

LPG Cylinder Tank Evacuation

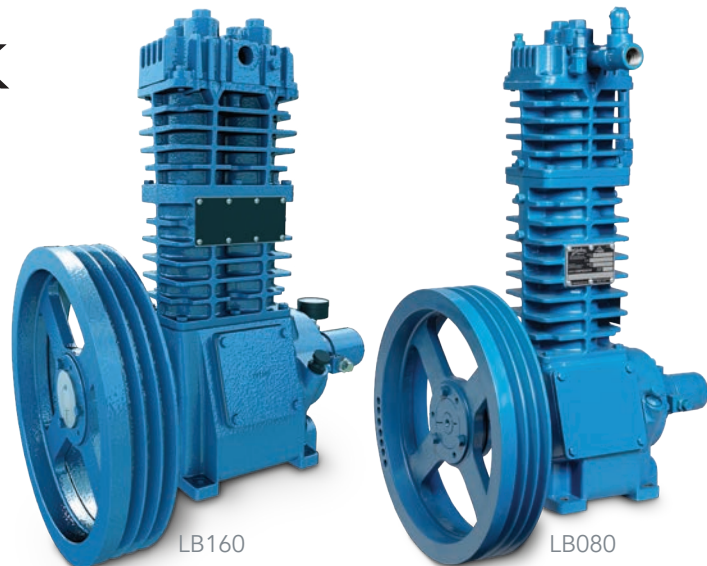
APPLICATION DOCUMENT

While popularity in the use of liquefied petroleum gas (LPG) as a motor fuel is in a growth stage, it has a long history as a first-choice fuel in other applications. Two of the most common are as the cooking source for BBQ grills and the power source for forklifts.

In these instances, the main challenge for the supplier is not filling the tanks, but clearing empty tanks of any remaining LPG vapor and the small amount of liquid that may remain. There are two reasons that empty tanks just can't be opened and the vapor allowed to escape into the atmosphere: 1) federal regulations prohibit it, and 2) the residual vapor and liquid can be collected and monetized.

Therefore, any LPG-supply operation that services a large amount of LPG cylinders must have in place a tank-evacuation program. This evacuation process is usually performed in four steps:

- **Step 1:** An inverted cylinder is connected to a holding tank at low pressure. When the "A" valve between the cylinder and holding tank is opened, gravity and the low pressure in the holding tank force the liquid into the tank. Note at this point that a four-way valve that connects the holding tank to the storage tank should be in the "B," or closed, position.
- **Step 2:** After turning the four-way valve to the "A," or open, position, the compressor situated between the holding and storage tanks pushes the liquid from the holding tank into the storage tank, with any vapors in the storage tank sent to the holding tank. This action creates enough pressure to facilitate the LPG-transfer process.
- **Step 3:** Once the LPG has been transferred, with the four-way valve in the "B" position and the "A" valve



open, the compressor pulls vapors from the holding tank and cylinder and pushes them to the storage tank's liquid section until the holding tank is at the desired pressure.

- **Step 4:** Close the "A" valve, move the four-way valve to the "B" position and disconnect the cylinder from the system; the holding tank has been returned to low pressure and the system is ready to perform the evacuation process again.

Compressors are integral to the LPG-cylinder evacuation process, but it can be optimized only if an oil-free model is used. Lubricated compressors create the risk of crankcase oil entering the product stream, which will contaminate the LPG and compromise its integrity.

