

TOWN OF ISLIP

OFFICE OF THE FIRE MARSHAL

MICHAEL CATALANO

CHIEF FIRE MARSHAL

**STUDY GUIDE FOR
LIQUEFIED PETROLEUM
GAS
CERTIFICATE OF
FITNESS**

The following information is provided to assist you in your preparation for the written and practical examinations. Upon successful completion of both examinations you will receive a certificate of fitness to dispense propane.

Written examinations are given every Thursday at 10:00a.m. at the Town of Islip Fire Marshal's office. There is a \$75.00 charge which entitles you to take 2 examinations, should you fail the first. If you fail the initial examination you must wait a minimum of **7 days**, from the initial examination, to take the second examination. If you fail the second examination you must wait a minimum of **6 months** to take an additional examination. There will be another \$75.00 charge for 2 additional examinations.

If observed dispensing propane without a valid certificate of fitness you will face fines not in excess of \$1,000.00 and / or a maximum of 15 days incarceration. If you utilize another individual's certificate of fitness you will face the above mentioned fine and that individual's certificate of fitness will be void. Neither individual's can not apply / re-apply for a propane written examination no sooner than one year from the violation date.

If you have additional questions please feel free to contact the Town of Islip Fire Marshal's Office at 631-224-5477.

NFPA 58

3.3.75.4 Waterbath (or Immersion-Type) Vaporizer. A vaporizer in which a vaporizing chamber, tubing, pipe coils, or other heat exchange surface containing liquid LP-Gas to be vaporized is immersed in a temperature-controlled bath of water, water-glycol combination, or other noncombustible heat transfer medium that is heated by an immersion heater not in contact with the LP-Gas heat exchange surface.

3.3.76 Vaporizing Burner (Self-Vaporizing Liquid Burner). A burner that also vaporizes liquid LP-Gas prior to burning it.

3.3.77 Vehicle Fuel Dispenser. A device or system designed to transfer and measure LP-Gas into engine fuel and mobile containers on vehicles.

3.3.78 Volumetric Loading. See 3.3.22.1, Volumetric Method Filling.

3.3.79 Water Capacity. The amount of water at 60°F (16°C) required to fill a container.

Chapter 4 General Requirements

4.1 Acceptance of Equipment and Systems.

4.1.1 Systems or components assembled to make up systems shall be approved as specified in Table 4.1.1.

4.1.2 Where necessary to alter or repair containers or container assemblies in the field, such changes shall be made using approved components.

Table 4.1.1 Containers

Containers Used	Capacity, Water		Approval Applies to ...
	gal	m ³	
Cylinders	<120	0.445	Container valves and connectors Manifold valve assemblies Regulators and pressure relief devices
ASME containers	≤2000	≤7.6	Container system* including regulator, or container assembly* and regulator separately
ASME containers	>2000	>7.6	Container valves Container excess-flow valves, backflow check valves, or alternate means of providing this protection such as remotely controlled internal valves Container gauging devices Regulators and container pressure relief devices

*Where necessary to alter or repair such systems or assemblies in the field in order to provide for different operating pressures, change from vapor to liquid withdrawal, or the like, such changes shall be permitted to be made by the use of approved components.

4.1.3 Acceptance applies to the complete system or to the individual components of which it is comprised as specified in Table 4.1.1.

4.2 LP-Gas Odorization.

4.2.1* All LP-Gases shall be odorized prior to delivery to a bulk plant by the addition of a warning agent of such character that the gases are detectable, by a distinct odor, to a concentration in air of not over one-fifth the lower limit of flammability.

4.2.2 Odorization shall not be required if it is harmful in the use or further processing of the LP-Gas or if such odorization will serve no useful purpose as a warning agent in such further use or processing.

4.2.3* If odorization is required, the presence of the odorant shall be determined by sniff-testing or other means, and the results shall be documented as follows:

- (1) When LP-Gas is delivered to a bulk plant
- (2) When shipments of LP-Gas bypass the bulk plant

4.3 Notification of Installations.

4.3.1 Stationary Installations. Plans for stationary installations utilizing storage containers of over 2000 gal (7.6 m³) individual water capacity, or with aggregate water capacity exceeding 4000 gal (15.1 m³), and all rooftop installations of ASME containers shall be submitted to the authority having jurisdiction by the person or company that either installs or contracts to have the containers installed before the installation is started. [See also 6.19.11.1(F).]

4.3.2 Temporary Installations. The authority having jurisdiction shall be notified of temporary (not to exceed 12 months) installations of the container sizes covered in 4.3.1 before the installation is started.

4.3.3 Notification of intent for transfer of LP-Gas directly from railcar to cargo tank shall be submitted to the authority having jurisdiction before the first transfer. The authority having jurisdiction shall have the authority to require inspection of the site or equipment for such transfer prior to the initial transfer.

* **4.4* Qualification of Personnel.** Persons who transfer liquid LP-Gas, who are employed to transport LP-Gas, or whose primary duties fall within the scope of this code shall be trained in proper handling procedures. Refresher training shall be provided at least every 3 years. The training shall be documented.

4.5* Ammonia Contamination.

4.5.1 LP-Gas stored or used in systems within the scope of this code shall contain less ammonia than the quantity required to turn the color of red litmus paper to blue.

4.5.2 The initial fill of LP-Gas in a transportation or storage system that has been converted from ammonia to LP-Gas service shall be tested for ammonia contamination prior to being used or transferred from that system.

4.6* Minimum Requirements. For any purpose or application addressed within the scope of this code, where the minimum requirements of the code are met, additional features or components of equipment not prohibited by the code shall be permitted to be used.

Chapter 5 LP-Gas Equipment and Appliances

5.1* Scope. This chapter applies to individual components and components shop-fabricated into subassemblies, container assemblies, and complete container systems.

5.2 Containers.

5.2.1 General.

5.2.1.1* Containers shall be designed, fabricated, tested, and marked (or stamped) in accordance with the regulations of the U.S. Department of Transportation (DOT); the ASME *Boiler and Pressure Vessel Code*, Section VIII, "Rules for the Construction of Unfired Pressure Vessels"; or the API-ASME *Code for Unfired Pressure Vessels for Petroleum Liquids and Gases*, except for UG-125 through UG-136.

(A) Adherence to applicable ASME Code case interpretations and addenda that have been adopted and published by ASME 180 calendar days prior to the effective date of this code shall be considered as compliant with the ASME Code.

(B) Containers fabricated to earlier editions of regulations, rules, or codes listed in 5.2.1.1 and of the Interstate Commerce Commission (ICC) *Rules for Construction of Unfired Pressure Vessels*, prior to April 1, 1967, shall be permitted to be continued to be used in accordance with Section 1.4.

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

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

(B) ASME or API-ASME containers shall be retested using the hydrostatic test procedure applicable at the time of the original fabrication.

(C) All container appurtenances shall be replaced.

(D) DOT 4E specification (aluminum) cylinders and composite cylinders involved in a fire shall be permanently removed from service.

5.2.1.3 ASME paragraph U-68 or U-69 containers shall be permitted to be continued in use, installed, reinstalled, or placed back into service. Installation of containers shall be in accordance with all provisions listed in this code. (See Section 5.2, Table 5.2.4.2 and Table 5.7.2.4(A), and Annex D.)

* **5.2.1.4** Containers that show excessive denting, bulging, gouging, or corrosion shall be removed from service.

5.2.1.5 Repairs or alteration of a container shall comply with the regulations, rules, or code under which the container was fabricated. Repairs or alteration to ASME containers shall be in accordance with the *National Board Inspection Code*.

5.2.1.6 Field welding shall be permitted only on saddle plates, lugs, pads, or brackets that are attached to the container by the container manufacturer.

5.2.1.7 Containers for general use shall not have individual water capacities greater than 120,000 gal (454 m³).

5.2.1.8 Containers in dispensing stations not located in LP-Gas bulk plants, industrial plants, or industrial applications shall have an aggregate water capacity not greater than 30,000 gal (114 m³).

5.2.1.9 Heating or cooling coils shall not be installed inside storage containers.

5.2.2 Cylinders.

5.2.2.1* Cylinders shall be continued in service and transported in accordance with DOT regulations.

* **5.2.2.2** A cylinder with an expired requalification date shall not be refilled until it is requalified by the methods prescribed in DOT regulations.

5.2.3 Cylinders Filled on Site. DOT cylinders in stationary service that are filled on site and therefore are not under the jurisdiction of DOT either shall be requalified in accordance with DOT requirements or shall be visually inspected within 12 years of the date of manufacture and within every 5 years thereafter, in accordance with 5.2.3.1 through 5.2.3.3.

5.2.3.1 Any cylinder that fails one or more of the criteria in 5.2.3.3 shall not be refilled or continued in service until the condition is corrected.

5.2.3.2 Personnel shall be trained and qualified to perform inspections. Training shall be documented in accordance with Section 4.4.

5.2.3.3 Visual inspection shall be performed in accordance with the following:

- (1) The cylinder is checked for exposure to fire, dents, cuts, digs, gouges, and corrosion according to CGA C-6, *Standard for Visual Inspection of Steel Compressed Gas Cylinders*, except that paragraph 4.2.1.1(1) of that standard (which requires tare weight verification) shall not be part of the required inspection criteria.
- (2) The cylinder protective collar (where utilized) and the foot ring are intact and are firmly attached.
- (3) The cylinder is painted or coated to minimize corrosion.
- (4) The cylinder pressure relief valve indicates no visible damage, corrosion of operating components, or obstructions.
- (5) There is no leakage from the cylinder or its appurtenances that is detectable without the use of instruments.
- (6) The cylinder is installed on a firm foundation and is not in contact with the soil.
- (7) A cylinder that passes the visual examination shall be marked with the month and year of the examination followed by the letter "E" (example: 10-01E, indicating requalification in October 2001 by the external inspection method).
- (8) The results of the visual inspection shall be documented, and a record of the inspection shall be retained for a 5-year period.

5.2.4 Container Service Pressure.

5.2.4.1 The service pressure of cylinders shall be in accordance with the appropriate regulations published under 49 CFR, "Transportation."

5.2.4.2 The maximum allowable working pressure (MAWP) for ASME containers shall be in accordance with Table 5.2.4.2.

5.2.4.3 In addition to the applicable provisions for horizontal ASME containers, vertical ASME containers over 125 gal (0.5 m³) water capacity shall comply with 5.2.4.3(A) through 5.2.4.3(E).

(A) Containers shall be designed to be self-supporting without the use of guy wires and shall be designed to withstand the wind, seismic (earthquake) forces, and hydrostatic test loads anticipated at the site.

(B) Maximum allowable working pressure (see Table 5.2.4.2) shall be the pressure at the top head with allowance made for increased pressure on lower shell sections and bottom head due to the static pressure of the product.

Table 5.2.4.2 Maximum Vapor Pressures and MAWP

Maximum Vapor Pressure in psig (MPag)		MAWP Pressure in psig (MPag)					
		Current ASME Code ^a		Earlier Codes			
				API-ASME		ASME ^b	
At 100°F	At 37.8°C	psig	MPag	psig	MPag	psig	MPag
80	0.6	100	0.7	100	0.7	80	0.6
100	0.7	125	0.9	125	0.9	100	0.7
125	0.9	156	1.1	156	1.1	125	0.9
150	1.0	187	1.3	187	1.3	150	1.0
175	1.2	219	1.5	219	1.5	175	1.2
215	1.5	250	1.7 ^c	250	1.7 ^c	200	1.4
215	1.5	312	2.2 ^c	312	2.2 ^c	—	—

Note: See Annex D for information on earlier ASME or API-ASME codes.

^aASME Code, 1949 edition, paragraphs U-200 and U-201 and all later editions (see D.2.1.5).

^bAll ASME codes up to the 1946 edition and paragraphs U-68 and U-69 of the 1949 edition (see D.2.1.5).

^cSee 6.23.3.1(A), 6.23.3.1(C), and 6.23.3.1(D) for required maximum allowable working pressure (MAWP) for ASME engine fuel and mobile containers.

(C) Wind loading on containers shall be based on wind pressures on the projected area at various height zones above ground in accordance with ASCE 7, *Minimum Design Loads for Buildings and Other Structures*. Wind speeds shall be based on a mean occurrence interval of 100 years.

(D) Seismic loading on containers shall be in accordance with ASCE 7, *Minimum Design Loads for Buildings and Other Structures*. A seismic analysis of the proposed installation shall be made that meets the approval of the authority having jurisdiction.

(E) Shop-fabricated containers shall be fabricated with lifting lugs or other means to lift the container.

5.2.4.4* ASME engine fuel and mobile containers shall have a MAWP of 312 psig (2.2 MPag) or higher.

5.2.4.5 Cylinders shall be designed and constructed for at least a 240 psig (1.6 MPag) service pressure.

5.2.5 ASME Container Openings.

5.2.5.1 ASME containers shall be equipped with openings for the service for which the container is to be used.

5.2.5.2 The openings required by 5.2.5.1 shall be located either in the shell, in the heads, or in a manhole cover.

5.2.5.3* ASME containers of more than 30 gal (0.1 m³) through 2000 gal (7.6 m³) water capacity that are designed to be filled volumetrically shall be equipped for filling into the vapor space.

5.2.5.4* ASME containers of 125 gal (0.5 m³) through 2000 gal (7.6 m³) water capacity shall be provided with an opening for an actuated liquid withdrawal excess-flow valve with a connection not smaller than ¼ in. national pipe thread.

5.2.5.5* ASME containers of more than 2000 gal (7.6 m³) water capacity shall have an opening for a pressure gauge.

5.2.5.6 ASME containers in storage or use shall have pressure relief valve connections that have direct communication with the vapor space of the container.

(A) If the pressure relief valve is located in a well inside the ASME container with piping to the vapor space, the design of the well and piping shall have a flow capacity equal to or greater than that of the pressure relief valve.

(B) If the pressure relief valve is located in a protecting enclosure, the enclosure shall be designed to minimize corrosion and to allow inspection.

(C) If the pressure relief valve is located in any position other than the uppermost point of the ASME container, the connection shall be internally piped to the uppermost point practical in the vapor space of the container.

5.2.5.7* ASME containers to be filled on a volumetric basis shall be fabricated so that they can be equipped with a fixed maximum liquid level gauge(s) that is capable of indicating the maximum permitted filling level(s) in accordance with 7.4.2.3.

5.2.6 Portable Container Appurtenance Physical Damage Protection.

*5.2.6.1 Cylinders of 1000 lb (454 kg) water capacity [nominal 420 lb (191 kg) propane capacity] or less shall incorporate protection against physical damage to cylinder appurtenances and immediate connections to such appurtenances when not in use by either of the following means:

- (1) A ventilated cap
- (2) A ventilated collar

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

populated or congested areas, the siting provisions of 6.3.1 and Table 6.3.1 shall be permitted to be modified as indicated by the fire safety analysis described in 6.25.3.

6.4.2 Aboveground multicontainer installations comprised of ASME containers having an individual water capacity of 12,000 gal (45 m³) or more and installed for use in a single location shall be limited to the number of containers in one group, with each group separated from the next group in accordance with the degree of fire protection provided in Table 6.4.2.

Table 6.4.2 Maximum Number of Containers in a Group and Their Separation Distances

Fire Protection Provided by	Maximum Number of Containers in One Group	Minimum Separation Between Groups	
		ft	m
Hose streams only (<i>see 6.4.2 and 6.25.3.1</i>)	6	50	15
Fixed monitor nozzles per 6.25.6.3	6	25	7.6
Fixed water spray per 6.25.3.1	9	25	7.6
Insulation per 6.25.5.1	9	25	7.6

6.4.3 Where the provisions of 6.26.3 and 6.26.4 are met, the minimum separation distance between groups of ASME containers protected by hose stream only shall be one-half the distances required in Table 6.4.2.

