Section 6.8(h) (Container valves and accessories) of this Chapter shall be fitted with one of the following:

1. Combination back-pressure check valve and excess flow valve;
2. One double or two single back-pressure check valves;
3. A positive shutoff valve, in conjunction with either an internal back-pressure valve; or an internal excess flow valve.

(c) All openings in a container shall be equipped with approved automatic excess flow valves except in the following:

1. Filling connections as provided in subsection (b) of this Section;
2. Safety relief connections, liquid level gauging devices as provided in Section 6.8(d) (Container valves and accessories), and Section 6.23(c), (h) (Liquid level gauging device) of this Chapter;
3. Pressure gauge connections as provided in Section 6.8(e) (Container valves and accessories), and subsections (d) and (f) of this Section.

(d) An excess flow valve is not required in the withdrawal service line providing the following are complied with:

1. Total system water capacity does not exceed 2,000 U.S. gallons;
2. The discharge from the service outlet is controlled by a suitable manually operated shutoff valve which is either:
 - i. Threaded directly into the service outlet of the container; or

ii. An integral part of a substantial fitting threaded into or on the service outlet of the container; or

iii. Threaded directly into a substantial fitting threaded into or on the service outlet of the container.

3. The shutoff valve is equipped with an attached handwheel or equivalent;

4. The controlling orifice between the contents of the container and the outlet of the shutoff valve does not exceed $\frac{3}{16}$ inches in diameter for vapor withdrawal systems and $\frac{1}{8}$ inches in diameter for liquid withdrawal systems;

5. An approved pressure-reducing regulator is directly attached to the outlet of the shutoff valve and is rigidly supported, or that an approved pressure reducing regulator is attached to the outlet of the shutoff valve by means of a suitable flexible connection provided the regulator is rigidly supported and properly protected on or at the tank. (See N.J.A.C. 13:52-8.9 Protection of container accessories.)

(e) All inlet and outlet connections except safety relief valves, liquid level gauging devices and pressure gauges on containers of 2,000 gallons water capacity, or more, and on any container used to supply fuel directly to an internal combustion engine, shall be labeled to designate whether they communicate with vapor or liquid space. Labels may be on valves.

(f) In lieu of an excess flow valve, openings may be fitted with a quick-closing internal valve which except during operating periods shall remain closed. The internal mechanism for such valves may be provided with a secondary control which shall be equipped with a fusible plug (not over 220 degrees Fahrenheit melting point) which will cause the internal valve to close automatically in case of fire.

(g) Not more than two plugged openings shall be permitted on a container of 2,000 gallons or less water capacity.

(h) Containers of 125 gallons water capacity or more manufactured after July 1, 1961, shall be provided with an approved device for liquid evacuation, the size of which shall be $\frac{3}{8}$ inch National Pipe Thread minimum. A plugged opening will not satisfy this requirement.

13:52-8.4 Safety devices

(a) In general, all safety devices shall comply with the following:

1. All container safety relief devices shall be located on the containers and shall have direct communication with the vapor space of the container.

2. In industrial and gas manufacturing plants, discharge pipe from safety relief valves on pipe lines within a building shall discharge vertically upward and shall be piped to a point outside building.

3. Safety relief device discharge terminals shall be so located as to provide protection against physical damage and such discharge pipes shall be fitted with loose rain-caps. Return bends and restrictive pipe fittings shall not be permitted.

4. If desired, discharge lines from two or more safety relief devices located on the same unit, or similar lines from two or more different units may be run into a common discharge header, provided that the cross-sectional area of such header be at least equal to the sum of the cross-sectional area of the individual discharge lines, and that the setting of safety relief valves are the same.

5. Each storage container of 2,000 gallons water capacity or over shall be provided with a suitable pressure gauge.

6. A final state regulator of an LP-gas system (excluding any appliance regulator) shall be equipped on the low pressure side with a relief valve which is set to start to discharge within the limits specified in the following table:

Regulator Delivery Pressure	Minimum	Maximum
1 p.s.i.g. or less	200 per cent	300 per cent
Above 1 p.s.i.g. but not over 3 p.s.i.g.	140 per cent	200 per cent
Above 3 p.s.i.g.	125 per cent	200 per cent

7. When a regulator or pressure relief valve is installed inside a building, the relief valve and the space above the regulator and relief valve diaphragms shall be vented to the outside air with the discharge outlet located not less than three feet horizontally away from any opening into the building which is below the discharge. (These provisions do not apply to individual appliance regulators when protection is otherwise provided. In buildings devoted exclusively to gas distribution purposes, the space above the diaphragm need not be vented to the outside).

(b) Safety devices for aboveground containers shall be provided as follows:

1. Containers of 1200 gallons water capacity or less which may contain liquid fuel when installed aboveground shall have the rate of discharge required by the Table set forth in Section 6.12 (Minimum required rate of discharge) of this Chapter provided by spring-loaded relief valve or valves. In addition to the required spring-loaded relief valve(s), suitable fuse plug(s) may be used provided the total discharge area of the fuse plug(s) for each container does not exceed 0.25 square inches.

2. The fusible metal of the fuse plugs shall have a yield temperature of 208 degree Fahrenheit minimum and 220 degrees Fahrenheit maximum. Relief valves and fuse plugs shall have direct communication with the vapor space of the container.

3. On a container having a water capacity greater than 125 gallons but not over 2,000 gallons the discharge from the safety relief valves shall be vented away from the container vertically upwards and unobstructed to the open

air in such a manner as to prevent any impingement of escaping gas upon the container. Loose-fitting raincaps shall be used. Suitable provision should be made for draining condensate which may accumulate in the relief valve or its discharge pipe. (See N.J.A.C. 13:52-6.11(k), Safety devices.)

4. On aboveground containers of 125 gallons water capacity or less the discharge from safety relief devices shall be located not less than five feet horizontally away from any opening into the building below the level of such discharge.

5. On a container having a water capacity greater than 2,000 gallons the discharge from the safety relief valve shall be vented away from the container vertically upwards to a point at least seven feet above the container, and unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the container. Loose-fitting raincaps shall be used. Suitable provisions shall be made so that any liquid or condensate that may accumulate inside the safety relief valve or its discharge pipe will not render the valve inoperative. If a drain is used, a means shall be provided to protect the container, adjacent containers, piping or equipment against impingement of flame resulting from ignition of product escaping from the drain (see 6.11(k)). (See N.J.A.C. 13:52-6.11(k), Safety devices.)

(c) On all containers which are installed underground and which contain no liquid fuel until buried and covered, the rate of discharge of spring-loaded relief valve installed thereon may be reduced to a minimum of 30 per cent of the specified rate of discharge in Table Number 1. Containers so protected shall not be uncovered after installation until the liquid fuel has been removed therefrom. Containers which may contain liquid fuel before being installed underground and before being completely covered with earth are to be considered aboveground containers when determining the rate of discharge requirement of the relief valves.

(d) On underground containers of more than 2,000 gallons water capacity, the discharge from safety relief devices shall be piped vertically and directly upward to a point at least seven feet above the ground.

1. On underground installations where there is a probability of the manhole housing becoming flooded, the discharge from vent lines should be above the possible water level.

2. All manholes or housings shall be provided with ventilated louvers or their equivalent, the area of such openings equalling or exceeding the combined discharge area of the safety relief valves, fuse plugs and other vent lines which discharge their content into the manhole housing.

(e) Safety devices for vaporizers shall be provided as follows:

1. Vaporizers of less than one quart total capacity, heated by the ground or the surrounding air, need not be equipped with safety relief valves provided that they are approved in a manner as provided for in Section 6.4 (Equipment and systems approval) of this Chapter.

2. No vaporizer shall be equipped with fusible plugs.

3. In industrial and gas manufacturing plants, safety relief valves on vaporizers within a building shall be piped to a point outside the building and be discharged upward.

13:52-8.5 Reinstallation of containers

Containers may be reinstalled if they do not show any evidence of harmful external corrosion or other damage. Where containers are reinstalled underground, the corrosion-resistant coating shall be put in good condition. (See N.J.A.C. 13:52-8.7(e), Installation of storage containers.)

Where containers are reinstalled aboveground, the requirements for safety devices and gauging devices shall comply with the provisions of Sections 6.23 (Liquid level gauging device) and 8.4 (Safety devices) of this Chapter.

13:52-8.6 Capacity of containers

A storage container shall not exceed 90,000 gallons water capacity.

13:52-8.7 Installation of storage containers

(a) Containers installed aboveground except as provided in subsection (f) of this Section shall be provided with substantial masonry or noncombustible structural supports on firm masonry foundation.

(b) Aboveground containers shall be supported as follows:

1. Horizontal containers shall be mounted on saddles in such a manner as to permit expansion and contraction. Structural metal supports may be employed when they are protected against fire in an approved manner. Suitable means of preventing corrosion shall be provided on that portion of the container in contact with the foundations or saddles.

2. Containers of 2,000 gallons water capacity or less may be installed with nonfireproofed ferrous metal supports if mounted on concrete pads or footings, and if the distance from the outside bottom of the container shell to the concrete pad, footing or ground does not exceed 24 inches.

(c) Any container may be installed, with nonfireproofed ferrous metal supports if mounted on concrete pads or footings, and if the distance from the outside bottom of the container to the ground does not exceed five feet, provided the container is in an isolated location and such installation is otherwise approved.

(d) Containers may be partially buried, provided the following requirements are met:

1. The portion of the container below the surface and for a vertical distance not less than three inches above the surface of the ground is protected to resist corrosion, and the container is protected against settling and corrosion as required for fully buried containers (see subsection (e) of this Section);

2. Spacing requirements shall be as required for underground tanks, pursuant to the provisions of Section 6.7(b) (Location of containers and regulating equipment) of this Chapter;

3. Relief valve capacity shall be as required for aboveground containers;

4. The container is located so as not to be subject to vehicular damage, or is adequately protected against such damage;

5. Filling densities shall be as required for aboveground containers;

6. Containers buried underground shall be placed so that the top of container is not less than six inches below grade. Where an underground container might be subject to abrasive action or physical damage due to vehicular traffic or other causes, then it shall be placed not less than two feet below grade, or otherwise protected against physical damage. It will not be necessary to cover the portion of the container to which the manhole and other connections are affixed; provided, however, where necessary, protection shall be provided against vehicular damage. When necessary to prevent floating, containers shall be securely anchored or weighted.

(e) Underground containers:

1. Containers shall be given a protective coating before being placed underground. This coating shall be equivalent to hot-dip galvanizing or two coats of red lead followed by a heavy coating of coal tar or asphalt. In lowering the container into place, care shall be exercised to prevent damage to the coating. Any damage to the coating shall be repaired before backfilling.

2. Containers shall be set on a firm foundation (firm earth may be used) and surrounded with earth or sand firmly tamped in place. Backfill should be free of rocks or other abrasive material.

(f) Containers with foundations attached (portable or semiportable containers with suitable steel "runners" or "skids" and popularly known in the industry as "skid tanks") shall be designed, installed and used in accordance with the provisions of this Section subject to the following:

1. If they are to be used at a given general location for a temporary period not to exceed six months they need not have fire-resisting foundations or saddles but shall have adequate ferrous metal supports.

2. They shall not be located with the outside bottom of the container shell more than five feet above the surface of the ground unless fire-resisting supports are provided.

3. The bottom of the skids shall not be less than two inches more than 12 inches below the outside bottom of the container shell.

4. Flanges, nozzles, valves, fittings and the like, having communication with the interior of the container, shall be protected against physical damage. Such containers should have outlets only in the heads.

5. When not permanently located on fire-resisting foundations, piping connections shall be sufficiently flexible to minimize possibility of breakage or leakage of connections if container settles, moves or is otherwise displaced.

6. Skids, or lugs for attachment of skids, shall be secured to container in accordance with the code or rules under which the container is designed with a minimum factor of safety of four, and built to withstand loading in any direction equal to four times the weight of the container and attachments when filled to the maximum permissible loaded weight. (See N.J.A.C. 13:52-8.7, Transportation of type "B" systems.)

(g) Field welding where necessary shall be made only on saddle plates or brackets which were applied by manufacturer of tank.

(h) For aboveground containers secure anchorage or adequate pier height shall be provided against possible container flotation wherever sufficiently high flood water might occur.

