BLACKMER LIQUEFIED GAS PUMPS FOR LP-GAS AND NH3 SERVICE

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

MODELS: LG1¼C, LG1½C

DISCONTINUED MODELS

960405
PARTS LIST NO. 585/ZB

Section	500
Effective	February 1982
Replaces	April 1980

SAFETY RULES

It is recommended that NFPA Pamphlet 58 be consulted for Safety Rules. Consult local and State regulations also.

WARNING DANGER

DO NOT ATTEMPT TO OPEN THE PUMP UNTIL YOU HAVE BLED OFF THE PRESSURE. ON SYSTEMS WITH METERS, THE DIFFERENTIAL VALVE WILL KEEP LIQUID UNDER PRESSURE IN THE PUMP, METER AND PIPING EVEN WHEN THE HOSE IS EMPTIED.

PUMP DATA

	LG1¼	LG1½
Nominal Capacity (GPM)		
(1800 RPM – 80 PSI)		
at Ambient Temperature of:		
80° F.	18	28
32° F.	14	22
(1200 RPM – 80 PSI)		
80° F.	10	17
32° F.	8	13
Maximum Relief Valve Pressure (PSI)	125	125
Maximum Differential Pressure (PSI)	100	100

Maximum Pump Speed . . . . . 1800 RPM
Maximum Temperature . . . . . 240° F.

These pumps are listed by Underwriters' Laboratories, Inc. for liquefied-petroleum gas and NH3, with a vapor pressure of not more than 200 PSIG at 100° F., at a differential pressure not over 125 PSI.

INSTALLATION

LOCATION

Locate the pump as near the source of supply as possible to reduce pipe friction. A good foundation reduces vibration and noise and improves the pump performance. On permanent installations, it is recommended that the pumping units be securely bolted to a concrete foundation.

When new pump foundations are to be cast in concrete, it is suggested that anchor bolts of the type shown in Fig. 1 be set into the concrete.

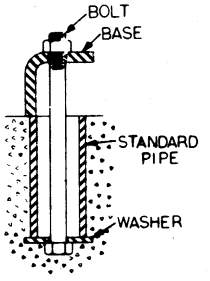

Fig. 1

This type of bolt allows for slight shifting of position to better line up with the mounting holes in the base plate. When pumps are to be located on existing concrete floors, holes should be drilled into the concrete and foundation bolt anchored therein.

PIPING

Many pump systems deliver at a rate below the designated capacity of the pump because the system was improperly piped. Restrictions in the pipe line should be avoided, such as elbows, sharp bends, globe valves, certain restricted type plug valves and undersized strainers. Use pipe of adequate size and strength that has been thoroughly flushed before connecting to the pump. Less restrictive gate or ball valves should also be used. Flexible connectors used near the pump will compensate for expansion, contraction and will provide a more vibration free operation.

Unions and valves in the piping near the pump will facilitate maintenance. On the intake side, locate the nearest fitting at least six inches from the pump to permit the removal of the pressure relief valve cover.

When the unit is first started, rotation should be checked with the direction arrow on the pump. The discharge pressure should be compared to the supply pressure with a closed discharge. If the differential is over 100 psi, the separate bypass valve setting should be reduced (see "Relief Valve").

Whenever possible, keep liquefied gas systems full of liquid, even when idle. This will keep the "O" rings from changing shape, shrinking or super cooling. Evaporation of liquefied gas leaves an abrasive powder on the surface which can cause wear to the pump, seals, meter, etc. If the system does not function properly, refer to the section on "Pump Troubles and Their Cures".

Use a vapor return line if possible. This will speed up delivery since a vapor line prevents back pressure from building up in

the receiving tank and a vacuum from forming in the supply tank. In laying out the system, read the section on "Pump Troubles" for suggested ways to eliminate difficulties they develop.

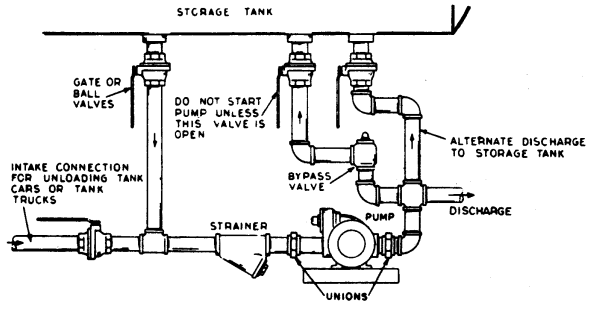

Fig. 2

ALIGNMENT

Where flexible couplings are used, the coupling cover should be removed and a straight edge laid across the two hubs of the coupling as shown in Fig. 3. The maximum offset should be less than .015".

With a feeler gauge or piece of flat steel of proper thickness, check the space between the two coupling halves. Insert a gauge at a point on the coupling and at 90° increments about the coupling. The space should not vary more than .020". If misalignment does exist, it must not exceed the above limits.

