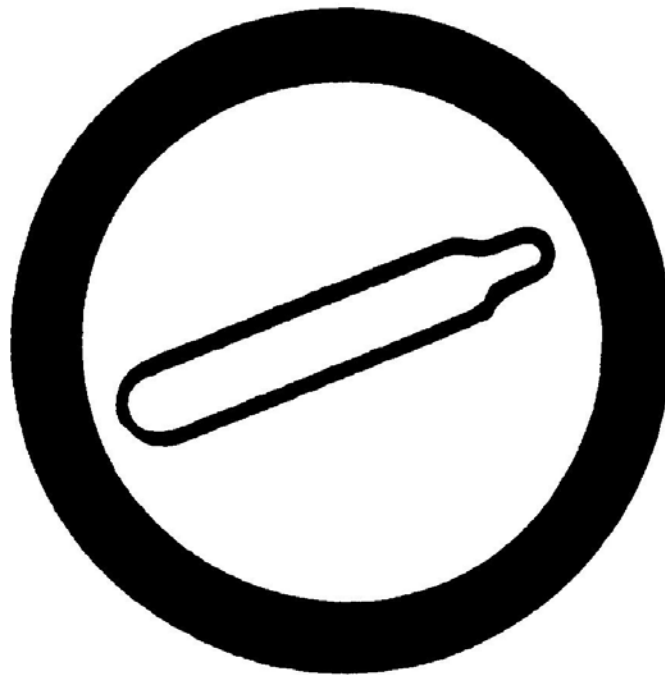




**CONSTRUCTION SAFETY
EDUCATION PROGRAM
#13**

WORKING SAFELY WITH PROPANE



This education program provides a guideline for proper use and storage of propane. It is intended to give contractors and workers practical information relating to the use and storage of propane and personal protective equipment.

This education program contains general information. For specific regulatory requirements, please consult the appropriate Workplace Safety Health Act & Regulation concerning proper use and storage of propane adopted under the Workplace Safety and Health Act and the Canadian Safety Association Standards (CSA).



PROPANE PROPERTIES – INTRODUCTION

Be Aware of the Hazards...



USE CAUTION when working with propane!

Temperature	Pressure
130°F	257 lbs.
110°F	197 lbs.
100°F	172 lbs.
90°F	149 lbs.
80 ° F	128 lbs.
60°F	92 lbs.
30°F	52 lbs.
0 ° F	23 lbs.
-44°F	0 lbs.

PROPANE - a liquefied petroleum gas has become very popular with the construction trades for temporary heat at areas under construction--for heating tar kettles--and many other applications associated with construction work.

CAREFUL HANDLING and utilizing Propane with properly designed equipment makes it a Safe--Useful--and Economical fuel for the Construction Trades.

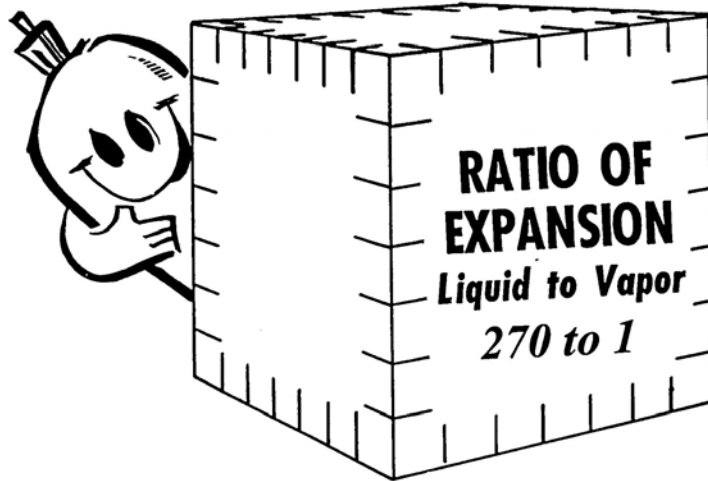
PROPANE is extracted from natural and refinery gases. It is normally a vapor gas at temperatures above its boiling point (-44 °F or -42.2°C). The boiling point is the temperature at which the liquid gas will convert into vapor at atmospheric pressure.

PROPANE is compressed into a liquid state and will remain a liquid under pressure when stored in special pressure containers, such as cylinders.

PRESSURE IN PROPANE CONTAINERS WILL VARY WITH LIQUID GAS TEMPERATURE!

For each degree rise in temperature of liquid Propane in the container, there will be a correlating increase of pressure.

When converting to vapor-liquid Propane will expand about 270 times its liquid volume. This explains why so much heating value (Btu's) can be stored in small containers. It also explains why escaping liquid gas causes more problems than an identical sized vapor leak.