6.4.4 Underground or mounded ASME containers shall be located in accordance with 6.4.4.1 through 6.4.4.5.

6.4.4.1 They shall be located outside of any buildings.

6.4.4.2 Buildings shall not be constructed over any underground or mounded containers.

6.4.4.3 The sides of adjacent containers shall be separated in accordance with Table 6.3.1 but shall not be separated less than 3 ft (1 m).

6.4.4.4 Where containers are installed parallel with ends in line, the number of containers in one group shall not be limited.

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

6.4.5 Additional container installation requirements shall comply with 6.4.5.1 through 6.4.5.12, 6.4.6, and 6.4.7.

* **6.4.5.1** Containers shall not be stacked one above the other.

* **6.4.5.2** Loose or piled combustible material and weeds and long dry grass shall be separated from containers by a minimum of 10 ft (3 m).

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

6.4.5.4 LP-Gas containers shall be located at least 10 ft (3 m) from the centerline of the wall of diked areas containing flammable or combustible liquids.

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

6.4.5.6 The requirements of 6.4.5.5 shall not apply where LP-Gas containers of 125 gal (0.5 m³) or less water capacity are installed adjacent to fuel oil supply tanks of 660 gal (2.5 m³) or less capacity.

6.4.5.7 No horizontal separation shall be required between aboveground LP-Gas containers and underground tanks containing flammable or combustible liquids installed in accordance with NFPA 30, *Flammable and Combustible Liquids Code*.

6.4.5.8* The minimum separation between LP-Gas containers and oxygen or gaseous hydrogen containers shall be in accordance with Table 6.4.5.8.

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

6.4.5.10 The minimum separation between LP-Gas containers and liquefied hydrogen containers shall be in accordance with NFPA 55, *Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks*.

6.4.5.11 Where LP-Gas cylinders are to be stored or used in the same area with other compressed gases, the cylinders shall be marked to identify their content in accordance with ANSI/CGA C-7, *Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Containers*.

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

6.4.6* Refrigerated LP-Gas containers shall be located within an impoundment in accordance with Section 12.3.

6.4.7* Structures such as fire walls, fences, earth or concrete barriers, and other similar structures shall not be permitted around or over installed nonrefrigerated containers unless specifically allowed as follows:

- (1) Structures partially enclosing containers shall be permitted if designed in accordance with a sound fire protection analysis.
- (2) Structures used to prevent flammable or combustible liquid accumulation or flow shall be permitted in accordance with 6.4.5.3.
- (3) Structures between LP-Gas containers and gaseous hydrogen containers shall be permitted in accordance with 6.4.5.9.
- (4) Structures such as fences shall be permitted in accordance with 6.18.4.

6.5 Location of Transfer Operations.

6.5.1* Liquid shall be transferred into containers, including containers mounted on vehicles, only outdoors or in structures specially designed for that purpose.

6.24.3.14 An identified and accessible switch or circuit breaker shall be installed at a location not less than 20 ft (6.1 m) or more than 100 ft (30.5 m) from the dispensing device(s) to shut off the power in the event of a fire, accident, or other emergency.

6.24.3.15 The markings for the switches or breakers shall be visible at the point of liquid transfer.

6.24.4 Installation of Vehicle Fuel Dispensers.

6.24.4.1 Hoses shall comply with the following:

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

6.24.4.2 A listed emergency breakaway device complying with UL 567, *Standard Pipe Connectors for Flammable and Combustible Liquids and LP-Gas*, and designed to retain liquid on both sides of the breakaway point, or other devices affording equivalent protection approved by the authority having jurisdiction, shall be installed.

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

- (1) Conventional systems shall be at least 10 ft (3.0 m) from any dispensing device for Class I liquids.
- (2) Low-emission transfer systems in accordance with Section 6.26 shall be at least 5 ft (1.5 m) from any dispensing device for Class I liquids.

6.25 Fire Protection.

6.25.1 Application. Section 6.25 applies to fire protection for LP-Gas facilities.

6.25.2* Planning.

6.25.2.1 The planning for the response to incidents including the inadvertent release of LP-Gas, fire, or security breach shall be coordinated with local emergency response agencies.

6.25.2.2 Planning shall include consideration of the safety of emergency personnel, workers, and the public.

6.25.3* Protection of ASME Containers.

6.25.3.1 Fire protection shall be provided for installations with an aggregate water capacity of more than 4000 gal (15.1 m³) and for ASME containers on roofs.

6.25.3.2 The modes of fire protection shall be specified in a written fire safety analysis for new installations and for existing installations that have an aggregate water capacity of more than 4000 gal (15.1 m³) and for ASME containers on roofs. Existing installation shall comply with this requirement within 2 years of the effective date of this code.

6.25.3.3 The fire safety analysis shall be submitted by the owner, operator, or their designee to the authority having jurisdiction and local emergency responders.

6.25.3.4 The fire safety analysis shall be updated when the storage capacity or transfer system is modified.

6.25.3.5 The fire safety analysis shall be an evaluation of the total product control system, such as the emergency shutoff and internal valves equipped for remote closure and automatic shutoff using thermal (fire) actuation, pullaway protection where installed, and the optional requirements of Section 6.26.

6.25.3.6 If in the preparation for the fire safety analysis it is determined that a hazard to adjacent structures exists that exceeds the protection provided by the provisions of this code, special protection shall be provided in accordance with 6.25.5.

6.25.4 Other Protection Requirements.

6.25.4.1 Roadways or other means of access for emergency equipment, such as fire department apparatus, shall be provided.

***6.25.4.2** Each industrial plant, bulk plant, and distributing point shall be provided with at least one approved portable fire extinguisher having a minimum capacity of 18 lb (8.2 kg) of dry chemical with a B:C rating. Where fire extinguishers have more than one letter classification, they shall be considered to satisfy the requirements of each letter class.

6.25.4.3 LP-Gas fires shall not be extinguished until the source of the burning gas has been shut off.

***6.25.4.4** Emergency controls shall be conspicuously marked, and the controls shall be located so as to be readily accessible in emergencies.

6.25.5 Special Protection.

6.25.5.1* If insulation is used, it shall be capable of limiting the container temperature to not over 800°F (427°C) for a minimum of 50 minutes as determined by test with insulation applied to a steel plate and subjected to a test flame substantially over the area of the test plate.

6.25.5.2 The insulation system shall be inherently resistant to weathering and the action of hose streams.

6.25.5.3 If mounding is utilized, the provisions of 6.6.6.3 shall be required.

6.25.5.4 If burial is utilized, the provisions of 6.6.6.1 shall be required.

6.25.6 Water Spray Systems.

6.25.6.1 If water spray fixed systems and monitors are used, they shall comply with NFPA 15, *Standard for Water Spray Fixed Systems for Fire Protection*.

6.25.6.2 Where water spray fixed systems and monitors are used, they shall be automatically actuated by fire responsive devices and shall also have a capability for manual actuation.

6.25.6.3 Where monitor nozzles are used, they shall be located and arranged so that all container surfaces that can be exposed to fire shall be wetted.

6.26 Alternate Provisions for Installation of ASME Containers.

6.26.1 Scope. Section 6.26 applies to alternate provisions for the location and installation of ASME containers that incorporate the use of redundant fail-safe product control measures and low-emission transfer concepts for the purpose of enhancing safety and to mitigate distance and special protection requirements.

6.26.2 Spacing Requirements for Underground and Mounded ASME Containers.

6.26.2.1 Where all the provisions of Section 6.26 are complied with, the minimum distances from important buildings



* **7.2.1.1** Transfer operations shall be conducted by qualified personnel meeting the provisions of Section 4.4.

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

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

7.2.2 Filling and Evacuating of Containers.

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

7.2.2.2 When noncompliance with Section 5.2 and Section 5.7 is found, the container owner and user shall be notified in writing.

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

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

7.2.2.5* Valve outlets on cylinders of 108 lb (49 kg) water capacity [nominal 45 lb (20 kg) propane capacity] or less shall be equipped with a redundant pressure-tight seal or a listed quick-connect coupling. Where seals are used, they shall be in place whenever the cylinder is not connected for use.

7.2.2.6 Nonrefillable (disposable) and new unused cylinders shall not be required to be equipped with valve outlet seals.

7.2.2.7 Containers shall be filled only after determination that they comply with the design, fabrication, inspection, marking, and requalification provisions of this code.

7.2.2.8 "Single trip," "nonrefillable," or "disposable" cylinders shall not be refilled with LP-Gas.

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

- (1) The service pressure marked on the cylinder shall be not less than 80 percent of the vapor pressure of the LP-Gas for which the cylinder is designed at 130°F (54.4°C).
- (2) The maximum allowable working pressure for ASME containers shall be in accordance with Table 5.2.4.2.

7.2.2.10 Transfer of refrigerated product shall be made only into systems that are designed to accept refrigerated product.

7.2.2.11 A container shall not be filled if the container assembly does not meet the requirements for continued service.

7.2.2.12 Transfer hoses larger than ½ in. (12 mm) internal diameter shall not be used for making connections to individual cylinders being filled indoors.

7.2.3 Arrangement and Operation of Transfer Systems.

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

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

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

- (1) Engines of LP-Gas cargo tank vehicles constructed and operated in compliance with Chapter 9 while such engines are driving transfer pumps or compressors on these vehicles to load containers in accordance with 6.5.4
- (2) Engines installed in buildings as provided in Section 11.12

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

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

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

(E) Sources of ignition shall be turned off during the filling of any LP-Gas container on the vehicle.

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

7.2.3.4 The cargo tank vehicle shall not transfer LP-Gas into dispensing station storage while parked on a public way.

7.2.3.5 Transfers to containers serving agricultural or industrial equipment requiring refueling in the field shall comply with 7.2.3.5(A) and 7.2.3.5(B).

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

(B) Equipment employing open flames or equipment with integral containers shall be shut down while refueling.

7.2.3.6 During the time railroad tank cars are on sidings for loading or unloading, the following shall apply:

- (1) A caution sign, with wording such as "STOP. TANK CAR CONNECTED," shall be placed at the active end(s) of the siding while the car is connected, as required by DOT regulations.
- (2) Wheel chocks shall be placed to prevent movement of the car in either direction.

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

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

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

- (1) Transfer protection shall be provided in accordance with Section 6.12.
- (2) Ignition source control shall be in accordance with Section 6.22.
- (3) Control of ignition sources during transfer shall be provided in accordance with 7.2.3.2.
- (4) Fire extinguishers shall be provided in accordance with 6.25.4.2.
- (5) Transfer personnel shall meet the provisions of 7.2.1.
- (6) Cargo tank vehicles shall meet the requirements of 7.2.3.
- (7) The points of transfer shall be located in accordance with Table 6.5.3 with respect to exposures.
- (8) Provision for anchorage and breakaway shall be provided on the cargo tank vehicle side for transfer from a railroad tank car directly into a cargo tank vehicle.

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

- (1) Transfer between cargo tanks or cargo tank vehicles where one is used as a bulk plant shall be temporary installations that comply with 4.3.2, 6.18.1, 6.18.2, 6.18.4, 6.18.5, 6.18.6, and 7.2.3.1.
- (2) Arrangements and operations of the transfer system shall be in accordance with the following:
 - (a) The point of transfer shall be in accordance with Table 6.5.3.
 - (b) Sources of ignition within the transfer area shall be controlled during the transfer operation as specified in 7.2.3.2.
 - (c) Fire extinguishers shall be provided in accordance with 6.25.4.2.
- (3) Cargo tanks shall comply with the requirements of 7.2.2.7.
- (4) Provisions designed either to prevent a pull-away during a transfer operation or to stop the flow of products from both cargo tank vehicles or cargo tanks in the event of a pull-away shall be incorporated.
- (5) Off-truck remote shutoff devices that meet 49 CFR 173.315(n) requirements and are installed on the cargo tank vehicle unloading the product shall satisfy the requirements of 7.2.3.9(4).
- (6) Cargo tank vehicle LP-Gas transfers that are for the sole purpose of testing, maintaining, or repairing the cargo tank vehicle shall be exempt from the requirements of 7.2.3.9(1).

7.2.4 Hose Inspection.

7.2.4.1 Hose assemblies shall be observed for leakage or for damage that could impair their integrity before each use.

7.2.4.2 These hose assemblies shall be inspected at least annually.

7.2.4.3 Inspection of pressurized hose assemblies shall include the following:

- (1) Damage to outer cover that exposes reinforcement
- (2) Kinked or flattened hose
- (3) Soft spots or bulges in hose

- (4) Couplings that have slipped on the hose, are damaged, have missing parts, or have loose bolts
- (5) Leakage other than permeability leakage

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

7.2.4.5 Leaking or damaged hose shall be immediately repaired or removed from service.

7.3 Venting LP-Gas to the Atmosphere.

* **7.3.1 General.** LP-Gas in either liquid or vapor form shall not be vented to the atmosphere unless it is vented under the following conditions:

- (1) Venting of LP-Gas shall be permitted where the maximum flow from fixed liquid level, rotary, or slip tube gauges does not exceed that from a No. 54 drill orifice.
- * (2) Venting of LP-Gas between shutoff valves before disconnecting the liquid transfer line from the container shall be permitted.
- * (3) Venting of LP-Gas, where necessary, shall be permitted to be performed by the use of bleeder valves.
- (4) Venting of LP-Gas shall be permitted for the purposes described in 7.3.1(1) and 7.3.1(2) within structures designed for container filling in accordance with Chapter 10.
- (5) Venting of LP-Gas listed liquid transfer pumps using such vapor as a source of energy shall be permitted where the rate of discharge does not exceed the discharge from a No. 31 drill size orifice.
- (6) Venting of LP-Gas for purging in accordance with 7.3.2 shall be permitted.
- (7) Venting of LP-Gas shall be permitted for emergencies.
- (8) Venting of LP-Gas vapor utilized as the pressure source in remote shutdown systems for internal valves and emergency shutoff valves shall be permitted.

7.3.2 Purging.

7.3.2.1 Venting of gas from containers for purging or for other purposes shall be accomplished in accordance with 7.3.2.2 through 7.3.2.4.

7.3.2.2 Venting of cylinders indoors shall only occur in structures designed and constructed for cylinder filling in accordance with 6.5.1 and Chapter 10 and with 7.3.2.2(A) through 7.3.2.2(C).

(A) Piping shall be installed to convey the vented product outdoors at least 3 ft (1 m) above the highest point of any building within 25 ft (7.6 m).

(B) Only vapors shall be exhausted to the atmosphere.

(C) If a vent manifold is used to allow for the venting of more than one cylinder at a time, each connection to the vent manifold shall be equipped with a backflow check valve.

* **7.3.2.3** Venting of containers outdoors shall be performed under conditions that result in rapid dispersion of the product being released.

7.3.2.4 If conditions are such that venting into the atmosphere cannot be accomplished safely, LP-Gas shall be burned at least a distance of 25 ft (7.6 m) from combustibles.

7.3.2.5 Venting of containers and burning of LP-Gas from containers shall be attended.

Chapter 8 Storage of Cylinders Awaiting Use, Resale, or Exchange

8.1 Scope.

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

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

8.1.2 This chapter does not apply to new or unused cylinders.

8.1.3 This chapter does not apply to cylinders stored at bulk plants.

8.2 General Provisions.

8.2.1 General Location of Cylinders.

* 8.2.1.1 Cylinders in storage shall be located to minimize exposure to excessive temperature rises, physical damage, or tampering.

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

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

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

* 8.2.1.5 Cylinders shall not be stored on roofs.

8.2.2 Protection of Valves on Cylinders in Storage.

* 8.2.2.1 Cylinder valves shall be protected as required by 5.2.6.1 and 7.2.2.5.

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

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

8.3 Storage Within Buildings.

8.3.1 **General.** Storage of cylinders in buildings shall be in accordance with Table 8.3.1(a) or Table 8.3.1(b) or the requirements of Section 8.3.