(i) When permanently installed containers are interconnected, provisions shall be made to compensate for expansion, contraction, vibration and settling of containers and interconnecting piping. Where flexible connections are used, they shall be of an approved type and shall be designed for a bursting pressure of not less than five times the vapor pressure of the product at 100 degrees Fahrenheit. The use of nonmetallic hose is prohibited for permanently interconnecting such containers.

(j) Container assemblies listed for interchangeable installation aboveground or underground shall conform to the requirements for aboveground installations with respect to safety relief capacity and filling density. For installation aboveground, all other requirements for aboveground installations shall apply. For installation underground, all other requirements for underground installations shall apply.

13:52-8.8 Dikes and embankments

(a) Because of the pronounced volatility of liquefied petroleum gases, dikes are not normally necessary, hence their general requirement is not justified as in the case of gasoline

or similar flammable liquids. It should be borne in mind that the heavy construction of the storage containers makes failure unlikely.

(b) When in the opinion of the authority having jurisdiction, to local conditions, the contents of aboveground containers are liable in case of container failure to endanger adjacent property, dikes may be specified of such capacity as may be considered necessary to meet the needs of the situation under consideration by the aforesaid authority.

13:52-8.9 Protection of container accessories

(a) Valves, regulating, gauging and other tank accessory equipment shall be protected against tampering and physical damage. Such accessories shall also be so protected during the transit of tanks intended for installation underground.¹

(b) On underground or combination aboveground-underground containers, the service valve handwheel, the terminal for connecting the hose, and the opening through which there can be a flow from safety relief valves shall be at least four inches above the container and this opening shall be located in the dome or housing. Underground systems shall be so installed that all the above openings, including the regulator vent, are located above the normal maximum water table.

(c) All connections to underground containers shall be located within a substantial dome, housing or manhole and with access thereto protected by a substantial cover.

¹The use of other than frangible shank type locks is not desirable because it prevents access to gas controls in case of emergency.

13:52-8.10 Drips for condensed gas

Where vaporized gas on low-pressure side of system may condense to a liquid at normal temperature and pressure, suitable means shall be provided for revaporization of the condensate.

13:52-8.11 Damage from vehicles

When damage to LP-gas systems from vehicular traffic is a possibility, precaution against such damage shall be taken.

13:52-8.12 Pits and drains

Every effort should be made to avoid the use of pits, except pits fitted with automatic flammable vapor detecting devices. No drains or blow-off lines shall be directed into or in proximity to sewer systems used for other purposes.

13:52-8.13 General provisions applicable to systems

(a) Where standard watch service is provided, it shall be extended to the liquefied petroleum gas installations and personnel properly trained.

(b) Suitable roadways or means of access for extinguishing equipment such as wheeled extinguishers or fire department apparatus shall be provided.

(c) If loading and unloading are normally done during other than daylight hours, adequate lights shall be provided to illuminate storage containers, control valves and other equipment.

(d) To minimize trespassing or tampering, the area which includes container appurtenances, pumping equipment, loading and unloading facilities and cylinder filling facilities shall be enclosed with at least a six-foot high industrial type fence unless otherwise adequately protected. There shall be at least two means of emergency access.

13:52-8.14 Container charging plants

(a) The container charging room shall be located not less than:

1. Ten feet from bulk storage containers;
2. 25 feet from line of adjoining property which may be built upon.

(b) Tank truck filling station outlets shall be located not less than:

1. 25 feet from line of adjoining property which may be built upon;
2. Ten feet from pumps and compressors if housed in one or more separate buildings.

(c) The pumps or compressors may be located in the container charging room or building, in a separate building or outside of buildings. When housed in a separate building, such building (a small noncombustible weather cover is not to be construed as a building) shall be located not less than:

1. Ten feet from bulk storage tanks;
2. 25 feet from line of adjoining property which may be built upon; nor
3. 25 feet from sources of ignition.

(d) Where a part of the container charging building is to be used for a boiler room or where open flames or similar sources of ignition exist or are employed, the space to be so occupied shall be separated from container filling room by a partition wall or walls of fire-resistant construction continuous from floor to roof or ceiling. Such separation walls shall be without openings and shall be joined to the floor, other walls and ceiling or roof in a manner to effect a permanent gas-tight joint.

(e) Electrical equipment and installations shall conform to the provisions of Sections 6.21 (Electrical equipment and other sources of ignition) and 6.22 (Fixed electrical equipment in classified areas) of this chapter.

(f) Containers shall be filled in accordance with the provisions of Section 6.21(a) (Electrical equipment and other sources of ignition) of this Chapter, and one of the following:

1. At a properly equipped container charging plant which complies with all applicable requirements of this Section;
2. From a tank truck complying with the provisions of Subchapter 12 (Transportation) of this Chapter. (For container filling in trailer courts, see N.J.A.C. 13:52-10.1 et seq., type "D" system and N.J.A.C. 13:53-13.1 et seq., Storage of containers awaiting use or resale.)

13:52-8.15 Fire protection

(a) Each bulk plant shall be provided with at least one approved portable fire extinguisher having a minimum rating of 12-BC. Ratings shall be in accordance with the Standard for Installation, Maintenance and Use of Portable Fire Extinguishers, NFPA Number 10.

(b) In industrial installations involving containers of 150,000 gallons aggregate water capacity or more, provision shall be made for an adequate supply of water at the container site for fire protection in the container area, unless other adequate means for fire control are provided. Water hydrants shall be readily accessible and so spaced as to provide water protection for all containers. Sufficient lengths of fire hose shall be provided at each hydrant location on a hose cart, or other means provided to facilitate easy movement in the container area. It is desirable to equip the outlet of each hose line with a combination fog nozzle. A shelter shall be provided to protect the hose and its conveyor from the weather.

(c) If in the opinion of the authority having jurisdiction, the use of fixed water spray nozzles will better serve to protect the containers and area, these may be specified. The method of release of water spray and alarm facilities shall be at the discretion of the Superintendent of State Police.

13:52-8.16 Painting of containers

Aboveground containers shall be kept properly painted.

13:52-8.17 Lighting of installations

At the discretion of the authority having jurisdiction, industrial installations shall be lighted. Electrical equipment and installations shall conform to the prescriptions of Sections 6.21 (Electrical equipment and other sources of ignition) and 6.22 (Fixed electrical equipment in classified areas) of this Chapter.

13:52-8.18 Vaporizers for internal combustion engines

The provisions of Section 9.8 (Vaporizers) shall apply.

13:52-8.19 Gas regulating and mixing equipment for internal combustion engines

The provisions of Section 9.9 (Gas regulating and mixing equipment) shall apply as to gas regulating and mixing equipment for internal combustion engines.

SUBCHAPTER 9. TYPE "C" SYSTEMS

13:52-9.1 Purpose and applicability of provisions for type "C" systems

(a) The provisions of this Subchapter apply to internal combustion engines, fuel containers and pertinent equipment for the use of liquefied petroleum gases as a motor fuel on easily movable, readily portable units, including self-propelled vehicles.

(b) Fuel containers and pertinent equipment for internal combustion engines using liquefied petroleum gas where installation is of the stationary type are covered by the provisions of Subchapter 8 (Type "B" Systems) of this Chapter.

(c) Subchapter 9 does not apply to containers for transportation of liquefied petroleum gases nor to marine fuel use.

(d) All general provisions of this Chapter apply to this Subchapter, unless otherwise noted in Subchapter 6 of this Chapter.

13:52-9.2 General provisions for type "C" systems

(a) Fuel may be used from the cargo containers of a truck while in transit, but not from cargo containers on trailers or semitrailers. The use of fuel from the cargo containers to operate stationary engines is permitted; provided wheels are securely blocked.

(b) Passenger carrying vehicles shall not be fueled while passengers are on board.

(c) Material handling trucks (including lift trucks) equipped with permanently mounted fuel containers shall be charged outdoors. Charging equipment shall comply with the provisions of Subchapter 14 (Liquefied Petroleum Gas Service Stations) of this Chapter.

(d) LP-gas fueled industrial trucks shall comply with the Standard for Type Designations, Areas of Use, Maintenance and Operation of Powered Industrial Trucks, NFPA No. 505.

(e) Engines on vehicles shall be shut down while fueling if the fueling operation involves venting to the atmosphere.

13:52-9.3 Design pressure and classification of fuel supply containers

(a) Except as covered in paragraphs 1 and 3 of this Section, containers shall be classified as follows:

Container Type	For Gases w/Vapor Pres. Not to Exceed Lb/Sq. In. Gauge at 100F (37.8C)	1949 & Earlier Editions ASME Code (Par. U-68, U-69)	Minimum Design Pressure of Container Lb. Per Sq. In. Gauge
			1949 Edition of ASME Code (Par. U-200, U-201); 1950, 1952, 1956, 1959, 1962 & 1965 Editions ASME Code; All Editions of API-ASME Code**
200*	215	200	250

* Container type may be increased by increments of 25. The minimum design pressure of containers shall be 100 per cent of the container type designation when constructed under 1949 or earlier editions of ASME Code (paragraph U-68 and U-69). The minimum design pressure of container shall be 125 per cent of the container type designation when constructed under (1) the 1949 ASME Code (Par. U-200 and U-201), (2) 1950, 1952, 1956, 1962 and 1965 editions of the ASME Code and (3) all editions of the API-ASME Code.

** Construction of containers under the API-ASME Code is not authorized after July 1, 1961.

1. Fuel containers for use in industrial trucks (including lift trucks) shall be either ICC containers authorized for LP-gas service having a minimum service pressure of 240 p.s.i.g. or minimum container type 250.¹

2. All container inlets and outlets except safety relief valves and gauging devices shall be labeled to designate whether they communicate with vapor or liquid space. Labels may be on valves.

3. Containers manufactured and maintained under Interstate Commerce Commission specifications and regulations may be used as fuel containers. When so used they shall conform to all rules of this Subchapter.

¹ Under 1950 and later ASME Codes, this means a 312.5 p.s.i.g. design pressure container.

13:52-9.4 Installation of fuel containers

(a) Containers shall be located in a place and in a manner to minimize the possibility of damage to the container.

1. Containers located in the rear of trucks and buses, when protected by substantial bumpers, will be considered in conformance with this requirement.

2. Fuel containers on passenger carrying vehicles shall be installed as far from the engine as practicable, and the passenger space or any space containing radio equipment shall be sealed from the container space to prevent direct seepage of gas to these spaces.

3. The container compartment shall be vented to the outside.

4. In case the fuel container is mounted near the engine or the exhaust system, the container shall be shielded against direct heat radiation.

(b) Containers shall be installed with as much clearance as practicable but never less than the minimum normal road clearance of the vehicle under maximum load conditions. This minimum clearance shall be to the bottom of the container or to the lowest fitting on the container or housing, whichever is lower.

(c) Permanent and removable fuel containers shall be securely mounted to prevent jarring loose, slipping or rotating, and the fastenings shall be designed and constructed to withstand static loading in any direction equal to twice the weight of the tank and attachments when filled with fuel using a safety factor of not less than four based on the ultimate strength of the materials to be used. Field welding, when necessary, shall be made only on saddle plates, lugs, or brackets, originally attached to the container by the tank manufacturer.

(d) Fuel containers on buses shall be permanently installed.

(e) Containers from which vapor only is to be withdrawn shall be installed and equipped with suitable connections to minimize the accidental withdrawal of liquid.

13:52-9.5 Valves and accessories

(a) Container valves and accessories shall have a rated working pressure of at least 250 p.s.i.g. and shall be of a type suitable for liquefied petroleum gas service.

(b) The filling connection shall be fitted with an approved combination back pressure check valve, and excess flow valve; one double or two single back pressure check valves; or a positive shutoff valve, in conjunction with either an internal back pressure check valve or an internal excess flow valve. Main shutoff valves adjacent to the tank on liquid and vapor lines must be accessible at all times. (See N.J.A.C. 13:52-6.8(h), Container valves and accessories.)

(c) With the exception of safety relief valves and filling connections which are equipped with an approved automatic backpressure check valve, all connections to containers, having openings for the flow of gas in excess of a Number 54 drill size shall be equipped with approved automatic excess flow valves to prevent discharge of contents in case connections are broken. This requirement may be waived when such exception is recognized by the testing and listing of the containers and fittings by a testing laboratory of nationally recognized standing.

