LP Gas Dispenser Operator

Study Guide

This Study Guide may be utilized for the following Permits:

- Class IV-DO Installer/Dispenser Operator
- Class IV-D Driver/Installer
- Class VI-A Dispenser Operator
- Class IV-DO Installer/Dispenser Operator

General Information

What Permits are required before I begin?

At least one Class VI is required for each dispenser location. Additional personnel may have a Class VI-A Permit or Class IV RV Permit with a DO endorsement.

How do I get a Permit?

An Oklahoma LP Gas Class X permit holder can administer a Class VI-A test.

When do Permits expire?

Permits will expire on August 31st of each year. The permit holder must also attend an annual Safety Class before the permit is renewed. Safety classes are held in several locations around the state between April and May, with makeup classes in June.

What do I do if there is a leak or an accident?

EVACUATE THE AREA! Eliminate sources of ignition, call the Fire Department, and then contact the Oklahoma LP Gas Administration at 405-521-2458. If it is night or a weekend, there will be additional contact information on the answering machine. You should also contact your propane supplier, as they are familiar with your dispenser and may know of a quick fix.

What is Propane?

Propane is a hydrocarbon (C3H8) and is sometimes referred to as liquefied petroleum gas, LP gas, or LPG. Propane is produced from both natural gas processing and crude oil refining, in roughly equal amounts from each source. Nearly 97 percent of propane consumed in the United States is produced in North America.

Is propane dangerous to the environment?

No. Propane is an approved, clean fuel listed in the 1990 Clean Air Act and the Energy Policy Act of 1992 and is one of the cleanest burning of all fossil fuels. Tests conducted by the U.S. Environmental Protection Agency show that propane-fueled vehicles produce 30 percent to 90 percent less carbon monoxide and about 50 percent fewer toxins and other smog-producing emissions than gasoline engines. Propane is also nontoxic, so it's not harmful to soil or water.

Definitions

ASME Container

May include any of the following: permanently mounted motor fuel tanks, house tanks, bulk storage tanks, portable tanks (420#), and cargo tanks, used to transport or store LP gases.

Container Appurtenances (valves and fittings)

Devices are installed in container openings for safety, control, or operating purposes. Examples include pressure-relief devices, shutoff valves, backflow check valves, excess-flow and internal valves, liquid level gauges, pressure gauges, and plugs.

C-Tag

Cylinder Identification Label with unique serial numbers that are tied back to the company that purchased the C-Tag.

Cylinder

A container designed, constructed, tested, and marked according to U.S. Department of Transportation specifications (Title 49, Code of Federal Regulations).

Dispensing Station

Fixed equipment in which LP gas is stored and dispensed into approved ASME containers or cylin-ders.

DOT

U.S. Department of Transportation

Fixed Maximum Liquid Level Gauge (Outage gauge, spitter valve, spew gauge)

A fixed liquid level gauge indicates when the liquid level in a container has reached its maximum permitted filling limit.

Liquefied Petroleum Gas

LP Gas or Propane

NFPA

National Fire Protection Association

Overfilling Prevention Device (OPD or stop valve)

A safety device that is designed to automatically prevent a container from being filled beyond its maximum permitted filling limit.

Point of Transfer

The location where connections and disconnections are made or where LP gas is vented to the atmosphere during transfer operations.

Portable Container

A container designed to be moved readily, as opposed to a container designed for stationary installations.

Pressure Relief Valve (pop-off valve)

A type of pressure relief device designed to both open and close to relieve excess internal pressure.

Sources of Ignition

Devices or equipment that are capable of igniting flammable LP gas vapor-air mixtures and that will permit propagation of flame away from them.

Universal Cylinder

A cylinder that can be connected for service in either the vertical or the horizontal position, so that the fixed maximum liquid level gauge, pressure relief device, and withdrawal appurtenances function properly in either position.

Water Capacity

The amount of water at 60°F required to fill a container.

