

## FREQUENTLY ASKED QUESTIONS ABOUT LP-GAS TRANSFER COMPRESSORS

1. What rate of liquid flow can be expected from a compressor?

LP-Gas compressors will transfer about 0.65 to 0.80 M<sup>3</sup>/hr liquid per M<sup>3</sup>/hr of piston displacement (5 to 6 gallons per minute for each cfm of piston displacement), providing the installation is acceptable.

2. How long does it take to recover vapors?

The time required to reduce the vapor pressure to about 25% of its original level may be estimated by:

$$T = 1.75 \frac{V}{PD}$$

T is Time (Minutes)  
V is the Vessel's Volume (M<sup>3</sup>)  
PD is the Compressor's Piston Displacement (M<sup>3</sup>/min)  
(V may be expressed in ft<sup>3</sup> if PD is in ft<sup>3</sup>/min)

3. How does the horsepower requirement for a compressor compare to that of a liquid pump?

The horsepower is comparable for liquid transfer only but greater horsepower is required for the vapor recovery phase.

4. How can you tell if an installation is acceptable or not?

- (a) The **compressor should be located as close to the tank being unloaded as possible** so that the heat due to compression can help displace liquid. Sometimes in cold climates the vapor line between the compressor and tank being unloaded is insulated in order to maintain the discharge temperature. Heat expands the gas thus helping to displace the liquid.
- (b) A good LP-Gas compressor installation will have no more than 1.4 to 2 Bar (20 to 30 psi) difference between inlet and discharge during liquid transfer. Proper line sizes and valves are essential.

## FREQUENTLY ASKED QUESTIONS - cont.

### 5. What size piping and type valves are recommended?

#### a. Piping:

	Vapor	Liquid
LB161	25 mm (1 in.)	50 mm (2 in.)
LB361	31 - 50 mm (1.25 - 2 in.)	75 mm (3 in.)
LB601	75 mm (3 in.)	100 mm (4 in.)
LB942	Consult Factory	Consult Factory

The pipe sizes listed are for typical installations with piping lengths up to about 35 meters maximum.

#### b. Valves:

Full flow type such as ball valves.

### 6. What size compressor should be used?

- to 42 M<sup>3</sup> vessels (11,000 water gallon capacity) -- LB-161.
- 98 M<sup>3</sup> vessels (26,000 water gallon capacity) -- LB-361.
- 125 M<sup>3</sup> vessels (33,000 water gallon capacity) -- LB601.
- Barge or ship unloading -- LB601 or LB942.
- For more than one tank of any size -- multiple small compressors or a single next size larger compressor can be used.

### 7. What happens when too large a compressor is used?

The liquid excess flow valves will close, stopping the liquid flow.

### 8. Why are the vapors discharged into the liquid space during vapor recovery?

The recovered vapors are warm or actually hot when they are discharged from the compressor. These **recovered vapors are discharged into the liquid space** so that the heat can be absorbed by the liquid as the vapors bubble up to the vapor space. This is necessary to prevent raising the tank pressure unnecessarily high and also, to prevent overloading the compressor motor.

### 9. To what pressure do you lower a tank car when recovering the vapors?

In the summer months the tank pressure is lowered to approximately 1.7 to 3.4 bar-g (25 to 50 psig). In colder winter months the pressure is reduced to about 0.7 to 1.4 bar-g (10 to 20 psig). The higher end of the ranges are for LP-Gas with high propane content.

## FREQUENTLY ASKED QUESTIONS - cont.

### 10. Why isn't the pressure reduced more?

Because it is not economical to do so. Near the pressures mentioned above, the cost of operating the compressor begins to approach the value of the gas which becomes less dense as the pressure drops.

### 11. Can a compressor be used with a meter?

Yes, but it is not recommended because the operation is very inefficient. The liquid meter presents additional restrictions in the line and the meter back pressure valve adds approximately 1 bar (15 psi) on to the compressor discharge pressure. Also, only the liquid flow is metered, the vapor is not.

### 12. Does extremely cold weather effect a compressor unloading operation?

The liquid transfer rate will fall, but less vapor remains to be recovered. So, the total time for both operations is not greatly affected.

### 13. Can a compressor displace liquid even if the temperature is -18° C (0° F).?

Yes, because the LP-Gas system has its own atmosphere. Vapors are present although the vapor pressure may be below that of the atmosphere at extremely low temperatures.

### 14. When should the 4-way valve be changed to start the vapor recovery process?

When the liquid flow stops. A sight glass or flow indicator in the liquid line is the surest indicator, however a drop in the discharge pressure and a change in the compressor sound will also occur.

### 15. Can a compressor help provide a positive suction flow to a liquid pump?

Yes. Systems with the vessels separated by a great distance or significant elevation difference may require that both a compressor and a pump be used.

### 16. Why does the compressor have to be oil free?

Because cylinder lubrication oil accumulates in the LP-Gas plant system or tank trucks and ultimately can cause problems in carburetion and domestic systems.

## FREQUENTLY ASKED QUESTIONS - cont.

17. Why is a seal necessary between the compressor cylinder and crankcase?

- a. To prevent crankcase oil contamination of the product.
- b. If no seal is used (such as on refrigeration type compressors), the LP-Gas is absorbed and tends to dilute the crankcase oil causing part failures.
- c. Likewise on refrigeration type units, should the inlet pressure drop too low or to a vacuum, the crankcase oil is "sucked" out of the crankcase and into the gas stream almost instantaneously.

18. Why are air-cooled compressors used for LP-Gas transfer?

LP-Gas compressors operate at much lower temperatures than typical air compressors, so water-cooled cylinders are not needed. Also, water cooling would remove heat from the discharge gas; heat that needed for effective liquid transfer.

19. Why is a liquid trap necessary?

Variation of temperatures result in condensation of LP-Gas vapors in the piping. If no trap is used, condensation can be drawn into the compressor cylinder resulting in **severe damage** to the compressor. Also, the compressor valves are designed for vapor flow and cannot handle the capacity in liquid form.

20. Does a compressor pump liquid through it?

No! Vapor only flows through the compressor which in turn displaces liquid.

21. What about the compressor foundation?

The compressor should be firmly bolted to a concrete foundation that solidly supports the compressor along the full length of its baseplate. The foundation should be at least 20 - 25 cm (8 - 10 in.) thick.

22. Are any special tools needed?

While not strictly required, Blackmer offers two special tools: 1) a protective cone fits on top of the piston rod to protect the packing during installation, and 2) a special wrench simplifies removal of the valve hold-down screw on the LB161, LB162, and LB942 models. The adjustable spanner used to remove the pistons is commercially available, but is not present in most tool sets. Blackmer offers all of these items, or a kit complete with all tools required for normal maintenance.