(d) All valves and connections on containers shall be adequately protected to prevent damage due to accidental contact with stationary objects or from loose objects thrown upon the road and all valves shall be safeguarded against damage due to collision, overturning or other accident. For farm tractors where parts of the vehicle provide such protection to valves and fittings, the foregoing requirements shall be considered fulfilled; however, on removable type containers the protection for the fittings shall be permanently attached to the container.

(e) Liquid level gauging devices shall comply with the following specifications:

1. Variable liquid level gauges which require the venting of fuel to the atmosphere shall not be used on fuel containers of industrial trucks (including lift trucks).

2. Permanently mounted fuel containers shall be equipped with a fixed length dip tube gauge, in accordance with the provisions of Section 6.23 (Liquid level gauging device) of this Chapter.

3. In the case of containers used solely in farm tractor service, and charged at a point at least 50 feet from any important building, the fixed liquid level gauging device may be so constructed that the outward flow of container content exceeds that passed by a Number 54 drill size opening, but in no case shall the flow exceed that passed by a Number 31 drill size opening. An excess flow valve is not required. Fittings equipped with such restricted drill size opening and container on which they are used shall be marked to indicate the size of the opening.

(f) Exchange of removable fuel containers preferably should be done outdoors but may be done indoors. When removable fuel containers are used, means shall be provided in the fuel system to minimize the escape of fuel when the containers are exchanged. This may be accomplished by either of the following methods:

1. Using an approved automatic quick-closing coupling (a type closing in both directions when uncoupled) in the fuel line; or

2. Closing the valve at the fuel container and allowing the engine to run until the fuel in the line is consumed.

13:52-9.6 Piping, including pipe, tubing and fittings

(a) Piping from fuel container to first stage regulator shall be not less than schedule 80 wrought iron or steel (black or galvanized), brass or copper pipe, or seamless copper, brass or steel tubing.

1. Steel tubing shall have a minimum wall thickness of 0.049 inches.

2. Steel pipe or tubing shall be adequately protected against exterior corrosion.

3. Copper tubing shall be Type K or L or equivalent, having a minimum wall thickness of 0.030 inches.

4. Approved flexible connections (see Section 6.10 (Hose specifications) of this Chapter) may be used between container and regulator or between regulator and gas-air mixer within the limits of approval by the Division.

5. The use of aluminum piping or tubing is prohibited. In the case of removable containers, an approved flexible connection shall be used between the container and the fuel line.

(b) All piping shall be installed, braced and supported so as to reduce to a minimum the possibility of vibrations, stress or wear.

13:52-9.7 Safety devices

(a) The discharge outlet from safety relief valves shall be located on the outside of enclosed spaces and as far as practical from possible sources of ignition, and vented upward in such a manner as to prevent impingement of escaping gas upon containers, or parts of vehicle, or on vehicles in adjacent lines of traffic. A rain cap, or other protector, shall be used to keep water and dirt from collecting in the valve.

(b) The minimum required rate of discharge, determined in accordance with Section 6.11(b) (safety devices) of this Chapter, of liquefied petroleum gas for safety relief valves for motor fuel supply containers shall be not less than the following values: cubic feet per minute of liquefied petroleum gas at 60 degrees Fahrenheit and atmospheric pressure.

CONTAINER TYPE

	140	150	175	200
D x U	Liquefied Petroleum gas	Liquefied Petroleum gas	Liquefied Petroleum gas	Liquefied Petroleum gas
10	740	745	775	885
15	1090	1110	1155	1250
20	1450	1475	1540	1660

Over 20 To be calculated in direct proportion to above values.

D = Outside Diameter of container in feet and fractions thereof.

U = Overall length of container in feet and fractions thereof.

NOTE: The rate of discharge may be interpolated for intermediate values of D x U.

(c) Spring-loaded internal type safety relief valves shall be used on all motor fuel containers.

(d) When a discharge line from the container safety relief valve is used, the line shall be metallic, other than aluminum, and shall be sized, located and maintained so as not to restrict the required flow of gas from the safety relief valve.

1. Such discharge line shall be able to withstand the pressure resulting from the discharge of vapor when the safety relief valve is in full open position.

2. When flexibility is necessary, flexible hose or tubing shall be used.

(e) For hydrostatic relief valves, see Section 6.11(1) (Safety devices) of this Chapter. (See N.J.A.C. 13:52-6.11, Safety devices.)

13:52-9.8 Vaporizers

(a) Vaporizers and any part thereof and other carburating devices as may be subjected to full container pressure, shall have a design working pressure of at least 250 pounds per square inch gauge.

(b) Each vaporizer shall have a valve or suitable drain plug located at or near the lowest portion of the section occupied by the water or other heating medium, which will permit substantially complete draining of the vaporizer.

(c) Vaporizers shall be securely fastened so as to minimize the possibility of becoming loosened.

(d) Each vaporizer, shall be permanently marked at a visible point as follows:

1. With design pressure of the fuel-containing portion, in p.s.i.g.;

2. With the water capacity of the fuel-containing portion of the vaporizer, in pounds.

(e) Devices to supply heat directly to a fuel container shall be equipped with an automatic device to cut off the supply of heat before the pressure inside the fuel container reaches 80 per cent of the start-to-discharge pressure setting of the safety relief device on the full container.

(f) Exhaust gases shall not be used as a direct means of heat supply for the vaporization of fuel.

(g) Vaporizers shall not be equipped with fusible plugs.

13:52-9.9 Gas regulating and mixing equipment

(a) Approved automatic pressure-reducing equipment shall be installed in a secure manner between the fuel supply container and gas-air mixer for the purpose of reducing the pressure of the fuel delivered to the gas-air mixer.

(b) An approved automatic shutoff valve shall be provided in the fuel system at some point ahead of the inlet of the gas-air mixer, designed to prevent flow of fuel to the mixer when the ignition is off and the engine is not running.

1. In the case of industrial trucks and engines operating in buildings other than those used exclusively to house engines, the automatic shutoff valve shall be designed to operate if the engine should stop.

2. Atmospheric type regulators (zero governors) shall be considered adequate as an automatic shutoff valve only in cases of outdoor operation such as farm tractors, construction equipment, irrigation pump engines, and other outdoor stationary engine installations.

(c) The source of the air for combustion shall be completely isolated from the passenger compartment, ventilating system or air conditioning system.

13:52-9.10 Capacity of containers

No single fuel container used on passenger carrying vehicles shall exceed 200 gallons water capacity. No single fuel container on other vehicles normally operating on the highways shall exceed 300 gallons water capacity except as provided in Section 9.2(a) (General provisions for type "C" systems) of this Chapter.

13:52-9.11 Stationary engines in buildings

Stationary engines and gas turbines installed in buildings, including portable engines used instead of or to supplement stationary engines, shall comply with the Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, NFPA No. 37 and the appropriate provisions of Subchapters 6, 7 and 8 of this Chapter. (See N.J.A.C. 13:52-9.13, Industrial trucks inside buildings.)

13:52-9.12 Portable engines in buildings

(a) Portable engines may be used in buildings only for emergency use, except as provided by Section 9.11 (Stationary engines in buildings) of this Chapter.

(b) Exhaust gases shall be discharged to outside the building or to an area where they will not constitute a hazard.

(c) Provisions shall be made to supply sufficient air for combustion and cooling.

(d) An approved automatic shutoff valve shall be provided in the fuel system ahead of the engine, designed to prevent flow of fuel to the engine when the ignition is off or if the engine should stop.

(e) The capacity of LP-gas containers used with such engines shall comply with the applicable occupancy provisions of Section 7.4 (Containers and equipment used inside buildings) of this Chapter.

13:52-9.13 Industrial trucks inside buildings

(a) LP-gas fueled industrial trucks are permitted to be used in buildings and structures.

(b) No more than two LP-gas containers shall be used on an industrial truck for motor fuel purposes.

(c) Subject to approval by the authority having jurisdiction, LP-gas fueled industrial trucks are permitted to be used in buildings frequented by the public, when occupied by the public. The total water capacity of containers on each industrial truck shall not exceed 105 pounds (nominal 45 pounds LP-gas).

(d) Trucks shall not be left unattended in areas occupied by the public.

13:52-9.14 Garaging LP-gas fueled vehicles

(a) LP-gas fueled vehicles may be stored or serviced inside garages, provided there are no leaks in the fuel system and the fuel tanks are not filled beyond the maximum filling capacity in Section 6.14(a) (Filling densities) of this Chapter.

(b) LP-gas fueled vehicles being repaired in garages shall have the container shutoff valve closed except when fuel is required for engine operation.

(c) Such vehicles shall not be parked near sources of heat, open flames or similar sources of ignition, or near open pits unless pits are adequately ventilated.

SUBCHAPTER 10. TYPE "D" SYSTEMS**13:52-10.1 Applicability**

(a) This Subchapter applies to exchangeable, readily portable container LP-gas systems on travel trailers, camper trailers, self-propelled campers or mobile homes.

(b) Individual containers mounted on such vehicles shall be limited to 105 pounds water capacity (approximately 45 pounds LP-gas capacity). Commercial vehicles and vehicles using either larger exchangeable type or permanently mounted containers are covered in Subchapter 11, (type "E" Systems) of this Chapter. When such vehicles are permanently parked and LP-gas is supplied from a container, not mounted on and secured to the unit, Subchapters 7 and 8 of this Chapter shall apply.

13:52-10.2 Construction of containers

(a) Containers shall be constructed in accordance with the specifications of the Interstate Commerce Commission except as provided in subsection (b) of this Section.

(b) Containers constructed according to the requirements of the ASME or API-ASME Unified Pressure Code (see Section 6.5 (Requirements for construction and original test of containers) of this Chapter) shall be acceptable provided they comply with all other requirements set forth in this section. ASME containers constructed after December 31, 1967 shall be Type 250 (see subsection (a) of Section 8.2 (Design pressure and classification of storage containers) of this Chapter).

(c) Design of container shall provide for vapor withdrawal in accordance with the prescriptions of Section 10.8 (System design and service line pressure) of this Chapter when connected for use (that is, horizontal, near horizontal or vertical position). Design shall provide for installation of necessary accessories and for the system requirements of Sections 10.4 (Description of Subchapter 10 system) and 10.9 (System enclosures and mounting) of this Chapter and shall be such as to minimize the possibility of liquid entering the vapor outlet, whether the vehicle is parked or in motion.

13:52-10.3 Marking of containers

All containers except those included in Section 10.2(b) (Construction of containers) of this Chapter shall be marked in accordance with the Interstate Commerce Commission regulations. Additional markings not in conflict with the Interstate Commerce Commission regulations may be used.

13:52-10.4 Description of Subchapter 10 system

(a) Subchapter 10 system shall include any or all of the following:

1. Container bracket(s) or support(s);
2. Container(s);
3. Container valve(s);
4. Manifold valve assembly (two container systems);
5. Regulator(s); and
6. Relief valve(s).

(b) Systems may be designed for either vertical, horizontal or near horizontal container mounting. (See N.J.A.C. 13:52-10.6(c), Container valves and accessories.)

13:52-10.5 Location of containers and regulating equipment

(a) Containers shall not be installed, transported or stored (even temporarily) inside any vehicle covered by the provisions of this Subchapter except for listed, completely self-contained hand torches, lanterns or similar equipment with containers having a water capacity not exceeding 2½ pounds.

(b) Containers, control valves and regulating equipment comprising a complete system shall be mounted as follows:

1. On the chassis as close to the hitch as practical; or
2. In a recess that is gas tight to the inside of the mobile home or travel-trailer and accessible only from the outside. The recess shall be ventilated at top and bottom to facilitate diffusion of vapors.

(c) Systems mounted on the trailer hitch shall be so located that the discharge from safety relief devices shall not be less than three feet horizontally away from any opening into the mobile unit below the level of such discharge. When the system is located in a ventilated recess, vent openings in such recess shall not be less than three feet horizontally away from any opening into the mobile unit below the level of these vents.

13:52-10.6 Container valves and accessories

(a) Valves in the assembly of a two-cylinder system shall be arranged so that replacement of containers can be made without shutting off the flow of gas to the appliances.¹

(b) Shutoff valves on the containers shall be protected in transit, in storage, and while being moved into final utilization as follows:

1. By setting into recess of container to prevent possibility of their being stuck if container is dropped upon a flat surface; or
2. By ventilating cap or collar fastened to container, capable of withstanding a blow from any direction equivalent to that of a 30-pound weight dropped four feet. Construction must be such that a blow will not be transmitted to valve.