8.3.2 Storage Within Buildings Frequented by the Public and in Residential Occupancies.

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

(A) Where the total quantity stored in a building exceeds 200 lb (91 kg), an approved sprinkler system that at a minimum meets the requirement of NFPA 13, *Standard for the Installation of Sprinkler Systems*, for Ordinary Hazard (Group 2) shall be installed.

(B) The sprinkler density shall be 0.300 gpm (1.1 L/min) over the most remote 2000 ft² (18.6 m²) area and 250 gpm (946 L/min) hose stream allowance.

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

8.3.2.3 Storage in restaurants and at food service locations of 10 oz (283 g) butane nonrefillable containers shall be limited to no more than twenty-four containers and an additional twenty-four 10 oz (283 g) butane nonrefillable containers stored in another location within the building where constructed with at least a 2-hour fire wall protection.

8.3.3 Storage Within Buildings Not Frequented by the Public.

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

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

8.3.3.3 Storage beyond the limitations described in 8.3.3.2 shall comply with 8.3.4.

8.3.3.4 Cylinders carried as part of the service equipment on highway mobile vehicles shall not be part of the total storage capacity requirements of 8.3.3.1, where such vehicles are stored in private garages and carry no more than three cylinders with a total aggregate capacity per vehicle not exceeding 100 lb (45.4 kg) of propane.

8.3.3.5 Cylinder valves shall be closed when not in use.

8.3.4 Storage Within Special Buildings or Rooms.

8.3.4.1 The maximum quantity of LP-Gas stored in special buildings or rooms shall be 10,000 lb (4540 kg).

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

8.3.4.3 The construction of all such special buildings and rooms shall comply with Chapter 10 and the following:

- (1) Vents to the outside only shall be provided at both the top and bottom of the building and shall be located at least 5 ft (1.5 m) from any building opening.
- (2) The entire area shall be classified for purposes of ignition source control in accordance with Section 6.22.

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

8.4 Storage Outside of Buildings.

8.4.1* Location of Storage Outside of Buildings.

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

Table 8.3.1(b) Maximum Allowable Storage Quantities of LP-Gas in Mercantile, Industrial, and Storage Occupancies

Occupancy	Mercantile	Industrial	Storage
Maximum Allowable Quantity: Storage (state units: lbs, gals, etc.)	200 lb (1 lb maximum/cylinder)	300 lb	300 lb
MAQ increases for: Total (including threshold) for cabinets	200 lb	300 lb	300 lb
Total (including threshold) for suppression	200 lb	300 lb	300 lb
Total (including threshold) for both cabinets and suppression	200 lb	300 lb	300 lb
Total (including threshold) for other (describe)		Additional 300 lb	10,000 lb
		300 ft separation	In special rooms or buildings per Chapter 10

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

Table 8.4.1.2 Distances from Cylinders in Storage and Exposures

Quantity of LP-Gas Stored		Horizontal Distance to ...					
		(1) and (2)		(3) and (4)		(5)	
lb	kg	ft	m	ft	m	ft	m
≤720	≤227	0	0	0	0	5	1.5
721 to 2500	227+ to 1134	0	0	10	3	10	3
2501 to 6000	1134+ to 2721	10	3	10	3	10	3
6001 to 10,000	2721+ to 4540	20	6.1	20	6.1	20	6.1
>10,000	>4540	25	7.6	25	7.6	25	7.6

8.4.1.4 Cylinders in the filling process shall not be considered to be in storage.

8.4.2 Protection of Cylinders.

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

- (1) An enclosure in accordance with 6.18.4.2
- (2) A lockable ventilated enclosure of metal exterior construction

* **8.4.2.2*** Protection against vehicle impact shall be provided in accordance with good engineering practice where vehicular traffic is expected at the location.

8.4.3 Alternate Location and Protection of Storage. Where the provisions of 8.4.1 and 8.4.2.1 are impractical at construction sites or at buildings or structures undergoing major renovation or repairs, alternative storage of cylinders shall be acceptable to the authority having jurisdiction.

8.5* Fire Protection.

* **8.5.1** Storage locations, where the aggregate quantity of propane stored is in excess of 720 lb (327 kg), shall be provided with at least one approved portable fire extinguisher having a minimum capacity of 18 lb (9.2 kg) dry chemical with B:C rating.

* **8.5.2** The required fire extinguisher shall be located no more than 50 ft (15 m) from the storage location. Where fire extinguishers have more than one letter classification, they can be considered to satisfy the requirements of each letter class.

Chapter 9 Vehicular Transportation of LP-Gas

9.1 Scope.

9.1.1 This chapter applies to containers, container appurtenances, piping, valves, equipment, and vehicles used in the transportation of LP-Gas, as follows:

- (1) Transportation of cylinders
- (2) Transportation in cargo tank vehicles, whether fabricated by mounting cargo tanks on conventional truck or trailer chassis or constructed as integral cargo units in which the container constitutes in whole, or in part, the stress member of the vehicle frame
- (3)*Transfer equipment and piping, and the protection of such equipment and the container appurtenances against overturn, collision, or other vehicular accidents

9.1.2 This chapter does not apply to the following:

- (1) Cylinders and related equipment incident to their use on vehicles as covered in Section 6.23 and Chapter 11
- (2) Vehicles and procedures under the jurisdiction of DOT
- (3) The transportation of LP-Gas containers on vehicles where the containers are used to fuel the vehicle or appliances located on the vehicle as covered in Section 6.23, Section 11.14, and Section 11.15
- (4)*LP-Gas systems used for engine fuel

9.2 Electrical Requirements. Only electrical lighting shall be used with the vehicles covered by this chapter. Wiring shall be insulated and protected from physical damage.

9.3 Transportation in Portable Containers.

9.3.1 Application. Section 9.3 shall apply to the vehicular transportation of portable containers filled with LP-Gas delivered as "packages," including containers built to DOT cylinder specifications and other portable containers.

9.3.2 Transportation of Cylinders.

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

9.3.2.2 Cylinders shall be constructed as provided in Section 5.2 and equipped in accordance with Section 5.7 for transportation as cylinders.

**NEW YORK STATE
FIRE CODE**

3804.2 Maximum capacity within established limits. Within the limits established by local law restricting the storage of liquefied petroleum gas for the protection of heavily populated or congested areas, the aggregate capacity of any one installation shall not exceed a water capacity of 2,000 gallons (7570 L).

Exception: In particular installations, this capacity limit shall be determined by the code enforcement official, after consideration of special features such as topographical conditions, nature of occupancy, and proximity to buildings, capacity of proposed containers, degree of fire protection to be provided and capabilities of the local fire department.

3804.3 Container location. Containers shall be located with respect to buildings, public ways, and lot lines of adjoining property that can be built upon, in accordance with Table

3804.3. LP-gas containers shall not be located on the roofs of buildings.

3804.3.1 Special hazards. Containers shall also be located with respect to special hazards such as above-ground flammable or combustible liquid tanks, oxygen or gaseous hydrogen containers, flooding or electric power lines as specified in NFPA 58, Section 6.4.5.

3804.4 Multiple container installation. Multiple container installations with a total water storage capacity of more than 180,000 gallons (681 300 L) [150,000-gallon (567 750 L) LP-gas capacity] shall be subdivided into groups containing not more than 180,000 gallons (681 300 L) in each group. Such groups shall be separated by a distance of not less than 50 feet

**TABLE 3804.3
LOCATION OF LP-GAS CONTAINERS**

CONTAINER CAPACITY (water gallons)	MINIMUM SEPARATION BETWEEN CONTAINERS AND BUILDINGS, PUBLIC WAYS OR LOT LINES OF ADJOINING PROPERTY THAT CAN BE BUILT UPON		MINIMUM SEPARATION BETWEEN CONTAINERS ^{b, c} (feet)
	Mounded or underground containers ^a (feet)	Above-ground containers ^d (feet)	
Less than 125 ^{c, d}	10	5 ^e	None
125 to 250	10	10	None
251 to 500	10	10	3
501 to 2,000	10	25 ^{e, f}	3
2,001 to 30,000	50	50	5
30,001 to 70,000	50	75	(0.25 of sum of diameters of adjacent containers)
70,001 to 90,000	50	100	
90,001 to 120,000	50	125	

For SI: 1 foot = 304.8 mm, 1 gallon = 3.785 L.

- a. Minimum distance for underground containers shall be measured from the pressure relief device and the filling or liquid-level gauge vent connection at the container, except that all parts of an underground container shall be 10 feet or more from a building or lot line of adjoining property which can be built upon.
- b. For other than installations in which the overhanging structure is 50 feet or more above the relief-valve discharge outlet. In applying the distance between buildings and ASME containers with a water capacity of 125 gallons or more, a minimum of 50 percent of this horizontal distance shall also apply to all portions of the building which project more than 5 feet from the building wall and which are higher than the relief valve discharge outlet. This horizontal distance shall be measured from a point determined by projecting the outside edge of such overhanging structure vertically downward to grade or other level upon which the container is installed. Distances to the building wall shall not be less than those prescribed in this table.
- c. When underground multicontainer installations are comprised of individual containers having a water capacity of 125 gallons or more, such containers shall be installed so as to provide access at their ends or sides to facilitate working with cranes or hoists.
- d. At a consumer site, if the aggregate water capacity of a multicontainer installation, comprised of individual containers having a water capacity of less than 125 gallons, is 500 gallons or more, the minimum distance shall comply with the appropriate portion of Table 3804.3, applying the aggregate capacity rather than the capacity per container. If more than one such installation is made, each installation shall be separated from other installations by at least 25 feet. Minimum distances between containers need not be applied.
- e. The following shall apply to above-ground containers installed alongside buildings:
 1. Containers of less than a 125-gallon water capacity are allowed next to the building they serve when in compliance with Items 2, 3 and 4.
 2. Department of Transportation (DOTn) specification containers shall be located and installed so that the discharge from the container pressure relief device is at least 3 feet horizontally from building openings below the level of such discharge and shall not be beneath buildings unless the space is well ventilated to the outside and is not enclosed for more than 50 percent of its perimeter. The discharge from container pressure relief devices shall be located not less than 5 feet from exterior sources of ignition, openings into direct-vent (sealed combustion system) appliances or mechanical ventilation air intakes.
 3. ASME containers of less than a 125-gallon water capacity shall be located and installed such that the discharge from pressure relief devices shall not terminate in or beneath buildings and shall be located at least 5 feet horizontally from building openings below the level of such discharge and not less than 5 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances, or mechanical ventilation air intakes.
 4. The filling connection and the vent from liquid-level gauges on either DOTn or ASME containers filled at the point of installation shall not be less than 10 feet from exterior sources of ignition, openings into direct vent (sealed combustion system) appliances or mechanical ventilation air intakes.
- f. This distance is allowed to be reduced to not less than 10 feet for a single container of 1,200-gallon water capacity or less, provided such container is at least 25 feet from other LP-gas containers of more than 125-gallon water capacity.

(15 240 mm), unless the containers are protected in accordance with one of the following:

1. Mounded in an approved manner.
2. Protected with approved insulation on areas that are subject to impingement of ignited gas from pipelines or other leakage.
3. Protected by firewalls of approved construction.
4. Protected by an approved system for application of water as specified in NFPA 58, Table 6.4.2.
5. Protected by other approved means.

Where one of these forms of protection is provided, the separation shall not be less than 25 feet (7620 mm) between container groups.

SECTION 3805 PROHIBITED USE OF LP-GAS

3805.1 Unapproved equipment. Liquefied petroleum gas shall not be used for the purpose of operating devices or equipment unless such device or equipment is approved for use with LP-gas.

3805.2 Release to the atmosphere. Liquefied petroleum gas shall not be released to the atmosphere, except through an approved liquid-level gauge or other approved device.

3805.3 Balconies. LP-gas containers with a water capacity greater than 2.5 pounds (1.14 kg) shall not be stored on balconies. LP-gas burners having an LP-gas container with a water capacity greater than 2.5 pounds (1.14 kg) shall not be located on balconies or within 10 feet (3048 mm) of combustible construction.

Exception: One-and two-family dwellings.

SECTION 3806 DISPENSING AND OVERFILLING

* **3806.1 Attendants.** Dispensing of LP-gas shall be performed by a qualified attendant.

* **3806.2 Overfilling.** Liquefied petroleum gas containers shall not be filled or maintained with LP-gas in excess of either the volume determined using the fixed liquid-level gauge installed by the manufacturer, or the weight determined by the required percentage of the water capacity marked on the container.

3806.3 Dispensing locations. The point of transfer of LP-gas from one container to another shall be separated from exposures as specified in NFPA 58.

SECTION 3807 SAFETY PRECAUTIONS AND DEVICES

3807.1 Safety devices. Safety devices on LP gas containers, equipment and systems shall not be tampered with or made ineffective.

* **3807.2 Smoking and other sources of ignition.** "No Smoking" signs complying with Section 310 shall be posted when required by the code enforcement official. Smoking within 25 feet (7620 mm) of a point of transfer, while filling op-

erations are in progress at containers or vehicles, shall be prohibited.

Control of other sources of ignition shall comply with Chapter 3 and NFPA 58, Section 6.20.

* **3807.3 Clearance to combustibles.** Weeds, grass, brush, trash and other combustible materials shall be kept a minimum of 10 feet (3048 mm) from LP-gas tanks or containers.

* **3807.4 Protecting containers from vehicles.** Where exposed to vehicular damage due to proximity to alleys, driveways or parking areas, LP-gas containers, regulators and piping shall be protected in accordance with Section 6.23.

SECTION 3808 FIRE PROTECTION

3808.1 General. Fire protection shall be provided for installations having storage containers with a water capacity of more than 4,000 gallons (15 140 L), as required by Section 3-10 of NFPA 58.

3808.2 Fire extinguishers. Fire extinguishers complying with Section 906 shall be provided as specified in NFPA 58.

SECTION 3809 STORAGE OF PORTABLE LP-GAS CONTAINERS AWAITING USE OR RESALE

3809.1 General. Storage of portable containers of 1,000 pounds (454 kg) or less, whether filled, partially filled or empty, at consumer sites or distributing points, and for resale by dealers or resellers shall comply with Sections 3809.2 through 3809.15.

Exceptions:

1. Containers that have not previously been in LP-gas service.
2. Containers at distributing plants.
3. Containers at consumer sites or distributing points, which are connected for use.

* **3809.2 Exposure hazards.** Containers in storage shall be located in a manner which minimizes exposure to excessive temperature rise, physical damage or tampering.

* **3809.3 Position.** Containers in storage having individual water capacity greater than 2.5 pounds (1 kg) [nominal 1-pound (0.454 kg) LP-gas capacity] shall be positioned with the pressure relief valve in direct communication with the vapor space of the container.

3809.4 Separation from means of egress. Containers stored in buildings in accordance with Sections 3809.9 and 3809.11 shall not be located near exit access doors, exits, stairways, or in areas normally used, or intended to be used, as a means of egress.

3809.5 Quantity. Empty containers that have been in LP-gas service shall be considered as full containers for the purpose of determining the maximum quantities of LP-gas allowed in Sections 3809.9 and 3809.11.

* **3809.6 Storage on roofs.** Containers shall not be stored on roofs.

3809.7 Storage in basement, pit or similar location. Liquefied petroleum gas containers shall not be stored in a basement, pit or similar location where heavier-than-air gas might collect.

* **3809.8 Protection of valves on containers in storage.** Container valves shall be protected by screw-on-type caps or collars which shall be securely in place on all containers stored regardless of whether they are full, partially full or empty. Container outlet valves shall be closed or plugged.

3809.9 Storage within buildings. Department of Transportation (DOTn) specification cylinders with maximum water capacity of 2.5 pounds (1 kg) used in completely self-contained hand torches and similar applications are allowed to be stored or displayed in a building. The quantity of LP-gas shall not exceed 200 pounds (91 kg) except as provided in Section 3809.11.