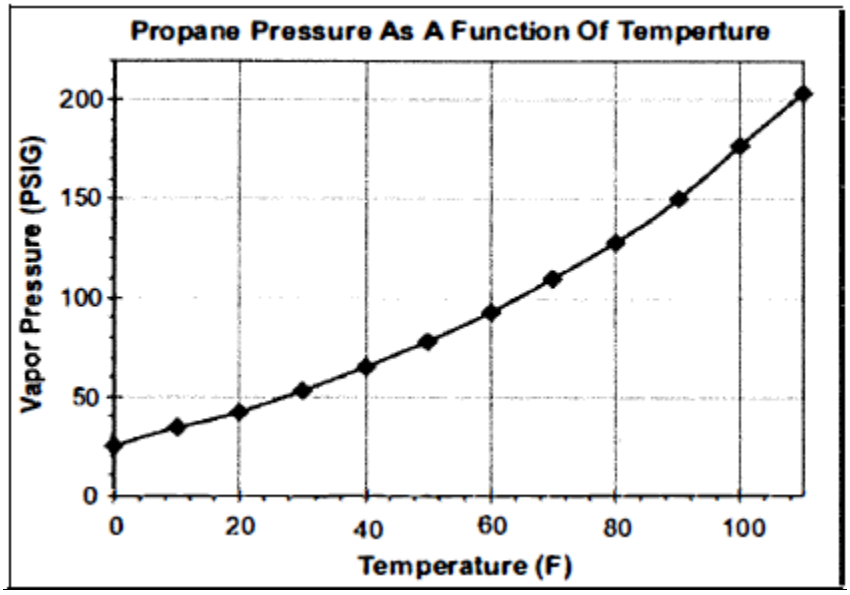
Tare Weight

The weight of an empty container.

Physical Characteristics

- Propane is nontoxic, colorless, and virtually odorless. As with natural gas, an identifying odor is added so the gas can be readily detected.
- Propane will vaporize at any temperature above -44°F.
- When liquid propane is released into the atmosphere, it vaporizes and rapidly expands to 270 times its original volume. Extremely cold tem-peratures are produced at the point of release and can produce frostbite very quickly on exposed skin.
- Liquid Propane weighs 4.2 lb. per gallon, about half the weight of wa-ter.
- Propane vapor is 1.5 times heavier than air; therefore, when it is released, it will settle in low areas.
- Propane liquid will expand approximately 1% for every 6-degree rise in temperature. This is why propane containers are filled to only 80% of their capacity, providing space for liquid to safely expand.

Vapor Pressure of Commercial Propane



- The relief valve on DOT cylinders is set to relieve at 375 psi
- The relief valve on ASME containers is the same as the working pressure, which would be 250 psi or 312 psi.

OSHA Fire Extinguisher Training, 29 CFR Section 1910.157(g)(l)

- Where the employer has provided portable fire extinguishers for employee use in the workplace, the employer shall also provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage firefighting.
- **1910.157(g)(2)** The employer shall provide the education required in paragraph (g)(l) of this section upon initial employment and at least annually thereafter.
- NFPA requires a minimum of 18 lb. BC or ABC Fire extinguisher to be readily available at each dispenser. Fire extinguishers shall be inspected by a competent person at least annually.

Personal Protective Equipment (PPE)

- OSHA 29 CFR 1910.132 requires that when hazards cannot be eliminated through engineering and/or administrative controls, PPE must be used to protect the eyes, face, head, feet, hands, arms, body, ears, and lungs.
- People filling tanks and cylinders should wear gloves and protective eyewear during the inspection, purging, and filling operation.