(c) Container openings for vapor withdrawal shall be located in the vapor space when the container is in service or shall be provided with a suitable internal withdrawal tube which communicates with the vapor space in or near the highest point in the container when it is mounted in service position, with the vehicle on a level surface.

1. Containers shall be permanently and legibly marked in a conspicuous manner on the outside to show the correct mounting position and the position of the service outlet connection.

2. The method of mounting in place shall be such as to minimize the possibility of an incorrect positioning of the container.

¹ The provisions of this subsection (a) are not to be construed as requiring an automatic change-over device.

13:52-10.7 Safety devices

(a) ICC containers shall be provided with safety relief devices as required by the regulations of the Interstate Commerce Commission.

(b) Containers constructed in accordance with the rules of the ASME or the API-ASME shall be provided with safety relief devices as required by Section 6.11 (Safety devices) of this Chapter.

(c) The delivery side of the gas pressure regulator shall be equipped with a safety relief device set to start to discharge at a pressure not less than two times and not more than three times the delivery pressure of the regulator.

13:52-10.8 System design and service lines pressure

(a) Systems shall be of the vapor-withdrawal type.

(b) Pressure of the vapor in piping downstream of the regular or supplying appliances shall not exceed 18 inches water column.

13:52-10.9 System enclosure and mounting

(a) Housings or enclosures shall be designed to provide proper ventilation.

(b) Doors, hoods, domes or portions of cabinets, required to be removed or opened for replacement of containers shall incorporate means for clamping them firmly in place, and prevent them from working loose during transit.¹

(c) Provision shall be incorporated in the assembly to hold the containers firmly in position and prevent their movement during transit, in accordance with the provisions of Section 9.4(c) (Installation of fuel containers) of this Chapter.

(d) Containers and appurtenances shall be protected against damage by one of the following:

1. Their location;
2. The vehicle frame or bumper; or
3. Protective housing.

¹ Locks, if used, should be of the frangible shank type.

13:52-10.10 Piping, including pipe, tubing and fittings

(a) Regulators shall be connected directly to cylinder valve outlets or mounted securely by means of a support bracket and connected to the cylinder valve or valves with listed high pressure flexible connections.

(b) Provision shall be made between the regulator outlet and the gas service line by either a flexible connector or a tubing loop to provide for expansion, contraction, jarring and vibration.

(c) Piping, tubing and fittings shall conform to Section 6.9(a) (Piping, including pipe, tubing and fittings) of this Chapter except that the use of aluminum tubing other than listed aluminum appliance connectors is prohibited.

1. Steel tubing shall have a minimum wall thickness of 0.049 inches.
2. Steel pipe or tubing shall be adequately protected against exterior corrosion.

(d) Approved gas tubing fittings shall be employed for making tubing connections.

(e) The gas line shall be firmly fastened in a protected location under the vehicle and outside and below any insulation or false bottom. Fastenings shall be such as to prevent abrasion or damage to the fuel line from vibration. Where the gas line passes through structural members or floors, a rubber grommet or equivalent shall be installed to prevent chafing.

(f) The gas line shall be installed to enter the vehicle through the floor directly beneath or adjacent to the appliance which it serves. Where a branch line is required, the tee connection shall be in the main gas line and located under the vehicle.

(g) All parts of the system assembly shall be so designed and secured as to preclude such parts working loose during transit.

(h) Before appliances are connected, piping systems shall stand a pressure of at least six inches mercury or three pounds gauge for a period of not less than ten minutes without showing any drop in pressure.

1. Pressure shall be measured with a mercury manometer or slope gauge, or an equivalent device calibrated so as to read in increments of not greater than $\frac{1}{10}$ pound.

2. The source of pressure shall be isolated before the pressure tests are made.

(i) When appliances are connected to the piping system, the entire system shall stand a pressure of not less than ten inches water column for a period of not less than ten minutes without showing any drop in pressure.

1. Pressure shall be measured with a water manometer or an equivalent device calibrated so as to read in increments of not greater than $\frac{1}{10}$ inches water column.

2. The source of pressure shall be isolated before the pressure tests are made.

13:52-10.11 Appliances

(a) LP-gas appliances shall be approved for use in a travel trailer or mobile home.

(b) Gas-fired heating appliances, including water heaters, shall be designed or installed to provide for complete separation of the combustion system from the atmosphere of the living space.

1. Such appliances shall be installed with the combustion air inlet assembly furnished as a component of the appliance and, also, with either the flue gas outlet assembly furnished as a component of the appliance, or a listed roof jack if the appliance is listed for such use.

2. The combustion air inlet assembly, flue gas outlet, assembly, and roof jack shall extend to the outside atmosphere.

(c) Except for range top burner sections and gas lights, all gas-fired appliances shall be provided with an automatic pilot device. Such automatic pilot devices, except range oven and broiler units, shall be of the complete shutoff type.

(d) Appliances shall be located inside a vehicle in such a manner that a fire at an appliance will not block egress of persons therefrom.

13:52-10.12 General precautions

(a) Containers, except those covered in requirements of Section 10.2(b) (Construction of containers) of this Chapter shall be marked, maintained and requalified in accordance with the regulations of the Interstate Commerce Commission.

(b) Requalification of containers for continued service is the responsibility of the owner. Containers shall be stamped with the date of requalification. When ICC cylinders are requalified by retesting, such retest shall be made in accordance with ICC regulations.

(c) Containers shall not be charged with fuel unless they bear the proper markings of the code under which they were fabricated, and are marked with the water capacity and tare weight in pounds.

(d) ICC containers which have been involved in a fire shall not be refilled until they have been requalified for service according to ICC regulations.

(e) ASME or API-ASME containers which have been involved in a fire shall not be refilled until they have been retested in accordance with the requirements for their original hydrostatic test and found to be suitable for continued service.

(f) Containers shall not be charged without the consent of the owner thereof.

(g) A permanent caution tag shall be provided by the manufacturer in accordance with Installations of Plumbing, Heating, and Electrical Systems in Mobile Homes, USA Standard A119.1-1963 or Installations of Plumbing, Heating, and Electrical Systems in Travel Trailers, USA Standard A119.2-1963. This tag shall be outside of any enclosure, attached to the outside of the exterior wall close to the gas supply connection, or near the inlet of the gas piping leading inside the mobile unit and adjacent to the container. The tag shall be conspicuously and legibly inscribed with substantially the following:

1. For systems designed for use with LP-gas only, tag shall read:

i. This system is designed for use with LP-gas only. Do not connect natural gas to this system.

ii. Securely cap gas inlet into the mobile unit when gas system is disconnected from gas supply.

iii. BEFORE TURNING ON GAS, MAKE CERTAIN ALL GAS CONNECTIONS HAVE BEEN MADE TIGHT, ALL APPLIANCE VALVES ARE TURNED OFF, AND ANY UNCONNECTED OUTLETS ARE CAPPED.

iv. After turning on gas, except after normal container replacement, test piping and appliances for leaks using a manometer or equivalent device. Locate any leak with soapy water—do not use open flame. Do not leave containers connected unless system has been proven to be gas tight.

2. For combination systems designed for use with either LP-gas or natural gas, the tag shall read:

i. This system is designed for use with either LP-gas or natural gas.

ii. Securely cap gas inlet into mobile unit when gas system is disconnected from gas supply.

iii. Before turning on gas, be certain appliances are suitable for gas to be used, and are equipped with correct orifices.

iv. BEFORE TURNING ON GAS, MAKE CERTAIN ALL GAS CONNECTIONS HAVE BEEN MADE TIGHT, ALL APPLIANCE VALVES ARE TURNED OFF, AND ANY UNCONNECTED OUTLETS ARE CAPPED.

v. After turning on gas, except after normal container replacement, test piping and appliances, for leaks using a manometer or equivalent device. Locate leaks with soapy water—do not use open flame. Do not leave system turned on or containers connected until system has been proven to be gas tight.

13:52-10.13 Charging of containers

(a) Containers shall be charged in accordance with the prescriptions of Section 6.14 (Filling densities) of this Chapter, and with one of the following:

1. At a properly equipped container charging plant which complies with all applicable requirements of this Subchapter.

2. At a trailer court location directly from a tank truck into the container or containers installed at any one vehicle with the following limitations:

i. Containers with water capacities in excess of 50 pounds (approximately 21 pounds LP-gas capacity) shall be provided with excess flow or back flow check valves to prevent the discharge of container contents in case of failure of the filling connections;

ii. Vapor or liquid shall not be vented to the atmosphere to aid in charging the container.

3. The container charging operation shall be performed only by qualified personnel;

4. When containers are accumulated at the tank truck for charging, such charging shall not be done within 50 feet of the nearest building, camper, trailer, self-propelled camper, mobile home or group of buildings, nor within 25 feet of public streets or highways. Private streets, roads or rights-of-way shall not be classed as public streets or highways.

SUBCHAPTER 11. TYPE "E" SYSTEMS**13:52-11.1 Applicability**

(a) This Subchapter applies to LP-gas system installations on vehicles (whether self-propelled or of the trailer or semi-trailer type) used for commercial, construction or public service purposes such as mobile libraries and clinics; to all exchangeable container systems with container capacities greater than 105 pounds water capacity (approximately 45 pounds LP-gas capacity) and to systems using containers permanently mounted on vehicles. It does not apply to:

1. Travel trailers, mobile units or mobile homes; (covered by Subchapter 10 (Type "D" System) of this Chapter);
2. LP-gas motor fuel systems (covered by Subchapter 9 (Type "C" Systems) of this Chapter);
3. Tank trucks and similar units designed to transport LP-gas as cargo (covered by Subchapter 12 (Transportation) of this Chapter).

(b) All general rules apply to this Subchapter unless otherwise noted.

(c) When such a vehicle is permanently parked, and LP-gas is supplied from a system not mounted on and secured to the unit, Subchapters 7 and 8 of this Chapter shall apply.

13:52-11.2 Construction and marking of containers

(a) Containers shall be constructed in accordance with Section 6.5 (Requirements for construction and original test of containers) of this Chapter and marked in accordance with the applicable requirements of Section 6.6 (Markings on containers) of this Chapter, and shall also meet the following:

1. Containers designed for use as portable cylinders shall be constructed in accordance with ICC specifications and as covered by Section 6.5(c) (Requirements for construction and original test of containers) of this Chapter.
2. All other containers whether designed for permanent mounting or for portable or semi-portable use (such as skid tanks), shall be constructed as provided for by Section 6.5(a) (Requirements for construction and original test of containers) of this Chapter. Mounting, securing and protection of such containers shall be as follows:

- i. Permanently installed containers shall meet Section 12.4(b)4 (Design and construction of containers) of this Chapter, inclusive with regard to container valves and accessories and the requirements of Section 12.3(c) (Design and construction of vehicles) of this Chapter as to mounting;

- ii. Portable or semi-portable containers (skid tanks) as covered by Section 8.9(f) (Protection of container accessories) of this Chapter shall meet the applicable requirements of Section 12.4(b)2 (Design and construction of containers, pertinent equipment) of this Chapter inclusive with regard to container valves and accessories, and Section 9.4(c) (Installation of fuel containers), as to mounting. Containers designed for permanent installation as part of Subchapter 8 systems shall not be used.

13:52-11.3 Capacity of a Subchapter 11 system

No single fuel container used on passenger carrying vehicles shall exceed 200 gallons water capacity.

13:52-11.4 Location of containers and systems

(a) Containers shall not be installed, transported or stored (even temporarily), inside any vehicle covered by this Subchapter, except as provided by the applicable regulations of the Interstate Commerce Commission or the Superintendent of the State Police.

(b) Containers, control valves and regulating equipment comprising a complete system shall be suitably protected against damage and weather. Systems may be installed in a recess vapor tight to the inside of the vehicle and accessible from and vented to the outside.

(c) Systems installed outside of a mobile unit shall be so located that discharge from safety relief devices shall not be less than three feet horizontally away from any opening into the unit below the level of the discharge. When the system is located in a recess vapor tight to the inside (see subsection (b) of this Section), vent openings in such recess shall be not less than three feet horizontally away from any opening into mobile unit below the level of these vents.

(d) There shall be no fuel connection between tractor and trailer or other vehicle units.