■ **3809.10 Reserved.**

3809.11 Storage within rooms used for gas manufacturing. Storage within buildings or rooms used for gas manufacturing, gas storage, gas-air mixing and vaporization, and compressors not associated with liquid transfer shall comply with Sections 3809.11.1 and 3809.11.2.

3809.11.1 Quantity limits. The maximum quantity of LP-gas shall be 10,000 pounds (4540 kg).

3809.11.2 Construction. The construction of such buildings and rooms shall comply with requirements for Group H occupancies in the *Building Code of New York State*; NFPA 58, Chapter 10; and both of the following:

1. Adequate vents shall be provided to the outside at both top and bottom, located at least 5 feet (1524 mm) from building openings.
2. The entire area shall be classified for the purposes of ignition source control in accordance with NFPA 58, Section 6.20.

* **3809.12 Location of storage outside of buildings.** Storage outside of buildings, for containers awaiting use, resale or part of a cylinder exchange program shall be located not less than 20 feet (6096 mm) from openings into buildings, 20 feet (6096 mm) from any motor vehicle fuel dispenser and 10 feet (3048 mm) from any combustible material and in accordance with Table 3809.12.

**TABLE 3809.12
LOCATION OF CONTAINERS AWAITING USE OR RESALE
STORED OUTSIDE OF BUILDINGS**

QUANTITY OF LP-GAS STORED	DISTANCES TO A BUILDING OR GROUP OF BUILDINGS, PUBLIC WAY OR LOT LINE OF PROPERTY THAT CAN BE BUILT UPON (feet)
500 pounds or less	0
501 to 2,500 pounds	10 ^a
2,501 to 6,000 pounds	15
6,001 to 10,000 pounds	20
Over 10,000 pounds	25

For SI: 1 foot = 304.8 mm, 1 pound = 0.454 kg.

a. Containers are allowed to be located a lesser distance.

* **3809.13 Protection of containers.** Containers shall be stored within a suitable enclosure or otherwise protected against tampering. Vehicular protection shall be provided as required by the code enforcement official.

* **3809.14 Separation from means of egress for containers located outside of buildings.** Containers located outside of buildings shall not be located within 20 feet (6096 mm) of any exit access doors, exits, stairways or in areas normally used, or intended to be used, as a means of egress.

3809.15 Alternative location and protection of storage. Where the provisions of Sections 3809.12 and 3809.13 are impractical at construction sites, or at buildings or structures undergoing major renovation or repairs, the storage of containers shall be as required by the code enforcement official.

**SECTION 3810
CONTAINERS NOT IN SERVICE**

3810.1 Temporarily out of service. Containers whose use has been temporarily discontinued shall comply with all of the following:

1. Be disconnected from appliance piping.
2. Have container outlets, except relief valves, closed or plugged.
3. Be positioned with the relief valve in direct communication with container vapor space.

3810.2 Permanently out of service. Containers to be placed permanently out of service shall be removed from the site.

**TOWN OF ISLIP
CODE**

*(14) Certificate of fitness and LPG. Any person who performs the transfer of liquid propane gas (LPG) within the jurisdiction of the Town of Islip shall first obtain a certificate of fitness from the Town of Islip Fire Marshal's office. **[Added 5-28-2008]**

- (a) Each person wishing to obtain a certificate of fitness shall submit the required application and fee as set by the Division of Code Enforcement and shall pass a written examination and practical test.
- (b) Any person transferring and/or dispensing LPG shall provide, upon the request of a Code Enforcement Official, a current certificate of fitness and, if unable to provide same, may be punishable by the provisions of this Code.
- (c) No person shall knowingly discharge LPG into the atmosphere without first notifying the Town of Islip Fire Marshal's office and without using an approved method or device.

§ 68-30.1. Energy Star requirements. [Added 4-29-2008]

- A. Legislative intent. It is the intent of the Town to protect the public health, safety, and welfare of its residents by mandating that new dwellings shall comply with the Long Island Power Authority New York Energy Star Labeled Homes Program guidelines, as they may be applicable. This will ensure that the dwelling(s) will use less energy than if built to prevailing building standards. Compliance with the Long Island Power Authority New York Energy Star Labeled Homes program guidelines as outlined in this section shall be required in addition to compliance with all other applicable requirements. It is further intended that the minimum standards of the current New York State Energy Conservation Construction Code must be met. In the event of a conflict, the codes of New York State will have preference.

**PROPANE
INDUSTRY
PUBLICATION**

DISPENSING PROPANE SAFELY

PROPANE

SEEKING
PROFITS



SEEKING
PROFITS



SEEKING
PROFITS

SEEKING
PROFITS

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INTRODUCTION

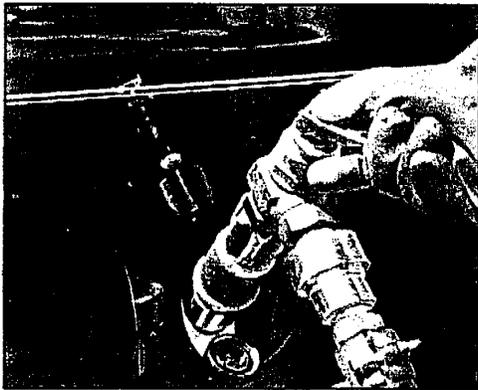
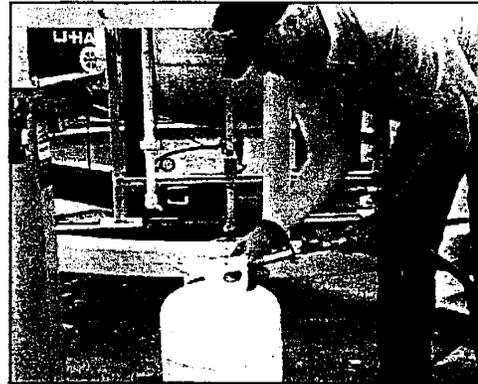


Dispensing stations offer a convenient fueling source for residential, recreational and business users of propane and are often a good source of revenue and increased traffic for the retailer.

To assure the safety of both propane users and dispensing station employees, operators must be thoroughly and properly trained to follow correct filling procedures.

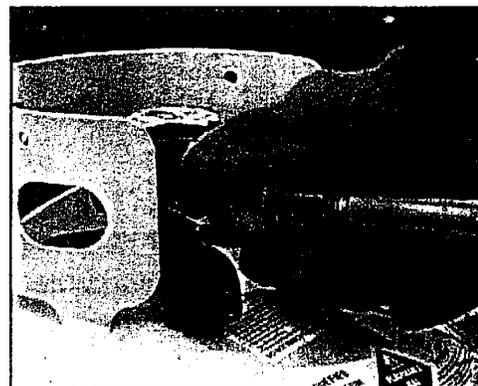
The purpose of this manual is to help train personnel who transfer propane from dispensing equipment to both DOT cylinders and ASME motor fuel containers.

Whether you work at a bulk plant cylinder dock, industrial location, hardware store, gasoline station, campground, or rental equipment company, you'll learn important information that can help make your job easier and safer.



In addition to being a good safety practice, thorough training is required by national codes such as NFPA 58, the *LP-Gas Code*, which requires that "persons who transfer liquid LP-Gas...shall be trained in proper handling and operating procedures"...and that "the training shall be documented."

So please read this manual carefully and review it often. It has been written especially for you!



2.0 PROPANE PROPERTIES AND CHARACTERISTICS

Propane is a clean-burning, portable fuel used in a variety of applications by both consumers and industrial and commercial businesses. The first step to safe dispensing of propane is becoming familiar with its properties and characteristics.

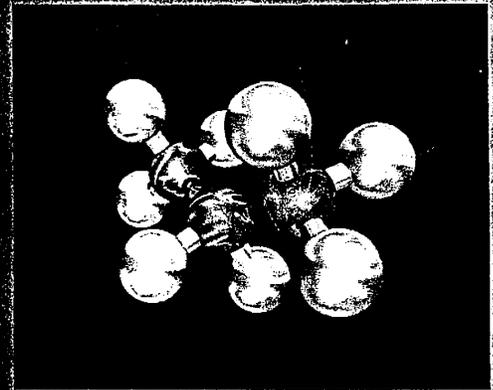
Propane is a member of the *hydrocarbon family* commonly referred to as liquefied petroleum gas, or LP-Gas. Butane is another LP-Gas in this group. These gases are normally found in pockets underground. They may be mixed in crude oil or in wet gas.

Propane can be either a liquid or a gas. In order to store propane as a liquid above its normal boiling point (-44 degrees F), it must be stored and transported in pressure-tight containers. Propane liquid stored in containers at ambient temperatures will begin to boil off and pressurize the vapor space of the container. This vapor is what is used in customer *appliances, equipment and vehicles*.

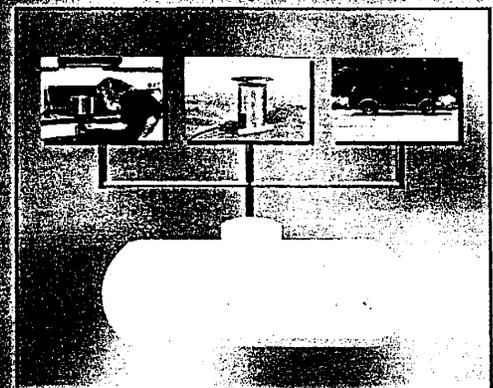
Storing and transporting propane as a liquid is what makes propane a *portable, versatile fuel*.

In its natural state, propane is colorless and odorless. To increase the likelihood that a propane leak can be detected, ethyl mercaptan, a sulfur-based compound is added to the gas at the time of production. Always be sensitive to the slightest gas smell and learn to recognize the odor of propane. Under certain conditions, the chemical odorant that gives propane its distinctive smell can fade or diminish in intensity. Some persons may have difficulty detecting this odorant.

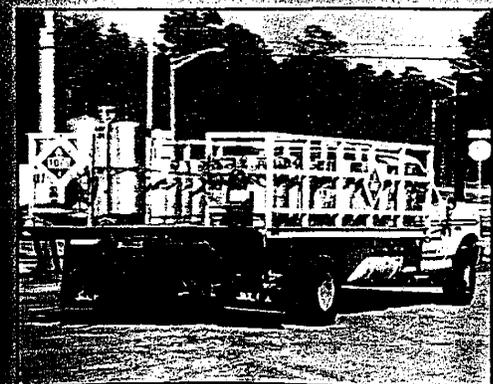
Colds, allergies, sinus congestion, cooking odors, certain medications, age, prolonged exposure to the odor of propane, damp or musty smells and the use of tobacco, alcohol or drugs may



hydrocarbon family



appliances, equipment and vehicles



portable, versatile fuel

diminish your ability to detect the odorant. If for any reason you are unable to *smell odorized propane*, notify your supervisor immediately. Your safety may depend on your ability to smell leaking propane.

Liquid propane, like water, will expand when heat is added to it. Propane, however, will expand considerably more than water over the same change in temperature. Propane liquid will increase in volume nearly 17 times greater than water over the same temperature increase. To allow for this expansion, propane containers are typically filled to only *80% of their capacity*.

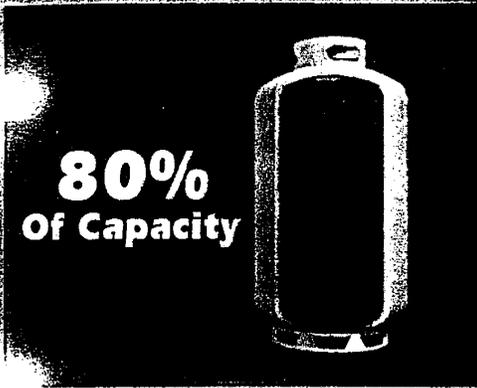
If propane liquid is released into the air, it quickly vaporizes, expanding 270 times its original volume. Therefore, liquid propane leaks can be more hazardous than vapor leaks. Liquid propane will also rapidly vaporize in air, causing a refrigerating effect that makes everything it touches extremely cold. If it comes in contact with skin, it will cause *freeze burns* because it extracts heat from the skin when it vaporizes. Propane liquid can cause third degree or deep skin burns. For this reason, gloves or other personal protective equipment resistant to propane should be worn when filling containers.

Propane is non-toxic, but if released in a confined space, will displace air. Therefore, avoid inhaling propane. Propane vapor is 1½ times heavier than air. If released into still air, it may settle in low-lying areas. However, if there is any air movement, the vapor will quickly dissipate in the air.

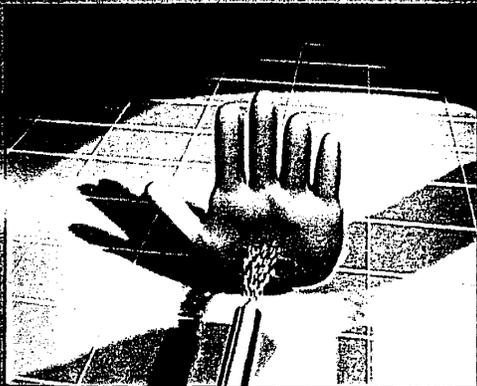
Every release or leak creates the potential for a hazardous situation. The *proper mixture* of propane vapor, air and a source of ignition causes propane to burn. Though propane can burn in concentrations from 2.15 to 9.6 percent in air, the ideal combustion range is 1 part propane to 24 parts air.



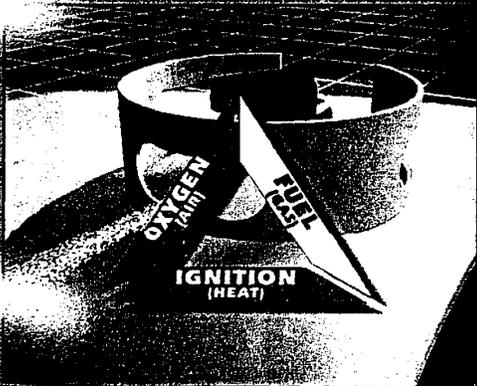
smell odorized propane



80% of their capacity



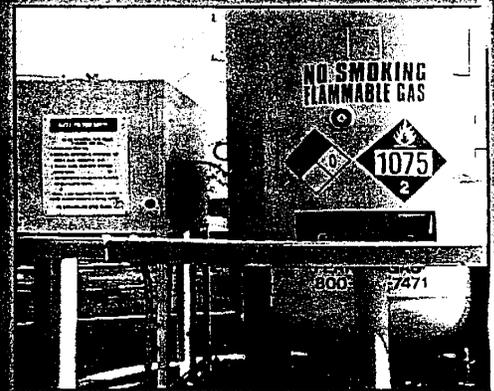
freeze burns



proper mixture

For this reason, the dispensing station is a *restricted area*. There must be no sources of ignition, such as from smoking or open flames within 25 feet of the filling connection and no running vehicles. An open flame or other source of ignition should never be used to check for a propane leak.

In addition to the material provided in this manual, more information is available from the Material Safety Data Sheet (MSDS) in the appendix.



restricted area

3.0 PROPANE CONTAINERS

In addition to understanding propane's properties, you'll need to become familiar with the *containers* that you will be filling. One of the most important principles is the fact that only containers designed and approved for propane storage must be filled by the dispenser operator. These containers are manufactured with special equipment and appurtenances that enable them to safely hold propane.

All propane containers are equipped with at least one *spring-loaded pressure relief valve*, designed to open when the pressure inside the container reaches its set level. It resets automatically after the excess pressure is released. High temperatures (which cause the liquid to expand) and overfilling are two reasons why relief valves may open. When a relief valve opens, it discharges flammable propane into the air.

3.1 DOT/ICC CYLINDERS

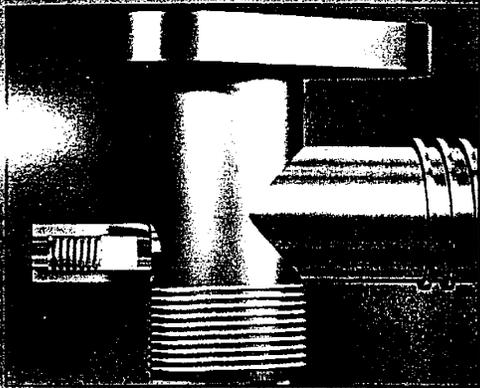
DOT (U.S. Department of Transportation) / ICC (Interstate Commerce Commission) cylinders are generally portable and are used on gas grills, camping equipment, or industrial lift trucks. They may also be used at construction sites or in other industrial applications.