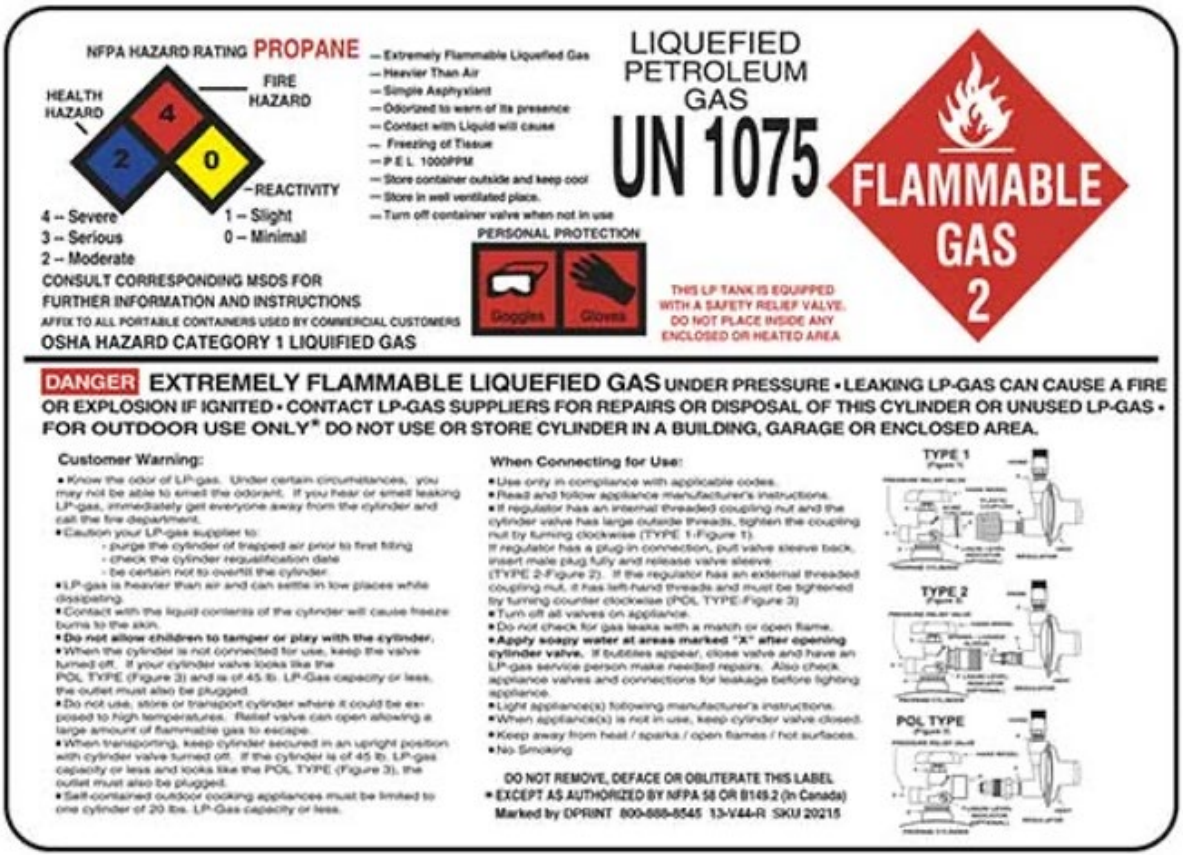
Required Knowledge

- Each person at the dispenser location should be familiar with the procedures and locations to turn off the electricity and close valves to stop the flow of propane in case of an accident. (Note: Propane that is in the lines may continue to escape for several minutes after the valves are closed)
- An identified and accessible switch or circuit breaker must be installed at a location not less than 20 feet or more than 100 feet from the dis-pensing device(s) to shut off the power in the event of a fire, accident, or other emergency.

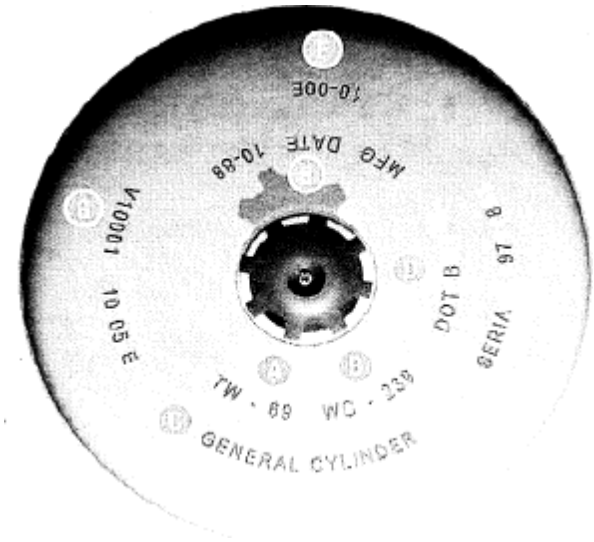
- Smoking, open flame, portable electrical tools, and extension lights capable of igniting LP gas must not be permitted within 25 ft. of a point of transfer while filling operations are in progress.
- Loose or piled combustible material and weeds, and long dry grass must be separated from containers by a minimum of 10 feet.
- Cylinders in storage must be located to minimize exposure to excessive temperature rises, physical damage, or tampering
- LP Gas cylinders and/or ASME tanks shall not be mounted in front of the vehicle, behind the rear bumper, or on the roof.
- Cylinders are filled by weight, therefore, the scales must be kept clean, level, and in good operating condition. They should be checked regularly to ensure proper calibration.