(e) Container or container carrier shall be secured in place by fastenings designed and constructed with a minimum safety factor of four to withstand loading in any direction equal to twice the weight of the container when filled to normal capacity with LP-gas. (See N.J.A.C. 13:52-9.4(c), Installation of fuel containers.)

13:52-11.5 Container valves and accessories

(a) Container valves and accessories shall be provided, protected and mounted as follows:

1. Systems utilizing ICC cylinders in accordance with Section 7.5 (Container valves and accessories) of this Chapter.

2. All other systems in accordance with the prescriptions of Section 8.5(b) through (g) (Container valves and accessories) of this Chapter.

3. Portable, semi-portable and permanently mounted containers shall be mounted and protected as provided by Section 11.2 (Construction and marking of containers) of this Chapter.

13:52-11.6 Safety relief devices

(a) ICC containers shall be provided with safety relief devices as required by the regulations of the Interstate Commerce Commission.

(b) Containers constructed in accordance with the rules of the ASME or the API-ASME shall be provided with safety relief devices as required by Section 6.11 (Safety devices) of this Chapter.

(c) A final stage regulator of an LP-gas system (excluding any appliance regulator) shall be equipped on the low pressure side with a relief valve which will start to discharge within the limits specified in the table set out in Section 7.6(b) (Safety devices) of this Chapter.

1. This requirement is permitted to be waived on liquid feed systems using tubing specified in Section 6.9(c) (Piping) of this Chapter.

2. The relief valve and the relief valve diaphragm shall be vented to the outside air and terminated at a position to minimize the possibility of vapors accumulating at sources of ignition.

(d) Whenever equipment such as a cargo heater or cooler on a commercial vehicle is a type designed to be in operation while in transit, suitable means to stop the flow, such as an excess flow valve or other device, shall be installed. This device will be actuated to stop the flow in the event of a break in fuel supply line. All excess flow valves shall comply with Section 6.8(c) (Container valves) of this Chapter. (See N.J.A.C. 13:52-6.8(h) (Container valves and accessories).)

13:52-11.7 System design and line pressure

Systems may be either vapor withdrawal or liquid withdrawal type and shall comply with the applicable requirements for the type of usage involved.

13:52-11.8 System enclosure and mounting

(a) Housing or enclosures shall be designed to provide proper ventilation.

(b) Hoods, domes, or removable portions of cabinets shall be provided with means to keep them firmly in place during transit.

(c) Provision shall be incorporated in the assembly to hold the containers firmly in position and prevent their movement during transit in accordance with the prescriptions of Section 9.4(c) (Installation of fuel containers) of this Chapter.

(d) Containers shall be mounted on a substantial support or base secured firmly to the vehicle chassis. Neither the container nor its support shall extend below the frame.

13:52-11.9 Piping, including pipe, tubing and fittings

(a) Regulators shall be connected directly to the container valve outlet or mounted securely by means of a support bracket and connected to the container valve or valves with a listed high pressure flexible connector.

(b) Provision shall be made between the regulator outlet and the gas service lines by either a flexible connector or a tubing loop to provide for expansion, contraction, jarring and vibration.

(c) Piping, tubing, and fittings shall conform to Section 6.9 (Piping) of this Chapter, except that the use of aluminum tubing is prohibited.

1. Steel tubing shall have a minimum wall thickness of 0.049 inches.

2. Steel pipe or tubing shall be adequately protected against exterior corrosion.

(d) Approved gas tubing fittings shall be employed for making tubing connections.

(e) The fuel line shall be firmly fastened in a protected location and where under the vehicle and outside and below any insulation or false bottom, fastenings shall be such as to prevent abrasion or damage to gas line due to vibration. Where the fuel line passes through structural members or floors, a rubber grommet or equivalent shall be installed to prevent chafing.

(f) The fuel line shall be installed to enter the vehicle through the floor directly beneath or adjacent to the appliance which it serves. When a branch line is required, the tee connection shall be in the main fuel line and located under the floor and outside the vehicle.

(g) All parts of the system assembly shall be so designed and secured as to preclude such parts working loose during transit.

13:52-11.10 Appliances

(a) LP-gas appliances shall be approved for use on commercial vehicles.

(b) In the case of vehicles not intended for human occupancy and where the gas-fired heating appliance is used to protect the cargo, such heater may be of the unvented type, but provision shall be made to dispose of the products of combustion to the outside.

(c) In the case of vehicles intended for human occupancy, all gas-fired heating appliances, including water heaters, shall be designed or installed to provide for complete sepa-

ration of the combustion system from the atmosphere of the living space. Such appliances shall be installed with the combustion air inlet assembly furnished as a component of the appliance and, also with either:

1. The flue gas outlet assembly furnished as a component of the appliance;
2. A listed roof jack if the appliance is listed for such use; or
3. The combustion air inlet assembly, flue gas outlet assembly, and roof jack shall extend to the outside atmosphere.

(d) Provision shall be made to insure an adequate supply of outside air for combustion.

(e) All gas-fired heating appliances and water heaters shall be equipped with an approved automatic device designed to shut off the flow of gas to the main burner and to the pilot in the event the pilot flame is extinguished.

(f) Gas-fired appliances installed in the cargo space shall be located so they are readily accessible.

(g) Appliances shall be constructed or protected to reduce to a minimum possible damage or impaired operation resulting from cargo shifting or handling.

(h) Appliances inside the vehicle shall be located so that a fire at an appliance will not block egress of persons from the vehicle.

(i) On appliances, other than those designed by the manufacturer for manual operation only, the State Police LP-Gas Unit may require 100 per cent automatic pilot equipment.

13:52-11.11 General precautions

(a) ICC containers shall be marked, maintained and requalified for use in accordance with the currently effective regulations of the Interstate Commerce Commission.

(b) Requalification of containers for continued service is the responsibility of the owner; containers shall be stamped with the date of requalification. When ICC cylinders are requalified by retesting, such retests shall be made in accordance with ICC regulations.

(c) Containers shall not be charged with fuel unless they bear the proper markings of the code or specification under which they were constructed, and, in addition, with their water capacity. In the case of cylinders or portable containers filled by weight, the container shall be marked with its tare weight.

(d) ICC containers which have been involved in a fire shall not be recharged until they have been requalified for service according to ICC regulations.

(e) ASME or API-ASME containers which have been involved in a fire shall not be recharged until they have been retested in accordance with the requirement for their original hydrostatic test and found to be suitable for continued service.

(f) Containers shall not be charged without the consent of the owner.

(g) A permanent caution plate shall be provided on the appliance or adjacent to the container outside of any enclosure. It shall include the following items:

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 the equipment is not in use.

13:52-11.12 Charging of containers

Containers shall be charged as provided in Section 6.14 (Filling densities) of this Chapter.

13:52-11.13 Fire extinguishers

Mobile cooking units shall be provided with at least one approved portable fire extinguisher having a minimum rating of 8-B, C. Ratings shall be in accordance with the Standard for Installation of Portable Fire Extinguishers, NFPA Number 10.

SUBCHAPTER 12. TRANSPORTATION

13:52-12.1 Applicability

(a) The provisions of this Subchapter apply to the equipment for and requirements for the transportation of liquefied petroleum gas by truck, semitrailer and trailers. This Subchapter also covers design and construction of cargo tanks permanently mounted on trucks, semitrailers and trailers, and of skid tanks used as combination transport and storage units. The design and construction of other liquefied petroleum gas containers which are not permanently attached to the truck, semitrailer, or trailers are not covered. All general rules apply to this Subchapter unless otherwise noted in Subchapter 6 (General Rules) of this Chapter.

(b) Cargo tanks and pertinent equipment for tank vehicles for the transportation of liquefied petroleum gas, in addition to complying with the requirements of this Subchapter, should also comply with the regulations of the Interstate Commerce Commission and those of any other regulatory body involved that may apply.

13:52-12.2 General requirements

(a) All vehicles used for the transportation of liquefied petroleum gas shall strictly comply with the general laws and regulations of this State governing the operation of motor vehicles.

(b) No person, firm, or corporation shall use any motor vehicle for the transportation of liquefied petroleum gas in tanks or containers in excess of ten gallons, unless a special permit therefor shall have been issued by the Director of Motor Vehicles.

1. A valid permit shall be carried on vehicles at all times when liquified gas is being transported.

2. Motor fuel is not included.

(c) Smoking, in any form, or the carrying of lighted matches, cigars, pipes or cigarettes, in, about, or in direct connection with any vehicle when used for transportation of liquified petroleum gas shall be prohibited.

1. The person in immediate responsible charge of such vehicle shall take every reasonable precaution and make every reasonable effort to enforce compliance with this requirement.

2. Approved safety matches only may be carried.

(d) Requirements for vehicles and shipments in transit, including precautions to be taken in the event of an accident and the reporting thereof shall be as specified in ICC regulations for Transportation of Explosives and other Dangerous Articles by Motor Vehicle, Part I, Sections 814, 826, 827, 828 (e) (1-2); provided, however, that accidents required to be reported by Section 814 shall also be reported to the Superintendent on a similar form as that required by ICC regulations.

13:52-12.3 Design and construction of vehicles

(a) In the event liquified petroleum gas is used in the truck engine, the fuel system shall be installed in accordance with the requirements of Subchapter 9 (Type "C" Systems) of this Chapter.

(b) Liquid transfer equipment shall meet the following requirements:

1. Pumps or compressors shall be designed for use with LP-gas; they shall be properly protected and may be mounted upon liquified petroleum gas tank trucks, trailers, or semitrailers and may be driven by the truck motor power take-off or internal combustion engine, hand, me-

chanical, hydraulic or electrical means. On electrical means of pumping, the electrical installation shall be in accordance with the requirements of the National Electrical Code for class I, Group D. Hazardous Locations.

2. When hose is carried connected to truck liquid pump discharge piping, an automatic device such as a differential regulator or equivalent device shall be installed between the pump discharge and the hose connection to prevent liquid discharge when the pump is not running.

i. When a meter is used, the device shall be installed between the meter outlet and the hose connection.

ii. An excess flow valve may also be used but shall not be used as the exclusive means to accomplish the requirements of this paragraph.

(c) The mounting of cargo tanks on vehicles shall meet the following requirements:

1. Tank motor vehicles with frames not made integral with the tank, as by welding, shall be provided with turn-buckles or similar positive devices for drawing the tank down tight on the frame. In addition, suitable stops or anchors shall be attached to the frame and/or the tank to prevent relative motion between them due to starting, stopping, and turning. The stops and anchors shall be so installed as to be readily accessible for inspection and maintenance.

2. Any tank motor vehicle designed and constructed so that the cargo tank constitutes in whole or in part the stress member used in lieu of a frame shall be supported by external cradles subtending at least 120 degrees of the shell circumference.

i. The design calculations shall include beam stress, shear stress, torsion stress, bending moment and acceleration stress for the cargo tank as a whole using a factor of safety of four, based on the ultimate tensile strength of the material.

ii. Maximum concentrated stresses which might be created at pads and cradles due to shear, bending and torsion shall also be calculated in accordance with Appendix G of the ASME Code, 1962 Edition.

iii. Fully loaded vehicles shall be assumed to be operating under highway conditions equal to 2 "g" loading. The effects of fatigue shall be taken into consideration.

iv. Cargo tanks mounted on frames may be supported by longitudinal members attached to pads providing the above-stated factors are taken into account.

3. Where any tank support is attached to any part of a tank head, the stresses imposed upon the head shall be provided for as required by paragraph 2 of this subsection.

4. Tank supports, stops, anchors and bumpers shall not be welded directly to the tank but shall be attached by means of pads of the same material as the tank.

i. The pad thickness shall be not less than 1/2 inch, or the thickness of the shell material if less, and no greater than the shell material.

ii. Each pad shall extend at least four times its thickness, in each direction, beyond the weld attaching the support, bumper, stop or anchor.

iii. Each pad shall be performed to an inside radius no greater than the outside radius of the tank at the place of attachment.

iv. Each pad corner shall be rounded to a radius at least 1/4 the width of the pad, and no greater than 1/2 the width of the pad.

v. Weep holes and tell-tale holes, if used, shall be drilled or punched before the pads are attached to the tank.

vi. Each pad shall be attached to the tank by continuous fillet welding using filler material having properties conforming to the recommendations of the maker of the shell and head material.