Cylinders attached to recreational vehicles (RV's) are normally removed for filling. Note that some propane containers mounted on recreational vehicles or other vehicles are ASME tanks, which are not to be removed for filling. Filling of permanently mounted ASME tanks is addressed later in the manual.

Cylinders are carefully designed to promote their safe use. They have a foot ring to keep them upright and most have a welded collar to protect the cylinder service valve from damage. Some cylinders have a steel collar that screws onto the cylinder to provide service valve protection. This



containers



spring-loaded pressure relief valve



DOT/ICC cylinders

collar should be in place at all times during transfer and storage. Exchange cylinders may have a protective cap rather than a collar.

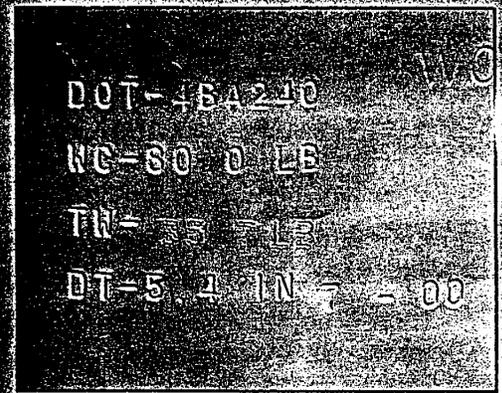
On the protective collar, or stamped on the head of the cylinder itself, are a number of *markings*. This identifies the cylinder more precisely and provides information that is used for refilling.

Cylinders are equipped with a combination cylinder service valve, which is normally used to fill the cylinder and to withdraw propane for operating appliances. This will be one of two types: a liquid cylinder valve used to take liquid propane out of the cylinder and a vapor service valve used to take vapor out of the cylinder.

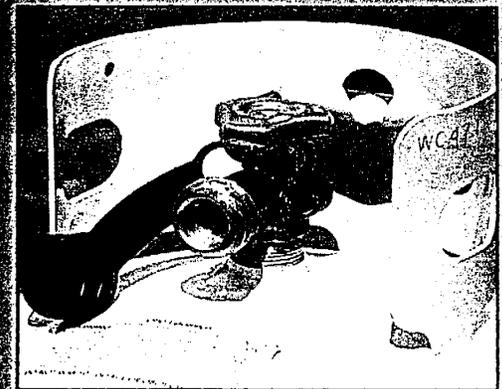
There are three different types of vapor service valves: a POL, which has only internal threads inside of the valve outlet and is a left-hand thread; a quick-closing coupling, also known as a *Type 1*, which has right-handed threads on the outside as well as the left-hand thread inside the valve outlet; and a quick disconnect, also known as a *Type 2*, which contains all the safety features as the quick closing coupling but contains a quick disconnect fitting to the appliance connection. The cylinder fill nozzle will screw into the cylinder service valve outlet on all three types of valves.

To help prevent overfilling of cylinders, NFPA 58 (LP-Gas Code) requires all newly manufactured, refurbished or requalified cylinders with a propane capacity of 4 pounds up to 40 pounds to be equipped with an *OPD*, an *overfilling prevention device*.

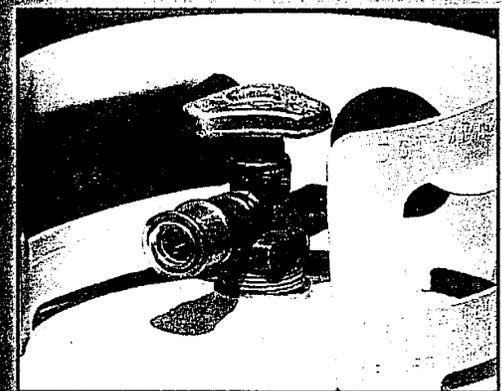
An OPD is a secondary means of assuring that cylinders are not overfilled, but must not be used as a method for determining the proper amount of propane in the cylinder. OPD-equipped cylinders can be identified by either warning labels or the unique valve hand wheel, a



markings



Type 1



Type 2



overfilling prevention device (OPD)

50 PROANE CONTAINERS

modified triangle. The OPD marking is distinctively molded into the hand wheel and valve body.

The exception for requiring an OPD includes cylinders in industrial truck service, including forklift truck cylinders and cylinders identified and used for industrial welding and cutting gases. Cylinders required to have an overfilling prevention device, an OPD, must also be equipped with either a Type 1 or Type 2 connection, as well as a fixed maximum liquid level gauge, prior to being refilled.

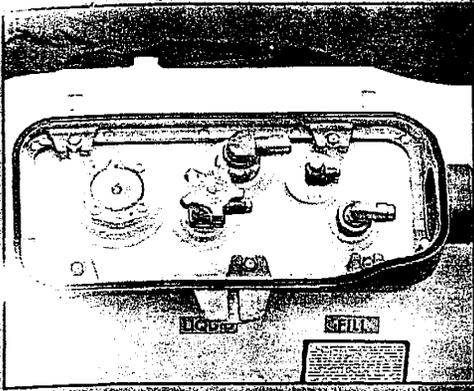
3.2 ASME TANKS

In addition to filling portable DOT cylinders, you may also be required to fill *ASME tanks*, which are usually permanently mounted on a vehicle. These are manufactured to ASME (American Society of Mechanical Engineers) specifications.

The tank on a propane-fueled vehicle has a system of valves and safety features used to safely fill a motor vehicle tank. The *liquid filler valve* is installed at the point where propane will enter the tank during the filling process. It is a double back-check valve, allowing propane to be pumped into the tank but not be removed. It also has a gasket or "o" ring that provides a leak proof seal between the liquid filler valve and filler nozzle.

The *fixed maximum liquid level gauge* is opened to measure when a safe fill level is reached. When the valve is opened during the filling procedure, it will emit propane vapor. Once the liquid propane reaches the 80% level in the tank, the valve emits a steady white fog of liquid propane.

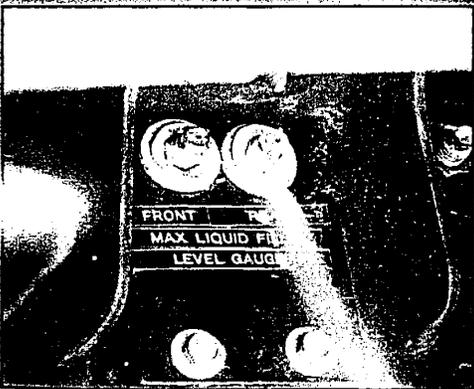
Many propane motor fuel and RV tanks are equipped with an *automatic stop fill valve* inside the tank that prevents overfilling of the vehicle tank. As the tank is being filled, the valve's float



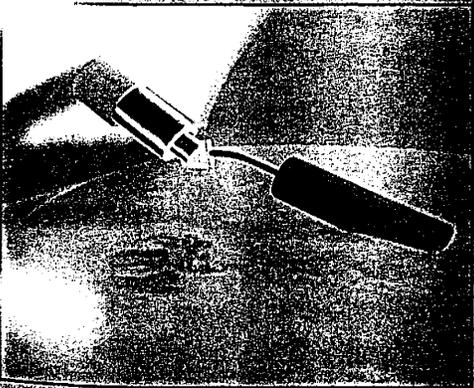
ASME tanks



liquid filler valve



fixed maximum liquid level gauge

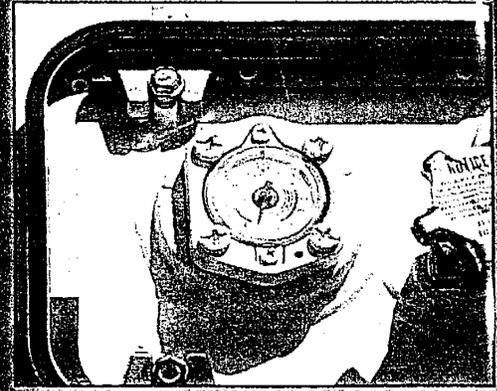


automatic stop fill valve

arm rises with the liquid level and closes off the filler valve when the tank is 80% full. The *float gauge* shows approximately how much propane is in the tank. It must not be used as a measuring device while filling a tank. Only the fixed maximum liquid level gauge or automatic stop fill valve can give an accurate indication of when the 80% level has been achieved.

Each ASME tank is also equipped with a *pressure relief valve*. If the pressure in the tank exceeds the setting of the relief valve, it will open, release the excess pressure and close again once the pressure inside the tank is less than the relief valve setting.

Motor vehicle tanks on motor homes or catering trucks usually have a propane vapor withdrawal valve that supplies propane to the appliances on board the vehicle. These appliances may be equipped with continuously operating pilot lights.



float gauge



pressure relief valve

4.0 FILLING PLANT/DISPENSING STATION EQUIPMENT

The filling plant or dispensing station is supplied with equipment designed to store and transfer liquid propane to cylinders and tanks.

A pump operated by an *electric motor* is used to transfer liquid propane from the storage tank, through the hose to the filling nozzle used to fill the propane cylinder or vehicle tank.

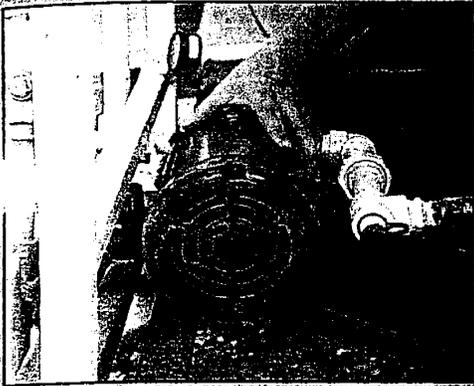
Prior to operating a dispenser, a *routine visual inspection* should be performed to assure that it is safe for use. This inspection will help find problems that could cause injury. In many cases, it is too late to correct problems once the filling process begins. The following are a few important inspection items:

- Ignition sources within 25 feet of the point of transfer
- Signs of propane leaks
- Flexible *transfer hose* (maximum length 18 feet)
- Fittings and adapters
- Scale (for accuracy) with test weights
- Valves and switches
- 18 lb. minimum dry chemical, B:C rated fire extinguisher
- Pipes, wires, brackets and valves
- Trash, debris and other combustibles; remove if found

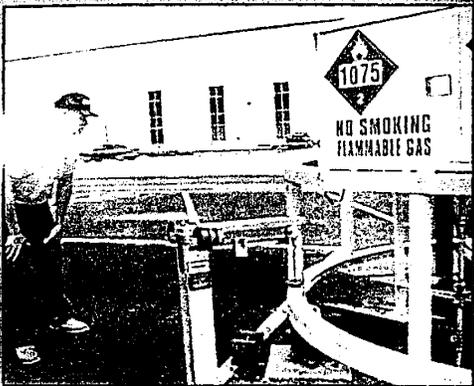
If any of these items are discovered, either correct them immediately or have them corrected before operating the equipment.

4.1 CYLINDER FILLING EQUIPMENT

DOT cylinders are typically filled by weight, though some may be filled by volume. Check state laws to determine if a cylinder can be filled by volume.



electric motor



routine visual inspection



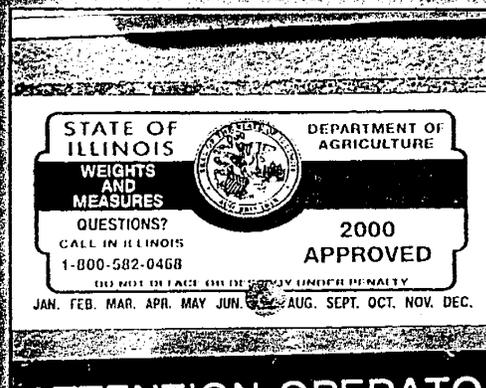
transfer hose

When filled by weight, a *scale* is used to measure the amount of liquid propane put into the cylinder. Scales should be checked regularly for accuracy. It is important that the customer is given a true measure of the propane put into the cylinder.

It is a violation of *Weights and Measures laws* if the customer is not provided with a true measure of the amount of propane put into the cylinder. If the measure is not accurate, both the attendant and the employer can be fined.



scale



Weights and Measures laws

5.0 FILLING PROPANE CYLINDERS

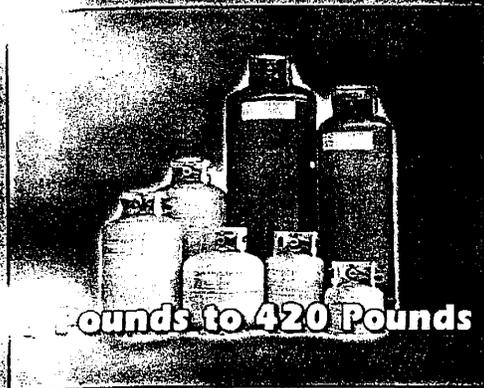
Refillable *DOT cylinders* range in size from 5 pounds to 420 pounds propane capacity. The size designation means the amount of propane that the cylinder can safely contain when filled.

The cylinder will be stamped to indicate its *water capacity*. There is generally a number stating the water capacity in pounds indicated by a "WC." All propane cylinders can be filled with propane to 42% of the stamped water capacity. The formula for calculating propane from water capacity is: $.42 \times \text{water capacity pounds} = \text{propane capacity in pounds}$. Charts or decals which convert water capacity to pounds of propane are available and can be attached to the dispenser cabinet area.

Another stamping found on every propane cylinder is "TW" or "T" followed by a number. This number indicates the *tare weight* of the cylinder. Tare weight is the weight of the cylinder (including the cylinder valve) when empty. Note that cylinders of the same size may have different tare weights. The tare weight is needed to set the scale to the proper total weight of the cylinder when filled. The proper filled weight = Tare weight plus 42% of WC.

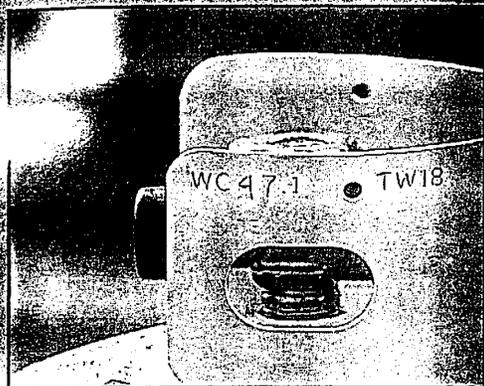
Cylinders legally permitted to be filled by volume must be filled using the *fixed maximum liquid level gauge*, also called an "outage gauge" or "bleeder valve". Magnetic float gauges must not be used to determine the fill level of a cylinder. When filling volumetrically, the hose end valve must be shut off immediately when liquid propane (white fog) exits the fixed maximum liquid level gauge, which indicates the propane level has reached its maximum volume.

Some states require cylinders offered for resale to be filled using a liquid meter. If using one, fill the cylinder by volume and then charge the



5 Pounds to 420 Pounds

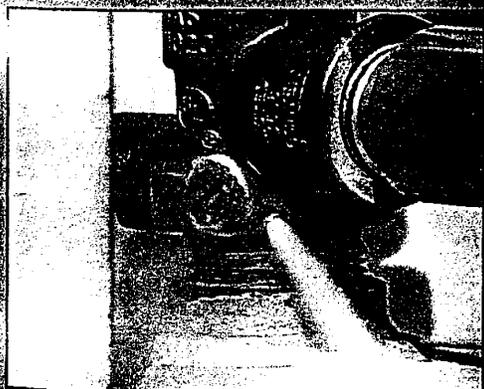
DOT cylinders



water capacity



tare weight



fixed maximum liquid level gauge

FILLING PROPANE CYLINDERS

customer for the product according to the meter reading.