PROPANE IS ODORIZED TO GIVE IT A FOUL AND UNCOMMON ODOR that smells like boiling cabbage or rotten eggs--so leaking gas can be detected before a flammable mixture has accumulated. Should you detect an odor of gas, close service valve at container, and if unable to remedy the source of leak, call your Propane service man.

It has recently been recognized that odorants are not completely effective warning agents in all cases. Certain odorants can fade away.

A small portion of the population differs in their ability to smell, and the sensitivity to odors generally decreases with age or with impaired physical conditions such as a cold or respiratory allergies.



Propane vapor is heavier than air. Escaping gas will seek out low places such as excavations, to collect and create a flammable mixture.

The use of matches or fire to check for leaks is definitely not advised.

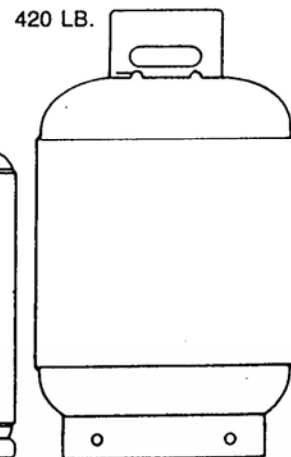
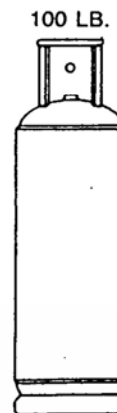
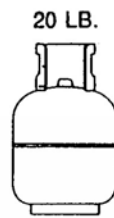
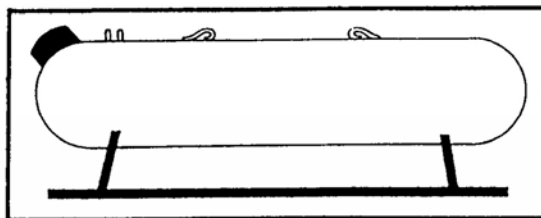


Heat required to convert liquid propane into a vapor within the container occurs when the temperature is above minus 44°F.

Excessive withdrawal from the container at a rate greater than this heat transfer capacity will cause refrigeration of the liquid gas. It reduces both temperature and pressure in the container. Heavy frost will accumulate outside the container at liquid level, which signifies the draw on the container is becoming too great for best efficiency.

TANKS and CYLINDERS

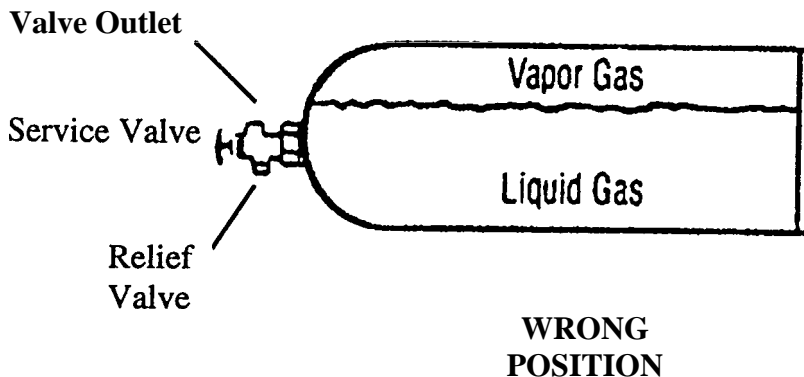
BULK TANK
Stationary
and
Mobile



STORAGE AND TRANSPORTATION

ALWAYS USE-STORE-AND TRANSPORT CYLINDERS UPRIGHT IN WELL VENTILATED AREAS.

In the upright position the relief valve section of the cylinder valve communicates with the vapor space in the cylinder as it is intended to be.



Propane containers are never charged completely liquid full. A vapor space must be maintained above the liquid level to allow for liquid expansion that results from temperature increase. Standard cylinders are charged with 100 pounds by weight of liquid gas.

DO NOT USE-STORE-OR TRANSPORT CYLINDERS IN A HORIZONTAL POSITION.

Cylinders lying horizontally allow liquid gas to communicate with the relief valve. If an abnormal pressure was to occur and the relief valve was required to function, **liquid** gas **would** emit from the valve. It **would** also allow **liquid** to flow to a vapor consuming type appliance. **BOTH CONDITIONS ARE UNSAFE.**

IMPORTANT SAFETY TIPS

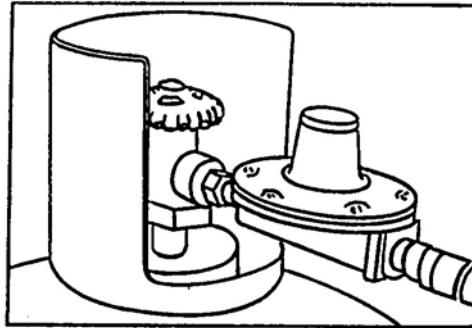
- 1) Do not drop cylinders; make sure valve caps are in place and cylinder valves closed when moving cylinders.
- 2) Make sure cylinders are placed on solid footing or secured to prevent tipping and falling.
- 3) Do not lift any cylinder by its collar, use a hoisting cradle.
- 4) Store full or empty cylinders in a specific area outdoors, where they will be protected against abnormal rise in temperature, tipping over, physical damage or tampering with. Cylinder valves must be closed with protective collars or caps put in place.
- 5) Use only hose and regulating equipment approved for LP-GAS PROPANE services. They must have a minimum working pressure of 350 psi.
- 6) Protect hoses or piping from damaging traffic and excessive heat.
- 7) After changing cylinders or making hose connections, all connections should be checked for leaks with soap or leak detectors.