(d) Trucks, trailers and semitrailers shall not be equipped with any artificial light other than electrical.

1. Lighting circuits shall have suitable over-current protection (fuses or automatic circuit breakers).

2. The wiring shall have sufficient carrying capacity and mechanical strength, and shall be suitably secured, insulated and protected against physical damage.

(e) Cargo tank, chassis, axles and springs shall be metallically connected.

(f) The exhaust system, including muffler and exhaust line, shall have ample clearance from the fuel system and combustible materials. Truck exhaust discharge shall be directed away from any tank and appurtenances and to the outside of the frame and any skirting. Muffler cut-out shall not be used.

(g) Each tank truck or tractor shall be provided with at least one approved portable fire extinguisher having at least a 12-B, C rating or, when more than one is provided, each extinguisher shall have at least a 6-B, C rating. Each truck transporting cylinders shall have at least one extinguisher having a 8-B, C rating. Ratings shall be in accordance with the Standard for Installation, Maintenance and Use of Portable Fire Extinguishers, NFPA No. 10.

(h) Semitrailers and trailers shall comply with the following requirements:

1. All trailers shall be firmly and securely attached to the vehicle drawing them by means of suitable drawbars, supplemented by safety chains.

2. Every trailer or semitrailer shall be equipped with a reliable system of brakes, and adequate provision shall be made for its efficient operation from the driver's seat of the vehicle drawing the trailer.

3. Every trailer or semitrailer shall be provided with side lights and a tail light.

4. Four-wheeled trailers shall be of a type of construction which will prevent the towed vehicle from whipping or swerving from side to side dangerously, and will cause it to follow substantially in the path of the towing vehicle.

5. Where a fifth wheel is employed, it shall be ruggedly designed, securely fastened to both units and equipped with a positive locking mechanism which will prevent separation of the two units, except by manual release.

6. Any loaded cargo tank trailer or cargo tank semitrailer when parked shall be so positioned that the safety relief valve shall communicate with the vapor space of the container.

(i) Each tank truck and trailer shall be provided with properly attached steel bumpers or chassis extension which shall be so arranged as to protect the tank, piping, valves and fittings in case of collision.

(j) Each tank truck and trailer shall carry chock blocks permanently chained to the vehicle, which shall be used to prevent rolling of the vehicle whenever it is parked, including when loading and unloading.

13:52-12.4 Design and construction of containers, pertinent equipment

(a) Containers shall be designed and classified as follows:

Container Type	Minimum Design Pressure of Container Lb. Per Sq. In. Gauge		
	For Gases w/Vapor Pres. Not to Exceed Lb/Sq. In. Gauge at 100F (37.8C)	1949 & Earlier Editions ASME Code (Par. U-68, U-69)	1949 Edition of ASME Code (Par. U-200, U-201); 1950, 1952, 1956, 1959, 1962 & 1965 Editions ASME Code; All Editions of API-ASME Code***
80*	80*	80*	100*
100	100	100	125
125	125	125	156
150	150	150	187
175	175	175	219
200**	215	200	250

* New storage containers of the 80 type have not been authorized since December 31, 1947.

** Container type may be increased by increments of 25. The minimum design pressure of containers shall be 100 per cent of the container type designation when constructed under 1949 or earlier editions of ASME Code (paragraph U-68 and U-69). The minimum design pressure of container shall be 125% of the container type designation when constructed under (1) the 1949 ASME Code (paragraph U-200 and U-201), (2) 1950, 1952, 1956, 1962 and 1965 editions of the ASME Code and (3) all editions of the API-ASME Code.

*** Construction of containers under the API-ASME Code is not authorized after July 1, 1961.

(b) Longitudinal shell welds shall be located in the upper half of the container.

(c) Cargo tank valves and accessories shall comply with the following requirements:

1. Nonrecessed container fittings and appurtenances shall be protected against damage by either:

i. Their location;

ii. The vehicle frame or bumper, or

iii. A protective housing. The protective housing, if used, shall comply with the requirements under which the tanks are fabricated with respect to design and construction and shall be designed to withstand static loadings in any direction equal to twice the weight of the tank and attachments when filled with the lading using a safety factor of not less than four, based on the ultimate strength of the material to be used. The housing shall be provided with a weather cover if necessary to insure proper operation of valves and safety devices.

2. Filling connections shall be provided with approved automatic back pressure check valves, excess flow check valves or quick closing internal valves to prevent excessive escape of gas in case the filling and discharge connect on a common opening in the container shell, and that opening is fitted with a quick-closing internal valve as specified in paragraph 3, subsection (c) of this Section. In addition, every inlet and outlet connection shall be equipped with a manually or automatically operated shutoff valve.

3. Liquid discharge openings, except those for engine fuel lines, on tanks built after September 1, 1965 shall be fitted with a remotely controlled internal shutoff valve. Such valve shall conform to the following requirements:

i. The seat of the valve shall be inside the tank, or in the opening nozzle or flange or in a companion flange bolted to the nozzle or flange.

ii. All parts of the valve inside the tank, nozzle or companion flange, shall be made of material not subject to corrosion or other deterioration in the presence of the lading.

iii. The arrangement of parts shall be such that damage to parts exterior to the tank will not prevent effective seating of the valve.

iv. The valve may be operated normally by mechanical means, by hydraulic means, or by air or gas pressure.

v. The valve shall be provided with remote means of automatic closure, both mechanical and thermal, in at least two places for tanks over 3,500 gallons water capacity. These remote control stations shall be locat-

ed at each end of the tank and diagonally opposite each other. The thermal control mechanism shall have a fusible element with a melting point not over 220 degrees Fahrenheit or less than 208 degrees Fahrenheit. At least one remote control station shall be provided for tanks of 3,500 gallons water capacity or less and the actuating means may be mechanical.

4. All other connections to containers, except those used for gauging devices, thermometer wells, safety relief devices and plugged openings shall be provided with suitable automatic excess flow valves, or in lieu thereof may be fitted with quick-closing internal valves. The control mechanism for the internal valve shall be provided with a secondary control, remote from the fill or discharge connections, (for use in the event of accidents or fire during delivery operations) and such control mechanism shall have a fusible element with a melting point not over 220 degrees Fahrenheit or less than 208 degrees Fahrenheit.

5. Manually operated shutoff valves, except as covered in Section 6.16(h) (Transfer of liquids) and in Section 9.2(a) (General provisions for type "C" systems) of this Chapter, shall be closed except during transfer operations.

6. Excess flow valves shall close automatically at the rated flow of vapor or liquid as specified by the valve manufacturers. The flow rating of the piping beyond the excess flow valve shall be greater than that of the excess flow valve and the rating shall include valves, fittings and hose, except, when branching or necessary restrictions are incorporated in the piping system so that flow ratings are less than that of the excess flow valve at the tank, then additional excess flow valves shall be installed in the piping where such flow rate is reduced.

7. Container inlets and outlets, except those used for safety relief valves, liquid level gauging devices, and pressure gauges, shall be labeled to designate whether they communicate with vapor or liquid space when the container is filled to maximum permitted filling density. Labels may be on valves.

8. Each cargo tank shall be equipped with a suitable pressure gauge.

9. Any gauging device used to determine the maximum allowable filling limit of a cargo tank of a trailer or semi-trailer shall be located as near the midpoint (front-to-rear) of the cargo tank as practical.

i. If a gauging device, such as a rotary gauge or a slip tube gauge, is used for the above purpose, a fixed tube gauge set in the range of 85-90 per cent of the water capacity of the tank shall be provided, in addition, as a means of checking the accuracy of the variable gauge.

ii. The capacity indicated by this fixed gauge shall be marked on or adjacent to this gauge, which shall be secured to prevent tampering with the setting.

10. An opening shall be provided in each cargo tank to afford complete drainage.

(d) All piping—including pipe, tubing and fittings—shall comply with the following requirements:

1. All piping, tubing and fittings shall be securely mounted and protected against damage and breakage.

2. Pipe, tubing and fittings shall be suitable for a minimum pressure of 250 p.s.i.g. Pipe shall be at least Schedule 80 if joints are threaded, or threaded and back welded. At least Schedule 40 (ASTM A-53 Grade B Electric Resistance Welded and Electric Flash Welded Pipe or equal) shall be used if joints are welded or welded and flanged.

3. The use of aluminum alloy pipe, tubing or fittings is prohibited.

4. Provisions shall be made, in design or by provision of flexible connections, to compensate for stresses and vibrations in the piping system.

i. The flexible portion of connectors used for this purpose must not exceed three feet in length and shall be installed in accordance with the manufacturer's instructions.

ii. Flexible connectors used in the piping of new LP-gas cargo units built after December 31, 1967 shall be listed or approved flexible metal connectors or fabricated from listed or approved stainless steel or equivalent wire braid reinforced rubber hose with hose couplings suitable for LP-gas service.

5. Flexible connectors, on existing LP-gas cargo units, replaced after December 31, 1967 shall be listed or approved flexible metal connectors or fabricated from listed or approved stainless steel or equivalent wire braid reinforced rubber hose with hose couplings suitable for LP-gas service.

(e) Cargo tank safety relief valves shall comply with the following requirements:

1. The discharge from safety relief valves shall be vented away from the container upward and unobstructed to the open air in such a manner as to prevent any impingement of escaping gas upon the container.

i. Size of discharge lines from safety relief valves shall not be smaller than the nominal size of the relief valve outlet connection.

ii. Suitable provision shall be made for draining condensate which may accumulate in the discharge pipe.

2. Each discharge outlet from a safety relief valve shall be provided with a rain cap or other protector to keep water and dirt from collecting in the valve.

i. The protector shall be in place except when the valve operates.

ii. The rain cap or other protector shall not reduce the flow through the valve.

iii. When a safety relief valve is installed in a well in the top of a container, the well shall be painted or otherwise protected to reduce corrosion, shall be checked frequently and kept free of water and dirt.

3. Any portion of piping between tank and pump inlet or any wet hose which at any time may be closed at each end should be provided with relief valve to prevent excessive pressure developing.

13:52-12.5 Marking cargo vehicles

(a) Every motor vehicle, semitrailer and trailer transporting 1,000 pounds or more of liquefied petroleum gas shall have marked or placarded on the front, rear, each side "FLAMMABLE GAS" in letters not less than four inches high, using approximately a $\frac{5}{8}$ -inch stroke.

1. Letters shall be red upon a white background.

2. The front marking or placard may be displayed on the front of either the truck, truck body, truck tractor, or the trailer.

(b) Every tank motor vehicle transporting any quantity of liquefied petroleum gas shall be conspicuously and legibly marked or placarded with the words "FLAMMABLE GAS" or "FLAMMABLE COMPRESSED GAS" in the same manner covered in subsection (a) of this Section. In addition, the common name of the contents shall be marked on the tank in letters at least two inches high using approximately a $\frac{1}{4}$ -inch stroke; coloring to be the same as required for larger lettering.

(c) Every cargo tank shall be marked with the name of the motor carrier who owns the vehicle of which the tank forms a part, or if the operator of the vehicle is not the owner, then the name of the owner thereof.

(d) In addition to the marking required by subsections (a) through (c) of this Section, there may be marked on any cargo tank the appropriate trademark of the liquefied petroleum gas being transported therein; provided, however, that no such marking shall be of such size and character as to render the required markings inconspicuous.

13:52-12.6 Loading and unloading of vehicles

(a) Any tank, cylinder or container of liquefied petroleum gas that is not designed to be permanently attached to a vehicle shall be reasonably secured against movement within the vehicle by which it is being transported.

(b) Liquefied petroleum gas shall not be loaded into or on or transported in or on any pole trailer.

(c) Every precaution shall be taken in the loading or unloading of liquefied petroleum gas to keep fire away. No person shall smoke or carry any flame, lighted match, cigar, pipe or cigarette in the vicinity of any loading or unloading operations.

(d) Liquefied petroleum gas shall not be loaded into or on or unloaded from any vehicle unless the handbrake is securely set and all other reasonable precautions have been taken to prevent motion of the vehicle during loading or unloading operations.

(e) Tools which are likely to damage the effectiveness of the closure of or otherwise adversely affect any vessel, container or pertinent equipment shall not be used for the loading or unloading of liquefied petroleum gas.

(f) Containers of liquefied petroleum gas shall be braced to prevent relative motion between containers while in transit. Containers having valves or other fittings shall be loaded so that there will be a minimum likelihood of damage during transportation.