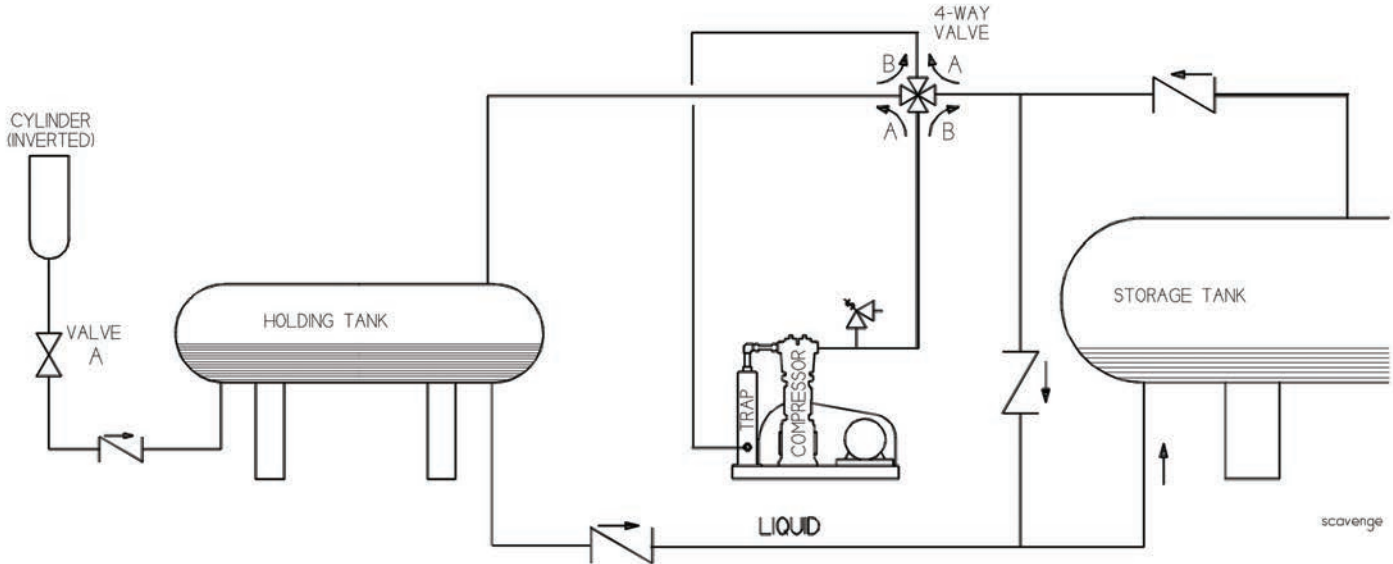
Knowing that an oil-free, non-lubricated compressor is the best alternative for LPG tank-evacuation activities, Blackmer® offers its LB Series Reciprocating Gas Compressors. Specifically, the smaller LB080 and LB160 models, produce flow rates between 8.45 cubic feet per minute (cfm) (14.35 m³/hr) and 16.9 cfm (28.7 m³/hr), which are ideal for LPG-tank evacuation. Both models feature thicker, more robust wear parts than competitive units, along with ductile-iron heads and cylinders, steel pistons and self-adjusting piston seals that all contribute to a rugged compressor that performs reliably in the most challenging conditions.



LPG Cylinder Tank Evacuation

Emptying LPG Cylinders

Diagram shows system utilizing a compressor to empty cylinders of both liquid and vapor.



COMPETITION

• Lubricated Compressors

Lubricated compressors can deliver the same levels of performance as non-lubricated models, but they run the risk of the crankcase oil entering the LPG stream. When this happens, the LPG becomes contaminated, which compromises its integrity.

FROM THE FIELD

Evacuating a single LPG cylinder is a rather straightforward process. Complexity enters the equation when six, eight, 10 and even more cylinders need to be emptied at once. This is often the case for larger LPG-supply operations with extensive customer bases that require a steady supply of the fuel.

Because emptying a single cylinder can take between 15 and 30 minutes, achieving optimized efficiency is the driving force behind a multi-cylinder emptying system, where the same amount of time is needed to

empty, for instance, 10 times as many cylinders. Therefore, a system must be created that allows multiple cylinders to be connected to the holding tank. In this case, a rack that can hold multiple cylinders is built with a network of piping that allows the evacuation of numerous cylinders at once.

An ancillary consideration for these multi-tank systems is the climate in which the evacuation process is conducted. The pressure inside the holding tank dictates how quickly the tanks can be evacuated, and that pressure changes with the ambient temperature. If the pressure gets too high, it can be a challenge to evacuate the cylinders down to zero, which will make it nearly impossible to perform vapor-recovery activities in the storage tank. If these conditions are unavoidable, the best solution is to use a two-stage compressor that will perform two stages of compression instead of one, making it easier to lower the pressure in the storage tank.

For more information on these additional solutions, visit us at blackmer.com.

atk0120-079 03/22

Copyright 2022 PSG®, a Dover company

Authorized PSG® Partner:

Where Innovation Flows 



PSG
1809 Century Avenue SW
Grand Rapids, MI 49503-1530 USA
P: +1 (616) 241-1611 • F: +1 (616) 241-3752
info@blackmer.com
blackmer.com