Understanding the Information on a Cylinder

- Become familiar with the information that is required on a cylinder.
- Consumer Warning Labels are required.



A. Tare Weight (the weight of the cylinder when it is new and empty)
B. Water Capacity {the number of pounds, of water, the cylinder will hold when full
C. Manufacturer Name or Symbol
D. Specification Design Code
E. Date of Manufacture (the date the cylinder was constructed)
F. Requalification Date(s)
G. Recertification Information (the RIM and date the cylinder was recertified). Note: some cylinders may have several Recertification dates on them.



Filling Cylinders by Weight

Cylinders with less than 200 pounds of water capacity and subject to DOT jurisdiction must be filled by weight. Check with your supervisor for any exceptions. During the filling procedure, the operator must be in attendance the entire time.

To fill a cylinder by weight:

1. Set the scale to the proper total weight of the filled cylinder: **tare weight** plus **42% of water capacity** plus the weight of the **hose** and **nozzle**. Filling charts with common cylinder capacities are also available.
2. Open the **liquid outlet valve** on the storage/supply tank and any valves in the bypass return line, if this has not already been done.
3. Connect the **dispensing hose** to the service valve.
4. Open the **service valve** on the cylinder.
5. Start the **pump** and slowly open the **hose end valve**.
6. Close the **hose end valve** as soon as the scale beam or indicator tips.
7. Close the **cylinder valve**.
8. Shut off the **pump**.
9. Disconnect the **dispensing hose**. Check the weight of the filled cylinder.
10. If it has been overfilled, contact your supervisor. DO NOT GIVE THE CUSTOMER AN OVERFILLED CYLINDER, since the relief valve may release propane and create a flammable mixture.
11. Close the **liquid outlet valve** on the storage tank.

12. Check the **cylinder valves**, especially the relief valve, for leaks.

Note: Never fill a cylinder with the gallons it can hold, as it may already be partially filled. Never stand in front of or look into a relief valve when filling a cylinder.

CAPACITY IN POUNDS	
WATER CAPACITY	**PROPANE CAPACITY**
12	5
15	6
24	10
26	11
48	20
60	25
67	28
69	29
72	30
80	33.5
98	40
104	43.5
120	50
144	60
239	100

Point of Transfer on a Dispenser

- Shall be 25 ft from buildings or property lines.
- Distance may be reduced to 12-1/2 ft if the dispenser meets all the requirements of a low-emission location.
- Distance may be further reduced to 10 ft if the building has 1hr fire-rated walls.
- Shall be 50 ft from outdoor places of public assembly, including schoolyards, athletic fields, and playgrounds.
- Electrical equipment shall be designed for hazardous locations and meet the National Electric Code, NFPA 70, within a 15 ft radius of the tank, pump, and point of transfer.

Hose, Hose Connections, and Flexible Connectors

- Hose, hose connections, and flexible connectors must be fabricated of materials that are resistant to the action of LP gas both as liquid and vapor.
- The hose must be designed for a working pressure of 350 psig with a safety factor of 5 to 1 and must be continuously marked with LP GAS, PROPANE, 350 PSI WORKING PRESSURE, and with the manufacturer's name or trademark.

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

Cylinder Inspection

Prior to filling any cylinder, an in-depth inspection must be carried out. At first glance, it may appear that it would take several minutes of inspection for each cylinder, however, this is not the case. The majority of cylinders can be inspected in a very short time. (Note, this inspection does not constitute a requalification. Requalification procedures are a DOT requirement and must be done to DOT specifications.)