Fill only cylinders that are stamped with proper DOT/ICC specifications. Examples of some DOT specs include:

- 4E-240
- 3B-240
- 4B-240
- **4BA-240** or 300
- 4BW-240 or 300
- Cylinders manufactured prior to April, 1967, use the letters ICC before the specification code; for example, ICC 4BA-240.

The first part of the specification number indicates the container type (steel, aluminum, etc.) while the second designation shows the design working pressure of the cylinder (240 psig, for example).

5.1 PRE-FILL VISUAL INSPECTION

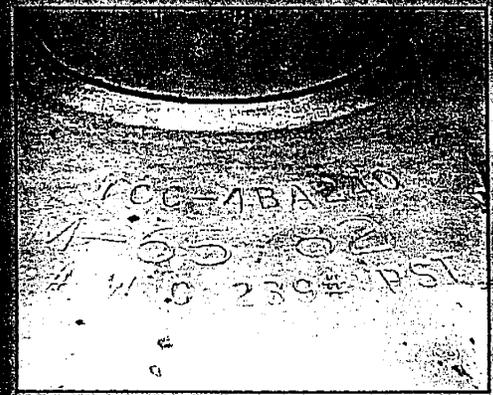
Before filling any cylinder, it must receive a pre-fill visual examination or inspection.

Check the *inspection date* stamped on the cylinder body or collar. If the cylinder requires a formal requalification, be sure it is within the required date. Make sure the cylinder is an approved refillable cylinder.

Domestic (general public) cylinders up to 100 lbs. propane capacity must have a *warning label* applied which includes information on the potential hazards of propane. All cylinders used by commercial and industrial customers must be labeled with an OSHA warning label.

The pre-fill inspection should include the following points:

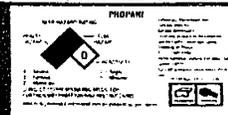
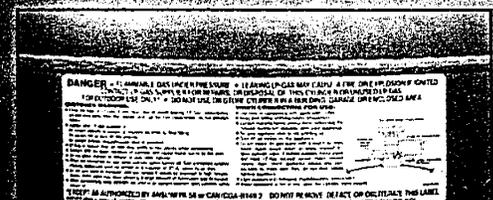
- *Excessive corrosion* on the bottom of the cylinder
- Any areas corroded or deeply pitted



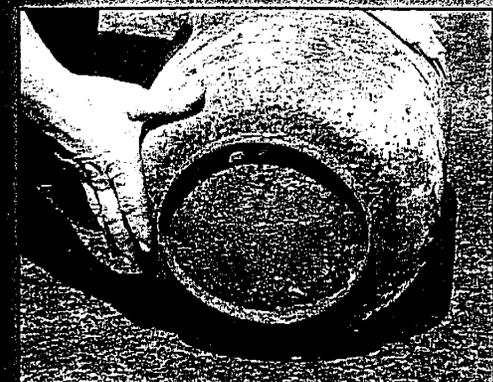
4BA-240



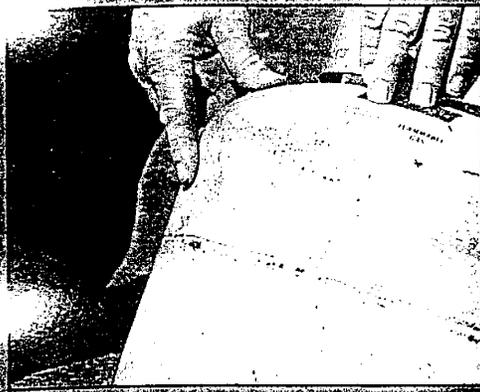
inspection date



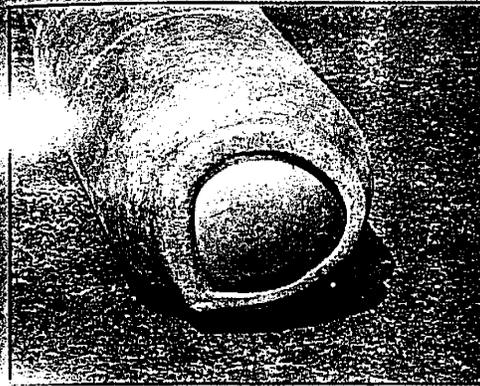
warning label



Excessive corrosion



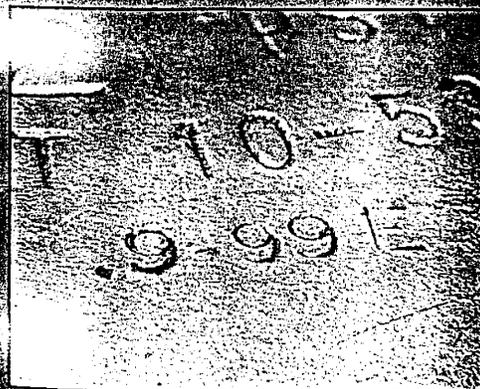
gouges



foot ring



Rejected cylinders



Markings

- Dents. If they are large, deep, have sharp angles or include a weld, do not fill the cylinder.
- Cuts, *gouges* or digs that can reduce the thickness of the cylinder walls and weaken them.
- The collar is protecting the cylinder valve
- Welds that secure the collar to the cylinder are not damaged.
- The *foot ring* is not bent and that it supports the cylinder in an upright, stable position.
- If a cylinder is bulging or shows evidence of fire damage, the cylinder must be taken out of service.
- If a cylinder contains propane, check it for leaks prior to filling.
- If it is empty, pressurize the cylinder and check for leaks before filling. Use an approved leak detector solution to check for leaks around the valve stem, pressure relief valve, valve threads and the service valve outlet.

Cylinders that fail a pre-fill inspection should not be filled until all problems are corrected. You should also inform the customer that the cylinder cannot be refilled until the problem is corrected. **Rejected cylinders** should be set aside and returned to the propane supplier.

5.2 REQUALIFICATION

In addition to a pre-fill inspection, some DOT cylinders must be periodically requalified and inspected, or they cannot be filled. Check with your supervisor to determine which cylinders require requalification.

Markings on the cylinder indicate the most recent requalification, which should be stamped near the date of manufacture on the collar or cylinder head.

Cylinders requiring requalification must be requalified within twelve years of the date of manufacture and the date, month and year, must be stamped into the cylinder.

The method of requalification is indicated by a letter following the requalification date (month and year) which indicates the type and duration of the requalification. For example:

- 3-98E. If the latest inspection date is followed by the letter "E", the requalification was performed by *visual inspection* and is valid for five years from that date.
- If the latest inspection date is followed by the letter "S", the requalification was performed by a *modified hydrostatic inspection* and is valid for seven years from that date.
- If there is no letter following the date, the requalification period was performed by a full hydrostatic inspection and is valid for twelve years from that date.

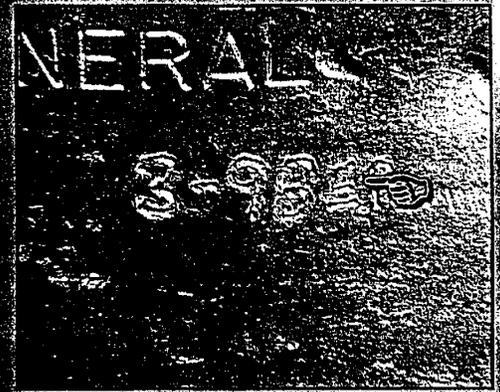
5.3 PURGING CYLINDERS

Purging is the removal of air and moisture from the cylinder. All new cylinders and in some cases used cylinders, may contain water, air or other contaminants. It is essential that these be removed before filling the container and placing it into service.

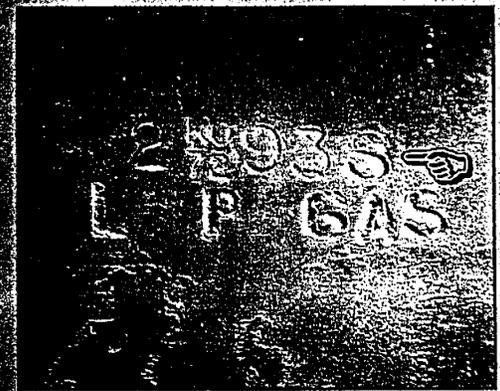
The presence of moisture and air in a propane cylinder can lead to operational problems, such as:

- Erratic or poor operation of appliances
- An increase in pressure resulting in the opening of the relief valve
- Regulator freeze up at the inlet orifice interrupting gas service
- An effect on the ability of the odorant to meet the present standards, as water can cause oxidation or rusting on the inside of the container.

The following containers must be purged before filling: All new cylinders or tanks, and cylinders or tanks that come in to be refilled and have the service valve open.



visual inspection



modified hydrostatic inspection



Purging

Note that Type 1 and Type 2 service valve equipped cylinders have a check valve that prevents the flow of propane when the cylinder service valve is open without being connected to the appliance. These types of cylinders do not have to be purged if they come in with the service valve open because the check valve will prevent air and moisture from entering the cylinder.

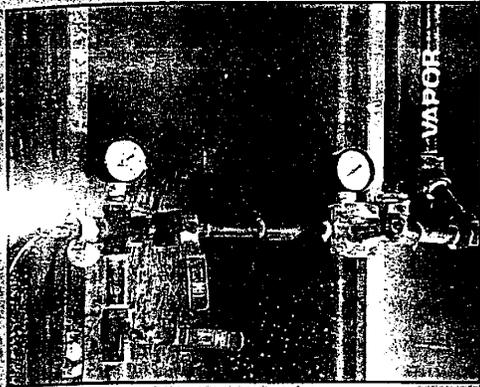
There are several different configurations of *purging systems*, for example, purging with propane vapor or a compressor. In addition, some cylinders and valve configurations may require different procedures or equipment. Therefore, consult your supervisor for information on your company's purging procedures and be sure to follow purging equipment manufacturer's instructions.

It is important to note that when purging a cylinder equipped with a Type 1 or a Type 2 service valve with an OPD, the release of propane may be considerably slower compared to a cylinder not equipped with an OPD, especially in earlier models. To increase the flow of propane, *open the fixed maximum liquid level gauge* as well as the service valve during purging.

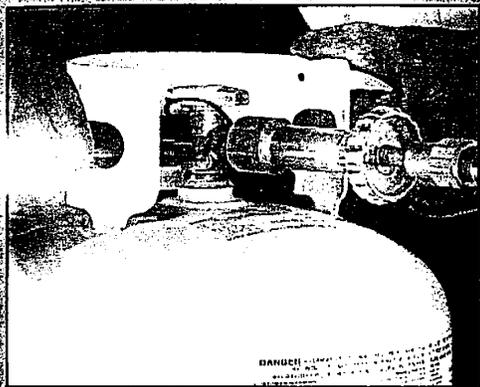
5.3.1 PURGING PROCEDURES

To purge a cylinder, the following steps should be taken:

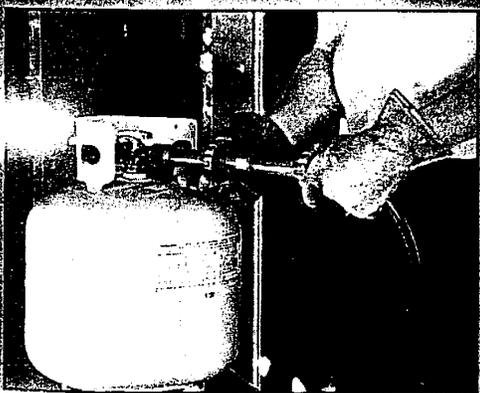
- Always purge in a safe, ignition free location. Purging of cylinders should be performed in an approved area (See NFPA 58).
- Determine if the cylinder pressure is zero. Should the container have only air pressure, the air may be vented directly to the atmosphere through the service valve. (For a Type 1 service valve, screw in a POL fitting, then open the valve; For a Type 2 service valve, insert *adapter* then open the valve.)
- If free water is present in the cylinder, it should be drained.



purging systems



open the fixed maximum liquid level gauge



adapter

- *Pressurize the cylinder* to approximately 15 PSIG with propane vapor. Note: Some OPD-equipped valves may require a minimum of 15 PSI. Never purge with liquid propane; to do so may cause the moist vapor to chill and remain in the cylinder.
- Fully open the cylinder service valve and vent to a safe atmosphere.
- Repeat the previous two procedures for a total of five purgings.
- Re-pressurize the cylinder with odorized propane vapor.
- The cylinder is now ready to be filled with propane.
- Once filled, all fittings and tank openings should be *checked for leaks* using an approved leak detector solution.

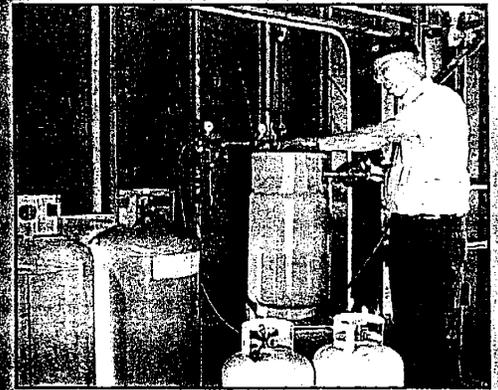
The cylinder is now ready to be placed in service.

5.3.2 ALTERNATE PURGING PROCEDURE USING A COMPRESSOR

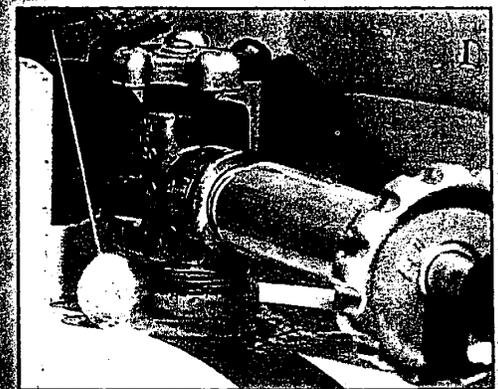
A *compressor* can be used to evacuate air in a cylinder to about 26" of mercury vacuum (2 PSI absolute pressure) when discharging to atmosphere. A hose suitable for vacuum service should be used and all unused valves must be closed. Protective caps on both liquid fill and vapor equalizing valves must be screwed on tightly to prevent air from entering the cylinder when vacuum is applied.

When pressure has been reduced to 26" of mercury vacuum, propane vapor can be introduced until the cylinder has reached atmospheric pressure. Add methanol as suggested and the cylinder is then ready to be filled with liquid propane.

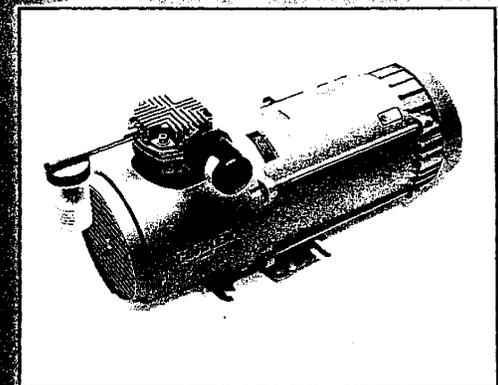
This method effectively removes water vapor after the water is drained and reduces air in the container to about 10% of the volume at



Pressurize the cylinder



checked for leaks



compressor

atmospheric pressure. No propane is released to the atmosphere with this process.

5.4 FILLING BY WEIGHT

When filling by weight, be sure that the scale platform is clean. There should be no ice, snow, grease or debris on the scale platform.

Before placing a cylinder on the scale for filling, remove all counter weights from the scale beam and slide the weight on the scale beam to zero. The *scale beam* should balance at midpoint through its travel path. If the scale does not balance, contact your supervisor.