(g) The determination of the maximum permitted filling when loading cargo tanks on trucks, trailers or semitrailers shall be by use of suitable liquid level gauge or by weighing, whether or not a meter is used. (See N.J.C.A. 13:52-6.14, Filling densities and N.J.A.C. 13:52-6.22, Fixed electrical equipment in classified areas.)

(h) Under no circumstances shall a tank motor vehicle be left unattended during the loading or unloading process. In this regard, the delivery hose shall be deemed to be a part of the vehicle when it is attached hereto.

(i) Vessels or containers of liquefied petroleum gas shall not be loaded onto any part of the floor or platform of any vehicle that is not essentially flat except that the vessels or containers may be loaded onto any vehicle not having a floor or platform only if the vehicle is equipped with suitable racks having adequate means of securing them in place.

(j) Transportation of portable containers shall comply with the following requirements:

1. Portable containers transported in vehicles shall be secured to prevent movement, tipping over, or physical damage. Valves shall be safeguarded against physical damage due to collision or overturning.

i. Containers not exceeding 200 pounds water capacity may be transported in other than upright position.

ii. Containers in excess of 200 pounds water capacity shall be transported with relief valves in direct communication with the vapor space of the container.

(k) Liquefied petroleum gas shall not be loaded into or on or unloaded from any tank motor vehicle with the engine

running unless the engine is used for the operation of the transfer pump of the vehicle. Unless the delivery hose is equipped with a shutoff valve at its discharge end, the engine of the motor vehicle shall be stopped at the completion of the loading or unloading operation while filling discharged connections are disconnected.

(l) Containers of liquefied petroleum gas shall not be loaded in any unit of transportation together with any poisonous gases or liquids.

13:52-12.7 Painting cargo tanks on vehicles

At least the upper $\frac{2}{3}$ of cargo tanks shall be painted with a light reflecting paint for the finish coat, except for lettering.

13:52-12.8 Transportation of Subchapter 8 Type "B" systems

(a) Containers not considered portable which are not designed for transportation and not permanently attached to the vehicle, shall be properly secured against movement during transportation.

1. The containers shall contain no more LP-gas than five per cent of their water capacity during transportation.

2. The containers shall be braced or otherwise secured on the vehicle to prevent relative motion while in transit; provided, however, containers which contain more LP-gas than five per cent of their water capacity may be transported subject to such limitations as may be specified by the Superintendent of State Police.

(b) Valves, regulating and other tank accessory equipment shall be adequately protected against physical damage during transportation.

(c) Lifting lugs on containers, covered by the provisions of subsection (a) of this Section, shall not be used as the exclusive means of lifting such containers.

13:52-12.9 Movable fuel storage tenders or farm carts

(a) Applicable general rules shall apply to the provisions of this Section.

(b) Valves, piping, fittings and accessories shall be adequately safeguarded against physical damage due to collision or upset.

(c) Threaded piping shall be not less than Schedule 80 and fittings shall be designed for not less than 250.

(d) Movable fuel storage tenders or farm carts shall not be refilled on a public road or highway.

13:52-12.10 Parking and garaging LP-gas tank vehicles

(a) Tank vehicles containing LP-gas, except in an emergency or as provided in subsection (b) of this Section, shall not be left unattended on any street, highway, avenue or alley; provided, that this shall not prevent a driver from the necessary absence from the vehicle in connection with a delivery, nor shall it prevent stops for meals or rest stops during the day or night if the vehicle is well lighted at point of parking.

(b) Unattended tank trucks containing LP-gas, shall not be parked in congested areas. The vehicles may be parked off the street in uncongested areas if at least 50 feet from any building used for assembly, institutional or multiple residential occupancy. This is not intended to prohibit the parking of delivery tank trucks of 3,500 gallons water capacity or less on streets adjacent to the driver's residence in uncongested residential areas, provided such points are at least 50 feet from a building used for assembly, institutional or multiple residential occupancy.

(c) Tank vehicles containing LP-gas shall not be stored, parked or garaged in any building unless the building is specifically approved for such use by the authority having jurisdiction, or is designed for such use.

(d) The following essential precautions shall be followed when it is necessary to garage LP-gas tank vehicles for service on the chassis or engine:

1. All primary shutoff valves shall be closed and liquid and vapor in the hose and piping vented to a safe location prior to moving the vehicle into the building.

2. The system shall be checked for any leaks, and any found shall be repaired before the vehicle is moved inside of the building.

3. The cargo container shall be gauged to determine that it is not filled beyond maximum filling capacity according to Section 6.14(a) (Filling densities) of this Chapter. If over-filled, it shall be corrected before the vehicle is moved inside of the building.

4. The vehicle shall not be parked near a source of heat, open flames or similar sources of ignition, or within the path of hot air being blown from a blower-type heater.

5. Unless the product is removed from the cargo tank and the pressure reduced to atmospheric, the driver shall instruct the responsible people in the garage of the nature of the cargo contents and instruct them not to tamper with the tank valves or fittings.

(e) Repair work shall not be done on the cargo container or primary shutoff valves while the vehicle is in the garage if the cargo container contains product.

SUBCHAPTER 13. STORAGE OF CONTAINERS AWAITING USE OR RESALE

13:52-13.1 Applicability

The provisions of this Subchapter shall apply to the storage of portable containers not in excess of 1,000 pounds water capacity filled or partially filled, at user location but not connected for use, or in storage for resale by dealers or resellers. This Subchapter shall not apply to containers stored at charging plants or at plants devoted primarily to the storage and distribution of LP-gas or other petroleum products.

13:52-13.2 General

(a) Containers in storage shall be located so as to minimize exposure to excessive temperature rise, physical damage or tampering by unauthorized persons.

(b) Containers when stored inside shall not be located near exits, stairways, or in areas normally used or intended for safe exit of people.

(c) Containers (empty or filled) which require valve protecting caps shall have such caps in place while in storage.

(d) The outlet valves of containers in storage shall be closed.

(e) Empty containers which have been in LP-gas service should preferably be stored in the open. When stored inside they shall be considered as full cylinders for the purpose of determining the maximum quantity of LP-gas permitted by this Section.

13:52-13.3 Storage within buildings frequented by the public

(a) ICC specification containers having a maximum individual water capacity of 2½ pounds, used with completely self-contained hand torches and similar applications, are permitted to be stored or displayed in a building frequented by the public.

1. The display of containers shall be limited to a total of 24 units of each brand and size.

2. The total quantity on display and in storage shall not exceed 200 pounds LP-gas.

(b) Storage as provided in Section 13.5 (Storage within special buildings or rooms) of this Chapter shall not be permitted within or attached to such a building.

13:52-13.4 Storage within buildings not frequented by the public (such as industrial buildings)

(a) The quantity of LP-gas shall not exceed 300 pounds (approximately 2,550 cubic feet in vapor form) except as provided in Section 13.5 (Storage within special buildings or rooms) of this Chapter.

(b) Containers carried as a part of service equipment on highway mobile vehicles are not to be considered in the total storage capacity in subsection (a) of this Section, provided those vehicles are stored in private garages, and are limited to one container per vehicle with an LP-gas capacity of not more than 100 pounds. All container valves shall be closed. LP-gas capacity of not more than 100 pounds. All container valves shall be closed.

13:52-13.5 Storage within special buildings or rooms

(a) The quantity of LP-gas stored in special buildings or rooms shall not exceed 10,000 pounds.

(b) The walls, floors and ceilings of container storage rooms that are within or adjacent to other parts of the building shall be constructed of material having at least a two-hour fire-resistant rating.

(c) A portion of the exterior walls or roof having an area not less than ten per cent of that of the combined area of the enclosed walls and roof, shall be of single strength glass or similar explosion relieving construction. See Guide for Explosion Venting, NFPA Number 68 for details.

(d) Each opening from storage rooms to other parts of the building shall be protected by a 1½ hour (B) listed fire door. See Standard for Fire Doors and Windows, NFPA Number 80.

(e) Such rooms shall have no open flames for heating or lighting.

(f) Such rooms shall be adequately ventilated both top and bottom to the outside only. The openings from such vents shall be at least five feet away from any other opening into any building.

(g) The floors of such rooms shall not be below ground level. Any space below the floor shall be of solid fill or properly ventilated to the open air.

(h) Such storage rooms shall not be located adjoining the line of property occupied by schools, churches, hospitals, athletic fields or other points of public gathering.

(i) Fixed electrical equipment shall be installed in accordance with the provisions of Section 6.22 (Fixed electrical equipment in classified areas) of this Chapter.

13:52-13.6 Storage outside of buildings

(a) Storage outside of buildings, for containers awaiting use or resale shall be located in accordance with the table set forth in subsection (b) of this Section with respect to the following factors:

1. Nearest important building or group of buildings;
2. Line of adjoining property which may be built upon;
3. Busy thoroughfares;
4. Line of adjoining property occupied by schools, churches, hospitals, athletic fields or other points of public gathering.

(b) Storage outside of buildings for containers awaiting use or resale shall comply with the provisions of the following table:

Quantity of LP-Gas Stored	Distance
500 pounds or less	0
501 to 2,500 pounds	0**
2,501 to 6,000 pounds	10 Feet
6,001 to 10,000 pounds	20 Feet
Over 10,000 pounds	25 Feet

** Container or containers shall be at least ten feet from any building on adjoining property, any sidewalk or any of the exposures described in paragraphs 1 and 3 of subsection (a) of this Section.

(c) Containers shall be in a suitable enclosure or otherwise protected against tampering.

(d) Valves and safety relief devices shall be protected against accumulation of ice and snow. Protective caps shall be deemed adequate.

(e) When the provisions of subsections (a), (c) or (d) of this Section are impractical at construction sites or buildings and structures undergoing major renovation, the storage of containers shall be acceptable to the authority having jurisdiction.

13:52-13.7 Fire protection

Storage locations other than supply depots separated and located apart from dealer, reseller or user establishment shall be provided with at least one approved portable fire extinguisher having a minimum rating of 8-B, C. Ratings shall be in accordance with the Standard for Installation, Maintenance and Use of Portable Fire Extinguishers, NFPA Number 10.

SUBCHAPTER 14. LIQUEFIED PETROLEUM GAS SERVICE STATIONS

13:52-14.1 Applicability

(a) This Subchapter shall apply to storage containers dispensing devices and pertinent equipment in service stations where LP-gas is stored and dispensed into the fuel tanks of motor vehicles. (See N.J.C.A. 13:52-9.1 et seq., Type "C" systems.)

(b) All general provisions of this Chapter apply to this Subchapter, unless otherwise noted.

(c) Containers and pertinent equipment shall comply with the requirements as outlined in this Subchapter, as well as with the requirements of the State or local authority having jurisdiction where the service station will be constructed.

13:52-14.2 Design pressure and classification of storage containers

Storage containers shall be designed and classified as follows:

Container Type	For Gases w/Vapor Pres. Not to Exceed Lb/Sq. In. Gauge at 100F (37.8C)	Minimum Design Pressure of Container Lb. Per Sq. In. Gauge	
		1949 & Earlier Editions ASME Code (Par. U-68, U-69)	1949 Edition of ASME Code (Par. U-200, U-201); 1950, 1952, 1956, 1959, 1962 & 1965 Editions ASME Code; All Editions of API-ASME Code**
200*	215	200	250

* Container type may be increased by increments of 25. The minimum design pressure of containers shall be 100 per cent of the container type designation when constructed under 1949 or earlier editions of ASME Code (Paragraph U-68 and U-69). The minimum design pressure of container shall be 125 per cent of the container type designation when constructed under (1) the 1949 ASME Code (Paragraph U-200 and U-201), (2) 1950, 1952, 1956, 1962 and 1965 editions of the ASME Code and (3) all editions of the API-ASME Code.