Visual inspections must be performed in accordance with the following:

1. The cylinder is checked for exposure to fire, dents, cuts, digs, gouges, and corrosion.
2. Any sleeve on the cylinder that hampers an inspection shall be removed.
    a. Any dent in a weld shall not be deeper that¼ inch.
    b. Any dent that does not include a weld shall not be deeper than 10% of the average dent diameter. Any dents that include a cut or gouge shall cause the cylinder to fail the inspection.
3. New, unused cylinders must have an Oklahoma C-Tag on them. A C-Tag is a small (approximately 1" x 3"), white adhesive label with a unique identification number. C-Tags must be attached by the seller of the cylinder.
4. Cylinders made to ICC specifications prior to 1967 are the equivalent of DOT specification cylinders and may be continued in service, provided they pass an inspection and have been properly requalified.
5. DOT aluminum and composite cylinders that have been involved in a fire shall be permanently removed from service.
6. DOT cylinders other than aluminum and composite that have been involved in a fire shall be requalified before being placed back into service.
7. The cylinder protective collar (where utilized) and the foot ring must be intact and firmly attached.
8. Welding on any pressure-containing portion of a cylinder is prohibited unless performed by a facility authorized by DOT.
9. The cylinder shall be painted or coated to minimize corrosion.
10. Cylinders classified as disposable, non-refillable, or single trips shall not be refilled.
11. The cylinder pressure relief valve shall indicate no visible damage, corrosion of operating components, or obstructions.
12. There shall be no leakage from the cylinder or its appurtenances that is detectable without the use of instruments.
13. If the cylinder is equipped with an O-ring or rubber seal inside the POL connection, it should be checked to ensure it is not cracked or deformed.
14. Cylinder date of manufacture and requalification dates must be checked. A cylinder that is past the requalification date shall not be refilled.
    a. Cylinders must be requalified 12 years from the date of manufacture. A cylinder that is out of date must be requalified by methods prescribed in DOT regulations.
    b. Cylinders that have passed external visual requalification may be continued in service for 5 years.

15. All cylinders used in industrial truck service (including forklift truck cylinders) must have the cylinder's pressure relief valve replaced by a new or unused valve within 12 years of the date of manufacture of the cylinders and every 10 years thereafter.
16. Cylinders with 4.2 lb. through 40 lb. propane capacity for vapor service must be equipped or fitted with a listed overfilling prevention device (OPD) that complies with UL 2227, Overfilling Prevention Devices, and a fixed maxi-mum liquid level gauge. These devices must be permitted to be a part of the container valve assembly.
17. The following types of cylinders are exempt from the requirements of installing a listed overfilling prevention de-vice:
    a. Cylinders used in industrial truck service (forklift) and cylinders that are marked and used for industrial welding and cutting gases.
    b. Cylinders manufactured before October 1, 1998, and designed for use in the horizontal position where an OPD is not available. These cylinders shall be marked with a label to indicate they are not equipped with an OPD.

Any cylinder that fails one or more of the criteria of the visual inspection requirements must not be refilled or continued in service until the condition is corrected.

Purging

- If a cylinder is new and never contained propane or if the cylinder valve was open when it was brought into the dispensing sta-tion, it must be purged of air before being filled. Failure to do so could result in excessive tank pressure, possibly causing the relief valve to open. It could also create fuel/air mix problems with any appliance the cylinder is connected to and could also contribute to odorant fade.
- Most new cylinders are now vacuum purged and only need to be pressurized with propane vapor before being filled. (Note: the propane vapor is not blown down on vacuum-purged cylinders)
- Propane dispensers should be equipped with a cylinder purging mani-fold which is equipped with a discharge stack that discharges the va-pors to a safe elevated location, at least 25 feet from any building.
- Cylinders should be pressurized to 15 psi with propane vapor. The propane/air mixture should then be released through the vent stack. Repeating the procedure at least 5 times will remove approximately 97% of the air.
- Propane liquid should never be used to purge an LP Gas container; only propane vapor. Using propane liquid will freeze any water vapor in the LP tank and cause regulator freeze-up problems later on.

