

# Blackmer®



Where Innovation Flows

## LPG Bulk Plants

### APPLICATION DOCUMENT

Bulk plants that store and supply liquefied petroleum gas, or LPG, are beehives of activity. Depending on the plant's physical configuration, LPG arrives via barge, ship or railroad, at which point it is offloaded and transferred into a series of storage tanks.

When needed, the stored LPG is transferred to large transport trucks or smaller bobtails that carry it to either an intermediate rack storage facility or directly to the end user.

Pumps play an indispensable role in this process, as they are the conduit through which the LPG flows from the storage vessel into the transport vehicle. The critical demand in the transfer of LPG is finding a pump technology that is capable of achieving and maintaining a high flow rate with no cavitation or damage to pump internals occurring. For example, at higher flow rates, LPG is more likely to cavitate, which makes it more difficult for the pump to maintain the desired flow rate. Also, because LPG is a thin fluid, some pump technologies, such as gear, rely on metal-to-metal contact to facilitate the transfer process, causing them to gall and break down prematurely.

But utilizing a pump that can create and maintain high flow rates is only part of an efficient LPG-transfer equation at a bulk plant. The pump's flow-rate capabilities must be in harmony with the transfer system's components and setup. In other words, the entire LPG-transfer system helps determine if the required flow rates can be achieved. For instance, flow-rate optimization is only possible if the system's piping, valves and pump meter are compatible, and if the proper connections for all of these components are in



LGLD4  
Sliding Vane  
Pump

place. No matter the abilities of the pump, if the system has not been designed and outfitted properly, desired flow rates will be very difficult to realize.

Blackmer® has the answer to LPG-transfer optimization with its LGL Series Sliding Vane Pumps, all of which are part of the company's Cavitation Line of pumping products. The LGLD model pumps, all constructed of ductile iron, come in 2-inch (51 mm), 3-inch (76 mm) and 4-inch (102 mm) sizes. They have the ability to produce flow rates ranging from 105 to 370 gpm (397-1,400 L/min) and operate in temperatures ranging from -25°F to 240°F (-32°C-115°C) at maximum working pressures of 350 psi (24.1 bar).

What sets them apart from the competition is their cavitation suppression liner that reduces vibration, noise and wear, resulting in longer and more efficient operation. The cavitation suppression liner, along with the pump end discs and vanes, are also replaceable, allowing the pump to be rebuilt to like-new condition.



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## COMPETITION

### • Gear Pumps

Gear pumps have a simple design that makes them well-equipped to transfer lubricating liquids, but LPG is non-lubricating. This creates metal-to-metal contact of the pump's gears, which will lead to performance degradation over time. The metal-to-metal wear will also create and enlarge cavities in the flow path, which will lead to efficiency-robbing product slippage.

### • Other Vane Pumps

Blackmer Sliding Vane Pumps are the only ones to feature cavitation-suppression features, which makes competing models susceptible to the internal damage that unchecked cavitation can cause.

## FROM THE FIELD

An LPG terminal in the Upper Midwest was looking for ways to optimize its product-transfer capabilities when the facility's operations manager suggested a seemingly pie-in-the-sky flow-rate goal: he wanted to achieve a 1,000-gpm (3,785 L/min) flow rate with four pumps for transport loading, even though the highest documented LPG flow rate any of his co-workers could remember seeing was 850 gpm (3,218 L/min).

Rather than take "No" for an answer, the operations manager redesigned the terminal layout so that it was as flow friendly as possible. That meant piping with no elbows or 90-degree turns, and the loading process would require the LPG to flow simultaneously through

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two hoses and two meters, all of which had to be able support a flow rate of at least 500 gpm (1,609 L/min). That would require a 10-inch trunk line and 4-inch pipe equipped with a like-sized flange shutoff and strainer.

Most importantly, it would require pumps that could easily deliver the needed flow rate: 4-inch (102 mm) Blackmer® LGLD4 Sliding Vane Pumps. The LGLD4 pumps were the perfect choice because they feature a replaceable cavitation suppression liner that reduces noise, vibration and wear, as well as replaceable vanes and discs that allow for easy rebuilding of the pumping chamber to like-new condition. All models are base-mounted and equipped with an internal relief valve. They can be powered by a hydraulic motor or electric motor, depending on the installation location and application.

When the four pumps were put into service, they went above and beyond the 1,000-gpm demand, with each line reaching 545 gpm (2,063 L/min), or 1,090 gpm (4,126 L/min) total for each set of pumps that was tasked with loading activities. By virtue of this optimal plant and piping design, the LGLD4 pumps were able to achieve a much higher flow rate than the conventional maximum flow rate of 425 gpm (1,609 L/min). These two lines with two pumps each are capable of filling a 7,000-gallon truck in about seven minutes, which is a significant improvement over the expected loading time.

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