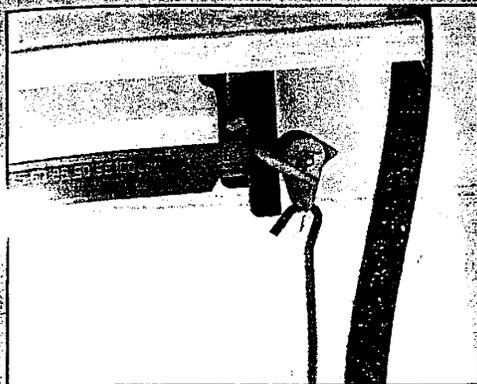
Place the cylinder on the center of the scale platform and *weigh the cylinder* before filling. The weight marked on the cylinder by "TW" is what the cylinder weighs (including the cylinder valve) when empty. If the weight of the cylinder exceeds the stamped tare weight on the cylinder, it may contain product or already be full. If the actual cylinder weight is 95% or less of the stamped tare weight, do not refill the cylinder as the cylinder may be severely corroded. Set the scale for the proper weight of the cylinder when filled.

$$\text{Fill Weight} = \text{TW} + 42\% \text{WC} + \text{Hose/Nozzle Weight}$$

The filling weight is the tare weight of the cylinder (including the service valve), plus the weight of the propane, which is 42% of the stamped water capacity, plus the weight of the filling hose and nozzle.

Connect the filling hose nozzle to the cylinder service valve. Open the cylinder service valve, start the pump and *open the filling hose nozzle*.

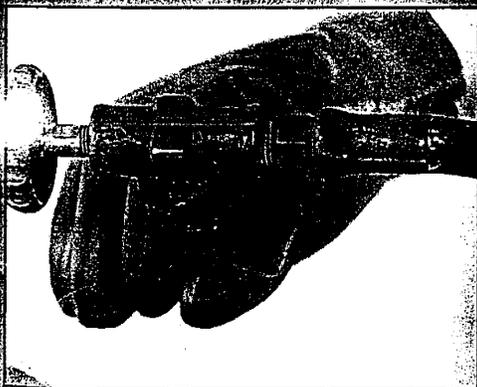
Check the cylinder service valve threads and valve stem for leaks using a commercial leak detection solution. Expanding bubbles indicate a



scale beam



weigh the cylinder



open the filling hose nozzle

leak. If a leak is detected, stop the filling process until the leak is repaired.

Watch the scale beam closely. As soon as the beam starts to rise, close the filler hose-end valve and turn off the pump. Close the cylinder valve. To bleed off the small amount of liquid propane trapped between the filler hose nozzle and cylinder service valve, slowly unscrew the filler hose nozzle from the cylinder service valve, or open the bleeder on the valve. Disconnect the filling hose-end nozzle from the cylinder service valve.

Check the weight of the full cylinder. If the cylinder is overfilled, the excess liquid propane must be removed before the cylinder is returned to the customer. Follow company policy to safely remove excess liquid propane.

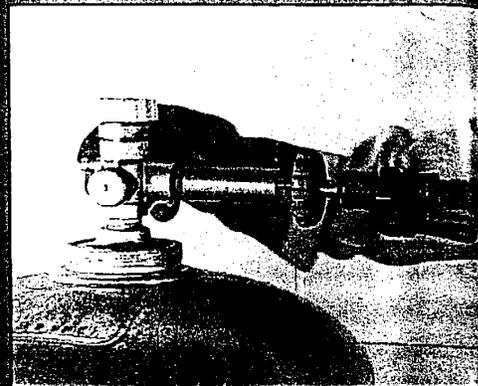
When filling has been completed, use a commercial leak detection solution to **check for leaks**. Expanding bubbles will indicate a leak. If there is evidence of leakage, DO NOT release the cylinder to the customer.

5.5 FILLING BY VOLUME

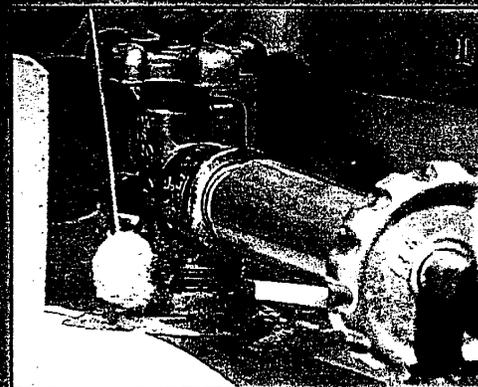
A cylinder filled by volume will be equipped with a **fixed maximum liquid level gauge**. The gauge will be either part of the service valve or a separate valve mounted in the head of the cylinder.

To begin filling by volume, **place the cylinder upright on a firm, level surface**. Attach the filler hose-end valve and adapter to the filling connection on the cylinder.

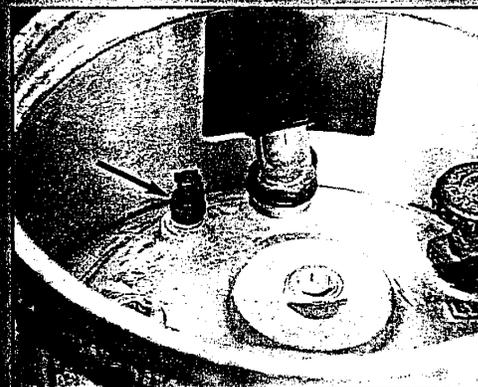
Open the fixed maximum liquid level gauge only enough to hear an audible hiss. Start the pump. Open the hose-end valve, and then slowly open the cylinder service valve. Begin transferring propane into the cylinder.



Check cylinder weight



check for leaks



fixed maximum liquid level gauge



place the cylinder upright on a firm, level surface

Immediately when a *white fog* appears at the outlet of the fixed maximum liquid level gauge, close the hose-end valve. Close the fixed maximum liquid level gauge. Close the service valve. Turn the pump off. Disconnect the filling adapter and filling hose.

Note that when cylinders are equipped with an OPD valve, filling may stop before the white fog appears. If filling was through a separate filler valve, use the proper filling hose adapter and follow the previously described procedures.

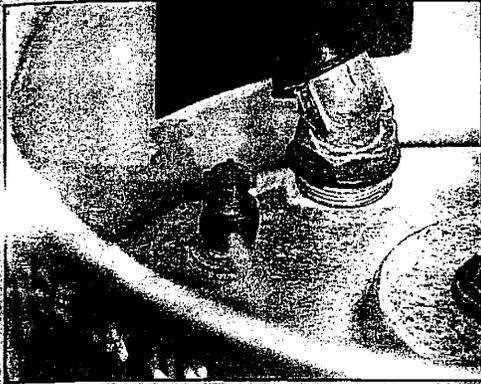
Check the cylinder valves and fittings for leaks. When filling is completed, cap the filler valve.

5.6 OTHER FILLING CONSIDERATIONS

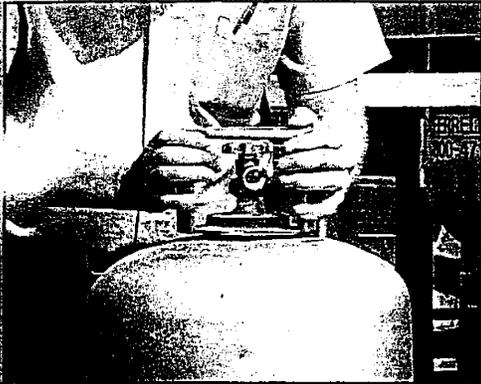
The *protective collar* on some cylinders screws onto the cylinder instead of being permanently attached to the cylinder. Make sure this type of collar is securely in place before returning the cylinder to the consumer.

To prevent accidental leakage, valve outlets on portable cylinders of 45 pounds propane capacity or less must be equipped with an effective seal such as a *plug (POL)*, a cap, a listed quick-closing coupling (Type 1) or a listed quick-connect coupling (Type 2).

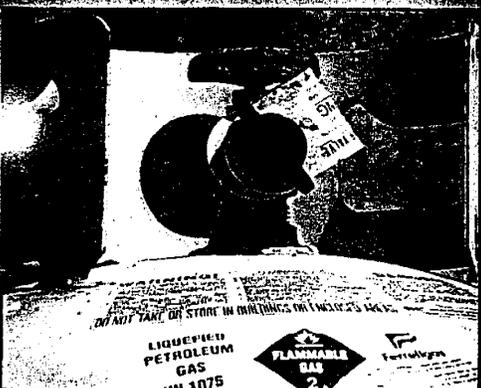
Do not refill disposable, single-use cylinders such as those used for home propane torches.



white fog



protective collar



plug (POL)

6.0 FILLING ASME MOTOR FUEL TANKS

Filling an *ASME motor fuel tank*, whether on a vehicle or on an RV, is easy as long as the correct steps are followed in the proper sequence.

6.1 ASME TANK INSPECTION

In order to be refilled, the *tank* must be of ASME specification and in good condition. ASME tanks must have a legible manufacturer's data plate; a working hand-wheel on the service valve; and a pressure relief valve. Check the service valve for damage or other weaknesses that might render it unfit for service.

ASME tanks do not require periodic requalification. If it appears, however, that the tank requires repair or further inspection by a qualified person, advise the customer. Do not fill any tank or cylinder that you consider unsafe or illegal. The filler valve, the fixed maximum liquid level gauge and the pressure relief valve must be remote-piped to the outside of the vehicle. Do not fill a tank that has a filling connection in the interior of a vehicle or in a trunk.

A propane-fueled vehicle must be identified by placement of a black and silver diamond-shaped *decal* affixed to the lower right segment of the vehicle, but not the rear bumper.

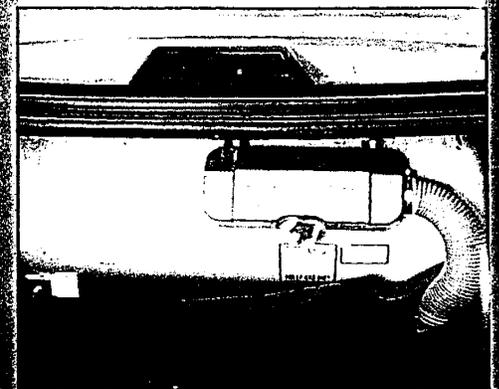
6.2 ASME VEHICLE TANK FILLING

To begin filling an ASME vehicle tank, remove the dust cap from the liquid filler valve on the vehicle tank. Check that the "O" ring or gasket in the filler valve is in place and clean. Check the fixed maximum liquid level gauge to make certain that the tank is not already full and is venting properly.

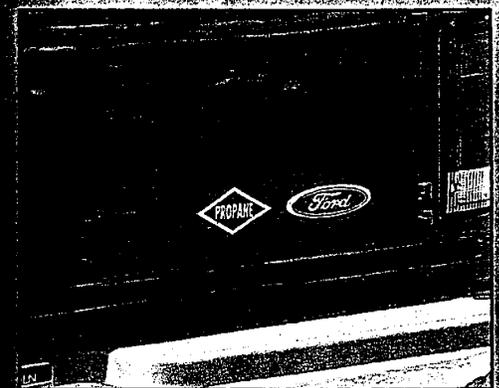
Connect the filler hose nozzle to the filler valve. Start the pump. Reset the meter. Open the hose-end valve. Use the fixed maximum liquid level



ASME motor fuel tank



tank



vehicle decal

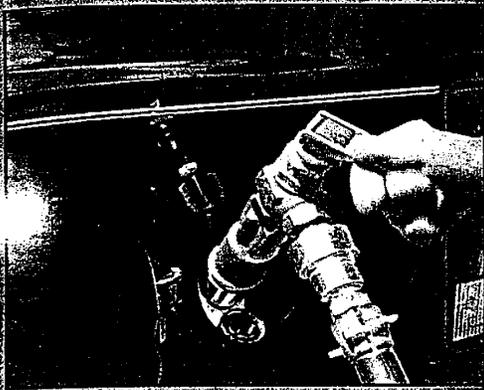
gauge or the automatic stop-fill valve (if the tank is equipped with one) to properly fill the tank. The magnetic float gauge may be used only as a guide and must not be used as the sole means of determining the maximum fill level.

When a white fog is flowing steadily from the fixed maximum liquid level gauge, the tank is considered to be full. **Close the hose-end valve**, close the fixed maximum liquid level gauge and turn the pump off. Disconnect the filler hose nozzle from the filler valve. Check the filler valve at the vehicle to ensure that it is not leaking. Replace the dust cap on the vehicle filler valve.

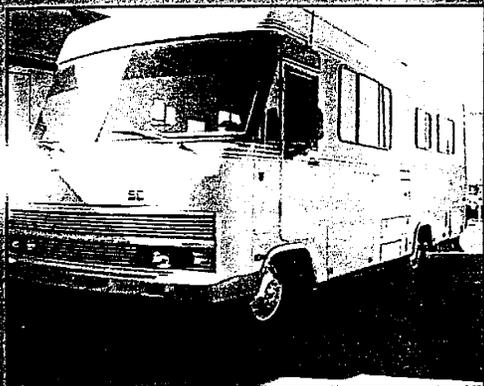
6.3 RV TANK FILLING

Vehicles with permanently mounted propane tanks must be kept at least 10 feet from any ASME bulk storage container. When servicing motor homes and **RVs with permanently installed tanks**, ensure that all engines and appliances, including pilot lights and automatic spark ignition devices, are shut off prior to filling. Be sure to allow sufficient time for the light(s) to extinguish. Propane escaping from the fixed maximum liquid level gauge or when disconnecting the filling nozzle could be ignited by operating pilot lights or burners. Also, it is a necessary safety practice to ask all persons to leave the vehicle for the duration of the filling operation. Insure the parking brake on the vehicle is set and, if necessary, place chock blocks under the wheels.

Before placing propane in the vehicle's tank, check the condition of the tank. Check the manufacturer's data plate to be sure its working pressure will accommodate propane. Most RV propane containers will have a 312 psi working pressure, but in no case should the working pressure be less than 250 psi for propane. Check the tank's **valves and fittings**, be sure that the tank is properly secured to the vehicle, and verify that valves, fittings and the regulator are all properly protected.



Close the hose-end valve



RVs with permanently installed tanks



valves and fittings

Make sure the *fixed maximum liquid level gauge* is working properly and that the tank actually needs filling. If a sustained white mist of propane liquid vents from the bleeder orifice, the container is full or over-filled. Do not proceed with the filling operation.

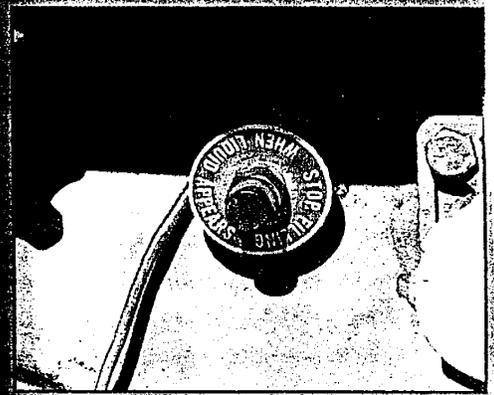
Before connecting the filler hose to the tank, ensure the proper *hose-end valve adapter* has been installed. Motor fuel and RV tanks usually take a 1 $\frac{3}{4}$ inch ACME adapter. Remove the dust cap from the liquid filler valve on the vehicle tank.

Before making connection to containers with separate filler valves, check to be sure the valve opening is free of trash and debris and that the gasket or "o" ring inside the valve is clean and in good condition. If necessary, clean the valve with a rag and/or replace the gasket or "o" ring before connecting the filler hose.

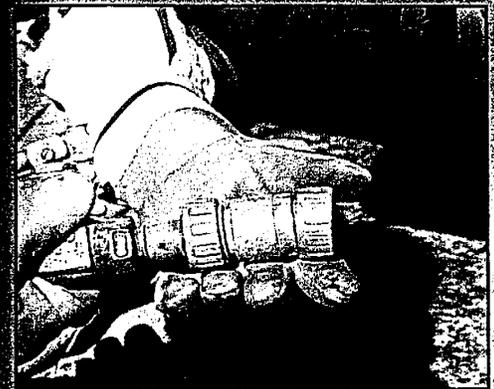
Install the appropriate adapter and connect the hose-end valve to the filler valve on the container. *Test for leaks* by opening the hose-end valve and charging the connection. If a leak occurs, close the hose-end valve immediately. Do not fill the container. Correct the problem by re-tightening the connection or replacing the gasket or "o" ring in the filler valve. Note that the entire valve may have to be replaced. It is also a rule that during filling operations, the operator must be in attendance the entire time.