DO NOT USE MATCHES OR OPEN FLAME

Repair all leaks before use.

- 8) Do not operate gas appliances in confined or unventilated areas, propane needs air for combustion.
- 9) A: Inside a building no more than 3 cylinders (Total of 300 lbs of gas) shall be manifolded together at one location for each heater.
B: Where more than one manifold is required for multiple heater installations, separate these manifolds by at least 50 feet.
C: Cylinders should be at least 10 ft. From heaters, shield cylinders at all times from radiated or blower heat they must not be exposed to temperatures over 125°F.

Regulators should be connected directly to cylinder valves or should be adequately supported.

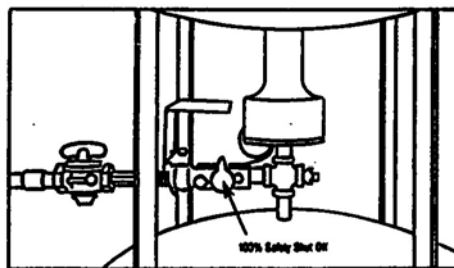


Excess flow check valves are supplied as a safety feature with propane equipment for the construction trades, as an integral part of the cylinder valve, the pressure regulator inlet connector, or manifold fitting for attachment to cylinders.

Open cylinder valves slowly to prevent premature closing of excess flow valve, open cylinder valve fully as a partially open valve will not permit excess flow valve to function as intended. (This is approximately 1/2 to 2 turns of the valve handle).

Use heating appliances equipped with LP-GAS approved safety shut off valves so that in the event pilot lights are extinguished the gas will automatically shut off.

PROPANE TORCHES that are not equipped with a flame safeguard are to be constantly attended while in operation.



CARBON MONOXIDE

Propane requires air to burn carbon monoxide is produced when there is insufficient air for propane combustion or when combustion products are recycled through appliances.

Carbon Monoxide is a colourless, odourless gas that even in small quantities deprives the body of oxygen.

A person exposed to carbon monoxide may experience:

- * Watering and smarting of the eyes.
- * Headaches, Tightness across the forehead and temples.
- * Weariness, Weakness, Dizziness and vomiting.
- * Loss of muscle control.

If someone exhibits these symptoms, provide fresh air immediately and get medical assistance. Monitor the area for carbon monoxide prior to reentry is a must.

Carbon Monoxide poisoning may lead to **unconsciousness and death**.

Check with your Propane Supplier, or local Authorities for approvals or any additional requirements.

Propane Gas Physical Properties

Pounds Per Gallon	5.1
Cu. Ft. Gas Per Gallon Liquid	44.0
Cu. Ft. Gas Per Pound	8.5
BTU Per Gallon	109,956
BTU Per Pound	21,622
BTU Per Cu. Ft.	2,520
Dewpoint in Degrees F	-46
Specific Gravity of Liquid	0.51
Specific Gravity of Gas	1.52
Vapor Pressure PSIG at 0F	23.5
Vapor Pressure PSIG at 70F	109.3
Vapor Pressure at 100 F	172

Informative Data

1 lb. Steam	970 BTU
1 Horsepower	746 KWH
1 HP (boiler)	33,472 BTU/hr
1 Kilowatt hour	3,412 BTU
1 Cu. Ft. Water	6,234 Gal.
1 Gal. Water	10 lbs.
1 Cu. Ft.	1,728 Cu. In.
1 Gallon	277 Cu. In.

PROPANE SAFETY REVIEW QUESTIONS

NAME: _____

DATE: _____

PART 1 FILLS IN THE BLANKS WITH CORRECT ANSWER

- 1) Propane has a boiling point of _____.

- 2) When converting to vapor liquid propane expands about _____ times its liquid volume.

- 3) Propane vapor is _____ than air.

- 4) Never use _____ to check for gas leaks.

PART 2 ANSWER TRUE OR FALSE TO EACH OF THE FOLLOWING

- T / F 1) Propane cylinders can only be transported when in a horizontal position.
- T / F 2) Propane cylinders can be stored indoors when empty.
- T / F 3) Propane can produce carbon monoxide.
- T / F 4) Headaches, weakness, dizziness and vomiting are some signs of carbon monoxide poisoning.