What to do if a Cylinder or Tank is Overfilled or Leaking

- Never release an overfilled or leaking container to the customer!
- If your dispenser is equipped with purging equipment, you should hook up the purging equipment and vent the container until it reaches the proper level.
- If there is no purging equipment and the container can be safely moved, it should be moved to a safe location, as far as possible from any source of ignition, and the manager notified.

Transporting Cylinders

- Closed-bodied vehicles such as passenger cars, vans, and station wagons must not be used for transporting cylinders of more than 45 lb. propane capacity per cylinder.
- The aggregate propane capacity being transported in closed-bodied vehicles shall not exceed 90 lb. of propane capacity.
- Cylinders and their appurtenances must be determined to be leak-free before being loaded into vehicles.
- Cylinders must be secured in position to minimize the possibility of movement, tipping, and physical damage.
- A cylinder, being transported, must have the relief valve positioned to communicate directly with the vapor space of the cylinder (in the upright position).
- Customers transporting cylinders inside a closed-bodied vehicle shall be advised to remove the cylinder as soon as possible to minimize the possibility of the relief valve discharge, especially in warm weather.
- Vehicles transporting more than 1000 lb. of propane (propane and container weight) shall be required to meet DOT Hazardous Material Transportation Regulations.

Filling Vehicle-Mounted ASME Tanks

- ASME tanks do not require periodic requalification, however, they shall be inspected to ensure there is a legible data plate, no rust, corrosion, dents, gouges, or other conditions that could make the tank unsafe.
- ASME tanks that are mounted in an enclosed space (such as a pickup camper) shall have remote filling, a remote 80% outage gauge, and the relief valve piped out.
- Never stand in front of or look into the relief valve when filling an ASME tank.
- All persons must exit the vehicle before LP Gas tanks on the vehicle are filled.
- All sources of ignition on the vehicle shall be turned off during the filling procedure.
- Older ASME tanks made to U-68 or U-69 specification and a 200 lb. working pressure may be continued in service.
- ASME tanks made to U-W specification and a 250 lb. working pressure may also be continued in service. Newer ASME tanks made to U-W specification will have a 312 lb. working pressure.
- Dispensers that are used to fill tanks on vehicles shall be equipped with an emergency breakaway device. The device shall be designed to retain the propane liquid on each side of the device in case of a pull-a-way.
- Hoses on dispensers shall not exceed 18 ft in length unless approved by the LP Gas Administrator
- Dispensers that fill any LP Gas container, other than by weight, shall be equipped with an approved meter that reads to the nearest 1/10 gallon. Meters are required to have their calibration proved annually.

Prohibited

- Tanks of more than 125-gallon water capacity shall not be transported with more than 5% propane unless specifically designed and approved by DOT. A trailer-mounted house tank with roll bars is not approved or allowed.
- Filling cylinders that are due for requalification shall not be allowed.
- ASME tanks without a legible data plate or missing the data plate shall not be filled.

- Filling tanks to more than the maximum allowable limits shall not be allowed.
- Filling Forklift cylinders that have an out-of-date relief valve is prohibited.

Unattended Dispensers

- Shall have the liquid withdrawal valves closed.
- Shall be locked or in a secured area.

Dispenser Labels

1. Labels should be readily visible from any direction the public approaches.
2. Each dispense shall be marked with "No Smoking", minimum 6-inch letters
3. Propane, LP Gas, or Flammable Gas, minimum 6-inch letters
4. The name of the dispenser operator and their phone number in minimum 2-inch letters
5. The name of the dispenser owner, if different than the operator
6. It is also good practice to display an emergency phone number if the operator's phone number is not an "after-hours" number.

Crash Protection

- Dispensers shall be protected from vehicle impact following good engineering practices.

Failure to Comply with Laws and Regulations

- Failure to comply with state laws, rules, and regulations can result in suspension or revocation of permits and/or a fine of not more than $1,000.00 per violation per occurrence.
- Failure to comply with Federal Laws can result in fines.
- Safety Code Enforcement Officers are certified State Police Officers with the authority to arrest, write citations, or put the dispenser location out of service.