** Construction of containers under the API-ASME Code is not authorized after July 1, 1961.

13:52-14.3 Container valves and accessories

(a) A filling connection on the container shall be fitted with one of the following:

1. A combination back-pressure check and excess flow valve.
2. One double or two single back-pressure check valve.
3. A positive shutoff valve, in conjunction with either:
 - i. An internal back-pressure valve, or
 - ii. An internal excess flow valve.¹

(b) A filling pipe inlet terminal not on the container shall be fitted with a positive shutoff valve in conjunction with either:

1. A back-pressure check valve; or
2. An excess flow check valve.

(c) All openings in the container except those listed below shall be equipped with approved excess flow check valves:

1. Filling connections, as provided in subsection (a) of this Section.
2. Safety relief connections, as provided in Section 6.8(b) (Container valves and accessories) of this Chapter.
3. Liquid level gauging devices, as provided in Section 6.8(d) and in Section 6.21(d) (Electrical equipment and other sources of ignition) of this Chapter.
4. Pressure gauge connections, as provided in Section 6.8(e) (Container valves and accessories) of this Chapter.

(d) All container inlets and outlets except those listed below shall be labeled to designate whether they connect with the vapor or liquid (labels may be on valves):

1. Safety relief valves;
2. Liquid level gauging devices;

3. Pressure gauges.

(e) Each storage container shall be provided with a suitable pressure gauge.

¹ In lieu of an excess flow valve, filling connection may be fitted with a quick-closing internal valve which shall remain closed except during operating periods. The mechanism for such valves may be provided with a secondary control which will cause it to close automatically in case of fire. When a fusible plug is used its melting point shall not exceed 220 degrees Fahrenheit.

13:52-14.4 Safety relief valves

(a) All safety relief devices shall be installed as follows:

1. On the container and directly connected with the vapor space;
2. Safety relief valves and discharge piping shall be protected against physical damage. The outlet shall be provided with loosefitting raincaps. There shall be no return bends or restrictions in the discharge piping.
3. The discharge from two or more safety relief valves having the same pressure settings may be run into a common discharge header. The cross-sectional area of such header shall be at least equal to the sum of the cross-sectional area of the individual discharges.
4. Discharge from any safety relief device shall not terminate in any building nor beneath any building.

(b) Aboveground containers shall be provided with safety relief valves as follows:

1. The rate of discharge, which may be provided by one or more valves shall be not less than that specified in Table 1 set forth in Section 6.12 (Minimum required rate of discharge for safety relief valves on containers) of this Chapter.
2. The discharge from safety relief valves shall be vented to the open air unobstructed and vertically upwards in such a manner as to prevent any impingement of escaping gas upon the container; loose-fitting raincaps shall be used. On a container having a water capacity greater than 2,000 gallons the discharge from the safety relief valves shall be vented away from the container vertically upwards to a point at least seven feet above the container.
3. Suitable provisions shall be made so that any liquid or condensate that may accumulate inside of the relief valve or its discharge pipe will not render the valve inoperative.
4. If a drain is used, a means shall be provided to protect the container, adjacent containers, piping or equipment against impingement of flame resulting from ignition of products escaping from the drain. (See N.J.A.C. 13:52-6.11(e), Safety devices.)

(c) Underground containers shall be provided with safety relief valves as follows:

1. The discharge from safety relief valves shall be piped vertically upward to a point at least ten feet above the ground. The discharge lines or pipes shall be adequately supported and protected against physical damage.
2. Where there is a probability of the manhole or housing becoming flooded, the discharge from regulator vent lines should be above the highest probable flood level.
3. If no liquid is put into a container until after it is buried and covered, the rate of discharge of the relief valves may be reduced to not less than 30 per cent of the rate shown in Table 1 set forth in Section 6.12 (Minimum required rate of discharge for safety relief valves on containers) of this Chapter. If liquid fuel is present during installation of containers, the rate of discharge shall be the same as for aboveground containers. Such containers shall not be uncovered until emptied of liquid fuel.

13:52-14.5 Capacity of liquid containers

Individual liquid storage containers shall not exceed 30,000 gallons water capacity.

13:52-14.6 Installation of storage containers

(a) In general, each storage container to be installed shall comply with the following requirements:

1. Each storage container used exclusively in service station operation shall comply with the following table, which specifies minimum distances to a building, group of buildings, and adjoining property lines which may be built upon:

Water Capacity per Container	Minimum Distances*	
	Aboveground and Underground	Between Aboveground Containers
Up to 2,000 gallons	25 feet	3 feet
Over 2,000 gallons	50 feet	5 feet

* The above distances may be reduced to not less than ten feet from service station buildings of other than wood frame construction.

2. In heavily populated or congested areas, the authority having jurisdiction shall determine restrictions of individual tank capacity, total storage, and distance to line of adjoining property which may be built upon, and other reasonable protective methods.
3. Readily ignitable material including weeds and long dry grass, shall be removed within ten feet of containers.
4. The minimum separation between LP-gas containers and flammable liquid tanks or containers shall be 20 feet; the minimum separation between a container and the center line of the dike shall be ten feet.

5. LP-gas containers located near flammable liquid containers shall be protected against the flow of accumulation of flammable liquids by diking, diversion curbs, or grading.

6. LP-gas containers shall not be located within diked areas for flammable liquid containers.

7. Field welding is permitted only on saddle plates or brackets which were applied by the container manufacturer.

8. When permanently installed containers are interconnected, provision shall be made to compensate for expansion, contraction, vibration and settling of containers and interconnecting piping.

i. Where flexible connections are used, they shall be of an approved type and shall be designed for a bursting pressure of not less than five times the vapor pressure of the product at 100 degrees Fahrenheit.

ii. The use of nonmetallic hose is prohibited for interconnecting containers.

9. Where highwater table or flood conditions may be encountered, protection against container flotation shall be provided.

(b) Aboveground containers shall comply with the following requirements:

1. Containers may be installed horizontally or vertically.

2. Containers shall be protected by crash rails or guards to prevent physical damage unless they are protected by virtue of their location. Vehicles shall not be serviced within ten feet of containers.

3. Container foundations shall be of substantial masonry or other noncombustible material. Containers shall be mounted on saddles which shall permit expansion and contraction, and shall provide against the excessive concentration of stresses. Corrosion protection shall be provided for tank mounting area. Structural metal container supports shall be protected against fire in an approved manner. This protection is not required on prefabricated storage and pump assemblies, mounted on a common base, with container bottom not more than 24 inches above ground and whose water capacity is 2,000 gallons or less if the piping connected to the storage and pump assembly is sufficiently flexible to minimize the possibility of breakage or leakage in the event of failure of the container supports.¹

(c) Underground containers shall comply with the following requirements:

1. Containers shall be given a protective coating before being placed underground. This coating shall be equivalent to hot dip galvanizing or to two coatings of red lead followed by a heavy coating of coal tar or asphalt.

i. In lowering the container into place, care shall be exercised to minimize abrasion or other damage to the coating.

ii. Damage to the coating shall be repaired before backfillings.

2. Containers shall be set on a firm foundation (firm earth may be used) and surrounded with earth or sand firmly tamped in place. Backfill should be free of rocks or other abrasive materials.

3. A minimum of two feet of earth cover should be provided. Where ground conditions make compliance with this requirement impractical, equivalent protection against physical damage shall be provided.

i. The portion of the container to which manhole and other connections are attached need not be covered.

ii. If the location is subjected to vehicular traffic, containers shall be protected by a concrete slab or other cover adequate to prevent the weight of a loaded vehicle imposing concentrated direct loads on the container shell.

¹ The provisions of Section 8.9(f)3 (Installation of storage containers) does not apply.

13:52-14.7 Protection of container fittings

Valves, regulators, gauges, and other container fittings shall be protected against tampering and physical damage.¹

¹ The use of other than frangible shank-type locks is not desirable because it prevents access to gas controls in case of emergency.

13:52-14.8 Transport truck unloading point

(a) During unloading, the transport truck shall not be parked on public thoroughfares (see Section 6.17 (Tank car or transport truck unloading points and operations) of this Chapter) and shall be at least five feet from storage containers, and shall be positioned so that shutoff valves are readily accessible.

(b) The filling pipe inlet terminal shall not be located within a building nor within ten feet of any building or driveway. It shall be protected against physical damage.

13:52-14.9 Piping, valves and fittings

(a) Piping may be underground, aboveground, or a combination of both. It shall be well supported and protected against physical damage and corrosion.

(b) Piping laid beneath driveways shall be installed to prevent physical damage by vehicles.

(c) Piping shall be wrought iron or steel (black or galvanized), brass or copper pipe; or seamless copper, brass or steel tubing and shall be suitable for a minimum pressure of 250 p.s.i.g. (See Section 6.9(a) (Piping) of this Chapter).

1. Pipe joints may be screwed, flanged, brazed or welded.

2. The use of aluminum alloy piping or tubing is prohibited.

(d) All shutoff valves (liquid or gas) shall be suitable for liquefied petroleum gas service and designed for not less than the maximum pressure to which they may be subjected. Valves which may be subjected to container pressure shall have a rated working pressure of at least 250 p.s.i.g.

(e) All materials used for valve seats, packing, gaskets, diaphragms and similar items shall be resistant to the action of LP-gas.

(f) Fittings shall be steel, malleable iron or brass having a minimum working pressure of 250 p.s.i.g. Cast iron pipe fittings, such as ells, tees, and unions shall not be used.

(g) All piping shall be tested after assembly and proved free from leaks at not less than normal operating pressures.

(h) Provisions shall be made for expansion, contraction, jarring vibration and for settling. This may be accomplished by flexible connections.

13:52-14.10 Pumps and accessories

All pumps and accessory equipment shall be suitable for LP-gas service, and designed for not less than the maximum pressure to which they may be subjected. Accessories shall have a minimum rated working pressure of 250 p.s.i.g. Positive displacement pumps shall be equipped with suitable pressure actuated bypass valves permitting flow from pump discharge to storage container or pump suction.

13:52-14.11 Dispensing devices

(a) Meters, vapor separators, valves and fittings in the dispenser shall be suitable for LP-gas service and shall be designed for a minimum working pressure of 250 p.s.i.g.

(b) Pumps used to transfer LP-gas shall be equipped to allow control of the flow and to prevent leakage or accidental discharge. Means shall be provided outside the dispensing device to readily shut off the power in the event of fire or other accident.

(c) A manual shutoff valve and an excess flow check valve shall be installed downstream of the pump and ahead of the dispenser inlet.

(d) Dispensing hose shall comply with the following requirements:

1. Hose shall be resistant to the action of LP-gas in the liquid phase and designed for a minimum bursting pressure of 1,250 p.s.i.g.

2. An excess flow check valve or automatic shutoff valve shall be installed at the terminus of the liquid line at the point of attachment of the dispensing hose.

(e) Location of LP-gas dispensing devices shall comply with the following:

1. LP-gas dispensing devices shall be located not less than ten feet from aboveground storage containers greater than 2,000 gallons water capacity. The dispensing devices shall not be less than 20 feet from any building (not including canopies), basement, cellar, pit or line of adjoining property which may be built upon and not less than ten feet from sidewalks, streets, or thoroughfares. No drains or blow-off lines shall be directed into or in proximity to the sewer systems used for other purposes.

2. LP-gas dispensing devices shall be installed on a concrete foundation or as part of a complete storage and dispensing assembly mounted on a common base, and shall be adequately protected from physical damage.

3. LP-gas dispensing devices shall not be installed within a building except that they may be located under a weather shelter or canopy provided this area is not enclosed on more than two sides. If the enclosing sides are adjacent to each other, the area shall be properly ventilated.

(f) The dispensing of LP-gas into the fuel container of a vehicle shall be performed by a competent attendant who shall remain at the LP-gas dispenser during the entire transfer operation.

(g) Provision shall be made for venting LP-gas contained in a dispensing device to a safe location.¹

¹ One way of accomplishing this is to vent the LP-gas at the point of discharge of the storage tank safety relief valve.

13:52-14.12 Safety rules

(a) There shall be no smoking on the driveway of service stations in the dispensing areas or transport truck unloading areas:

1. Conspicuous signs prohibiting smoking shall be posted within sight of the customer being served;

2. Letters on such signs shall be not less than four inches high.

(b) The motors of all vehicles being fueled shall be shut off during the fueling operations.

13:52-14.13 Electrical

Electrical equipment and installation shall conform to the provisions of Sections 6.21 (Electrical equipment and other sources of ignition) and 6.22 (Fixed electrical equipment in classified areas) of this Chapter.

13:52-14.14 Fire protection

Each service station shall be provided with at least one portable fire extinguisher having at least an 8-B, C rating. Ratings shall be in accordance with the Standard for Installation, Maintenance and Use of Portable Fire Extinguishers, NFPA Number 10.