Turn on power to the dispensing pump. Open the valve on the dispensing tank and reset the meter, if applicable, to zero. Open the fixed maximum liquid level gauge to allow an audible hiss as the propane vapor is released. Then slowly open the valve at the end of the filler hose.

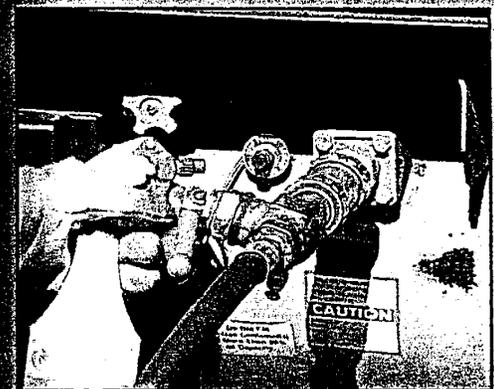
When a white fog is flowing steadily from the fixed maximum liquid level gauge, the tank is considered full. Filler valves equipped with an automatic stop-fill may stop filling before a white



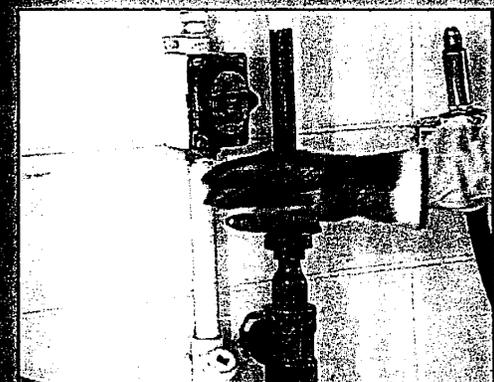
fixed maximum liquid level gauge



hose-end valve adapter



Test for leaks



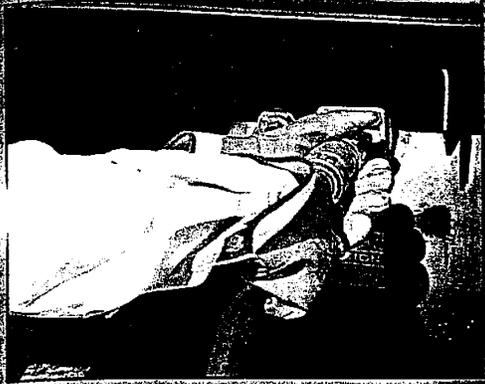
Turn on power to the dispensing pump

fog appears. Immediately close the valve on the end of the hose and the fixed maximum liquid level gauge. Turn off the pump. Also, close the valve on the dispensing tank.

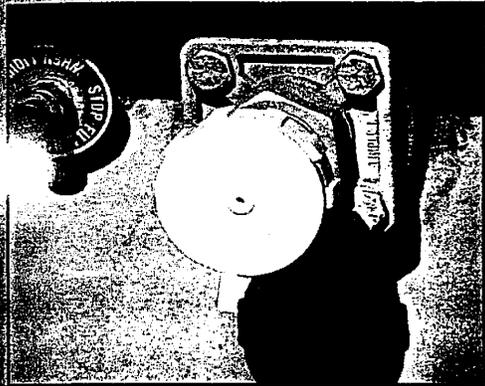
Do not fill the tank past its maximum permitted filling level. Proper filling will provide adequate room for expansion of the gas from heat.

When *disconnecting the filler hose*, caution must be taken to ensure the filler valve back check valve has closed. Open the bleed-off valve or loosen the hose coupling and adapter just enough to permit the trapped gas to slowly bleed off. Do not disconnect completely until the pressure has dissipated. If the pressure continues, re-tighten the hose coupling. Then unscrew the hose coupling from the adapter, leaving the adapter on the filler valve until the vehicle owner can have the valve repaired. Contact your supervisor.

Replace the dust cap on the vehicle filler valve. Return the filler nozzle to the dispenser holder.



disconnecting the filler hose



Replace the dust cap

7.0 LIFT TRUCK CYLINDERS

This section includes special instructions in the handling, maintenance, filling and use of motor fuel cylinders used on material handling equipment such as *forklifts*.

The inspection, requalification and general filling process is the same as for other DOT cylinders. However, pressure relief valves on cylinders used on industrial trucks must be replaced within twelve years of the date of manufacture and every ten years thereafter.

7.1 FILLING

Refueling lift truck containers can be accomplished either on site, at a cylinder filling plant, or by *exchanging* an empty cylinder for a full one.

Cylinders may be filled by weight or by volume, provided the cylinder has a fixed maximum liquid level gauge installed. Containers must not be filled solely by using the magnetic float gauge.

Containers must be filled outdoors or in an *approved filling area*, and may be filled on or off the lift truck. When filling the cylinder or tank on the lift truck, the engine must be off and the brakes set.

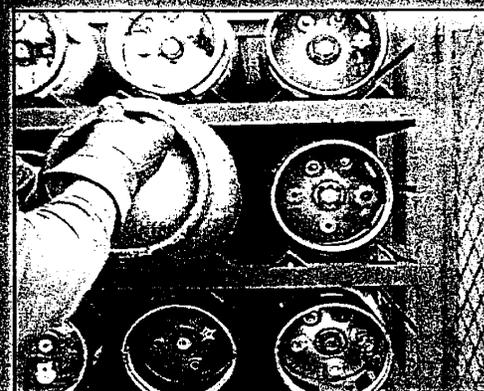
Cylinders may be filled through the ACME filler valve or through the service valve, using a special filling adapter.

When filled on site from a propane storage container, there are several important steps to be followed.

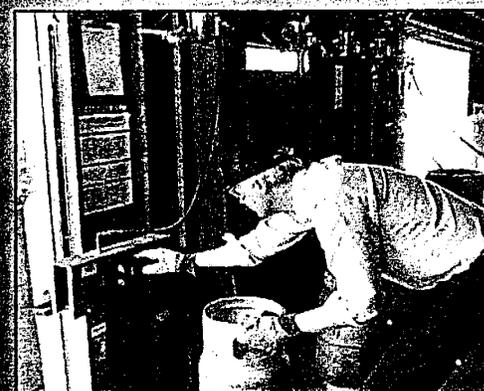
- Turn off the service valve on the tank, using the *quick disconnect* to unhook the fuel line without discharging any propane. (If there is no quick disconnect, turn off the valve and run the truck until the line is empty.)



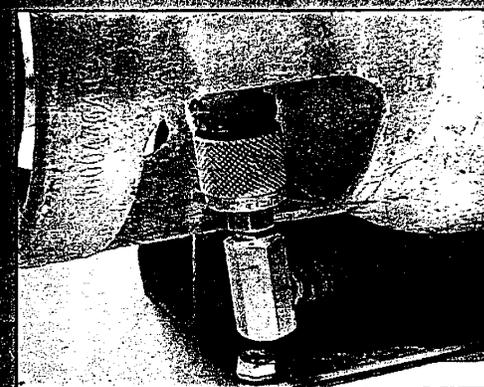
forklifts



exchanging



approved filling area



quick disconnect



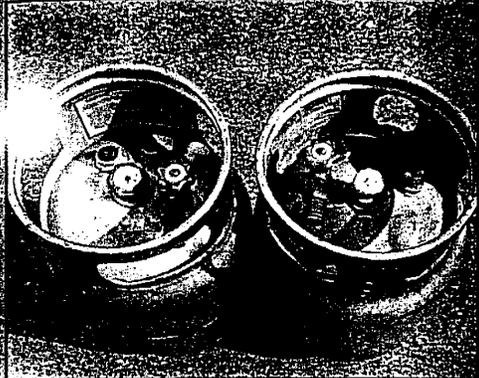
Stay in attendance

- Remove the service valve cap and wipe dirt from the opening.
- Screw the fill nozzle on the fill valve.
- Open the 80% fixed maximum liquid level gauge.
- Open the fill hose valve and turn on the pump motor switch. *Stay in attendance* while the tank is being filled. White fog tells you the safe fill level has been reached.
- Immediately shut off the fill hose valve and the fixed maximum liquid level gauge.
- Disconnect the fill hose.

Note that special care must be taken to ensure that the back checks on the valves are securely seated.

7.2 HANDLING AND MOUNTING

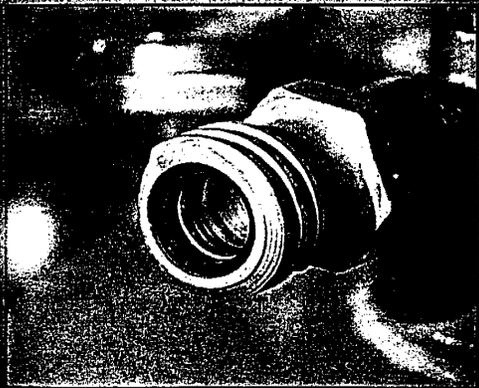
Lift truck cylinders are normally used in *liquid* service, but can be configured for *vapor* service. Always use the correct cylinder for the application.



liquid

vapor

Ensure the proper *gaskets/O-rings* are in the filler valve and/or service valve connector. Position the cylinder securely, using the positioning pins on the truck and the holes in the lift truck cylinder collar, with hold-down straps properly fitted and secured. *Pressure relief valves* should have a *deflection adapter* to divert any relief discharge upward. Ensure a plastic screw-on cap is attached to the ACME thread filler valve.



gaskets / O-rings

Be careful when mounting and removing cylinders from lift trucks to prevent damage to the cylinder, collar, or foot ring.



Pressure relief valve w/deflection adapter

8.0 TRANSPORTING CYLINDERS SAFELY

Once a cylinder is filled, assist your customers in transporting it in a safe manner. Cylinders must be transported so that the pressure relief valve is in communication with the vapor space and must be secured to prevent shifting, movement or falling. Closed-bodied vehicles, such as passenger cars, vans, and station wagons, may only transport cylinders less than 45 lbs. propane capacity, and the total weight of propane must be *less than 90 lbs.* Cylinders up to 45 lbs. propane capacity and all cylinders transported in closed-bodied vehicles must have a quick closing coupling or POL plug installed in the service valve outlet.

Your company may have pamphlets or other safety information that should be given to customers after the refueling operation is completed.

Cylinders larger than 1 lb. propane capacity may not be transported, used or stored inside of a motor home or recreational vehicle; however, they may be transported or stored in a *recess or cabinet* which is accessible from and vented to the outside.

Cylinders may be transported in an open truck, or closed-bodied vehicle if the cargo area is separated from the passenger and engine areas.

When the gross weight (weight of product and cylinders) totals 1,000 pounds or more, the truck must be *placarded* as required by USDOT regulations and a proper bill of lading and shipping papers must be on board. Also, the driver must have a CDL (Commercial Driver's License) with HazMat endorsement and the vehicle must be equipped with an 18 lb. minimum dry chemical, B:C rated fire extinguisher.



less than 90 lbs



RV recess or cabinet



DOT placard

9.3 FIRE AND EMERGENCY PROCEDURES

Propane vapor leaks and liquid leaks can create hazardous situations. However, a liquid leak means that when the liquid vaporizes into the air, you will have a much greater amount of vapor to contend with...**270** times as much.

There are several precautions that should be taken in the event of an emergency.

- Avoid becoming trapped in the dispensing area if there is an uncontrolled release of propane.
- Keep other people away from the area.
- Move and stay upwind of a propane leak or fire.
- Never enter a propane vapor cloud.
- *Eliminate sources of ignition.*
- Contact the fire department and tell them the nature of the emergency.

In any propane emergency where there is fire, flames should not be extinguished unless by doing so the fuel supply can be turned off. If the fire is extinguished and the supply of fuel is not turned off, an explosion hazard much greater than the fire hazard may be created.

Take the following steps in the event of a fire or emergency, if it is safe to do so and if the fire is not near the storage tanks or valves.

- If there is an *emergency shutdown* on the container piping, activate it.
- Close any and all accessible valves in the liquid and vapor lines.
- Shut off the electrical power at the main power supply.
- Stay away from the dispenser and keep others away until the fire department has arrived.



1 to 270 expansion ratio



Eliminate sources of ignition



Emergency shutdown

- Do not operate a dispenser that has been exposed to fire until it has been thoroughly inspected and repaired.

9.4 PORTABLE FIRE EXTINGUISHERS

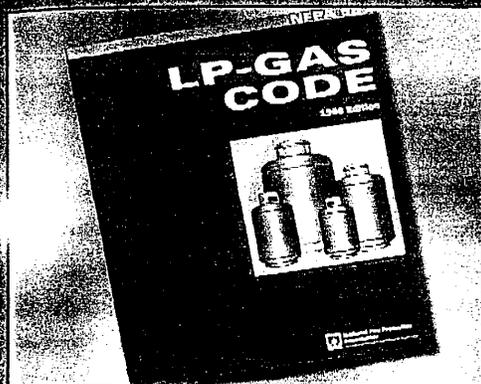
NFPA 58 (the *LP-Gas Code*) requires at least one fire extinguisher at the filling site, readily available in case of a fire. It must be at least 18 lb. dry chemical with a B:C rating, and serviced at least annually by a fire extinguisher servicing company.

Fire extinguishers are effective for small fires, such as those involving combustible materials. They are also valuable in providing an escape route for personnel. Remember that portable fire extinguishers have a limited application area and capacity and may be expended before a large fire can be extinguished.

9.5 PERSONAL PROTECTIVE EQUIPMENT

For your safety, pay particular attention to using personal protective equipment when transferring liquid propane. Freeze burns from contact with vaporizing propane can be extremely painful. *Propane-resistant gloves* must be used when filling propane containers.

Other protective equipment, such as safety glasses or goggles, may be required. Consult your supervisor for your company's policies



LP-Gas Code



Fire extinguishers



Propane-resistant gloves

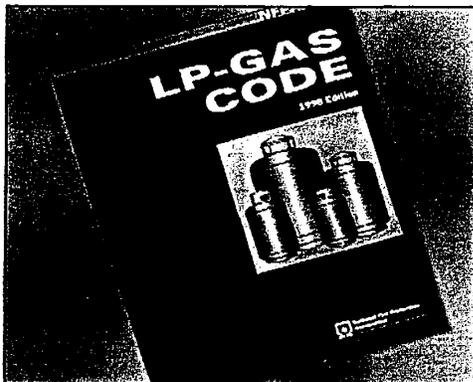
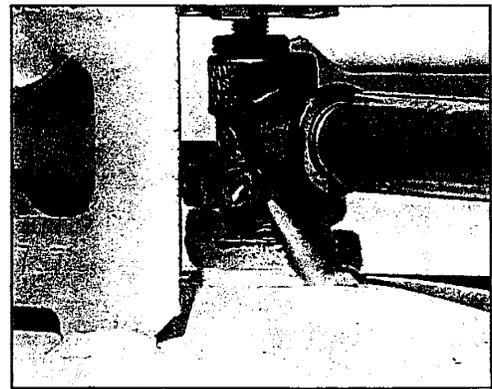
910 SAFETY MEASURES FOR
DISPENSING LIQUID PROPANE

SUMMARY



Filling propane containers from a dispenser is an important job. In order to assure your safety and the safety of your customers, you must follow several important rules.

- *Become familiar with propane and the dispensing equipment.*
- *Be aware of the different types of containers that you may be asked to refill.*
- *Wear the proper personal protective equipment when filling propane containers.*
- *Follow proper filling procedures.*
- *Learn your company's specific policies.*
- *Become familiar with emergency response equipment and procedures.*



Following these rules will enable you to safely and efficiently serve your company and the public.