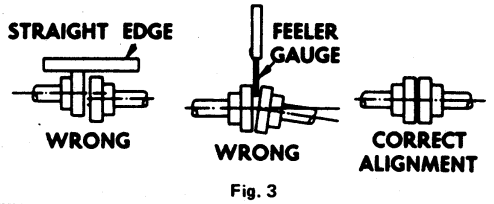

Fig. 3

RELIEF VALVE & BYPASS VALVE

The built-in spring loaded valve is to prevent damage to the pump or pumping system from excess pressure and should not be used for recirculation. A separate bypass valve, such as the Blackmer Model BV3/4 or BV1, is required by Underwriters' Laboratories Inc., piped from the pump discharge system back to the supply tank as shown in Fig. 2. The setting on the separate bypass valve should be at least 25 psi less than the 125 psi relief valve setting. Do not pipe the bypass valve back to the intake line. The valve and piping should be of adequate size to accommodate the full flow from the pump when the discharge line is closed and the pump running at its normal maximum speed.

TO REVERSE PUMP ROTATION

Remove bearing covers and lock collars from both heads, and the head from the shaft side. Reverse the rotor and shaft so that the shaft protrudes through the head still on the cylinder.

The vanes must be reversed in the slots so that the pressure relief grooves face in the directio of rotation. The rounded or wearing edge of the vanes must be outward to contact the bore of the cylinder. See sections DISASSEMBLY and ASSEMBLY for removal and replacement of heads and rotor.

STRAINER

A strainer (usually one size larger than pipe size) should be installed in the intake line to protect the pump from foreign matter. Inspect and clean the strainer periodically as a dirty strainer screen can cause the pump capacity to drop and the wear rate to increase. New installations should be inspected frequently until the initial accumulation of dirt, weld splatter, etc., is flushed from the system.

OPERATION

PERFORMANCE CHECK

Before starting, install a pressure gage in the tapped hole nearest the discharge port in the body by removing the gage plug (after gas is purged from the pump). Then check all the valves to make sure they are open. It is especially important that all valves between the pump and the bypass valve are open.

Break union joints to check for strain on the unit; pipes should not spring away or drop down. When the unit is first started, the discharge pressure, with closed discharge, should be checked and compared with the supply pressure. If the differential is over 100 psi, the separate bypass valve setting should be reduced. The separate bypass valve is necessary to prevent the pressure from ever rising high enough to open the relief valve on the pump, except under rare conditions. (If the separate bypass valve setting, is too near the pump valve setting, the pump valve will open and the pump will not deliver properly.)

To increase the pressure setting on the pump relief valve, remove the cap from the adjusting screw, loosen the lock-nut, and turn the adjusting screw clockwise or inward. To reduce the pressure setting, turn the screw counter clockwise, or outward.

Check the general performance of the unit; gallons per minute delivered, noise level (if any), signs of overheating, vibration, leakage, etc. If there is any malfunction, refer to the section, "Pump Troubles and Their Cures".

LUBRICATION

The pump bearings should be lubricated every three (3) months with a light No. 2 Lithium-base type of grease.

For extreme low temperature service in northern climates, the pump should be lubricated with a low temperature grease.

Listed below are some of the low temperature greases which can be used for this service:

Shell Oil Company – B & B 70919
Mobil Oil Co. – Mobil Grease No. 22
Standard Oil Co. – Supermil Grease No. 42901
Exxon – Beacon 325

Apply grease slowly with a hand gun to the grease fittings on each bearing cover until excess grease begins to come from the relief fittings. It is normal for some grease to escape from the tell-tale holes under the bearing covers for a short period after

lubrication. If this condition persists, the head must be removed and the mechanical seal replaced.

DISASSEMBLY

Before work is started on a pump it must be drained and the gas pressure relieved.

This model pump uses thrust collars against the bearings to protect the pump from end thrust. To remove the head, first remove the bearing cover. Loosen the set screws in the bearing collar and remove the collar. The bearings are slip-fit on the shaft. After the head capscrews are removed, loosen the head by prying with a screwdriver or tapping with a lead hammer, and slide the head assembly off the shaft. The shaft must be free of burrs and roughness to prevent damage to seals.

When the head is removed, the stationary seat of the seal will come off with the head. The rest of the seal can then be slid off the shaft as a complete unit.

If the seal has been leaking, it is advisable to replace the entire seal, including the stationary seat and the "O" ring. It is important to keep all parts of the seal clean. Before installing a new seal, the shaft should be thoroughly cleaned and all burrs and roughness removed with emery.

ASSEMBLY

If the rotor and shaft have been removed, it will be necessary to install the two bottom vanes and the push rods before replacing. This will prevent the push rods from falling down against the inner surface of the cylinder. The vanes must be held in place while making the installation. To install the two remaining vanes, turn the shaft by hand until an empty slot comes to the 12 o'clock position, insert a vane and move to the next slot.

Vanes must be installed with the rounded or wearing edge outward to contact the surface of the cylinder. The relief grooves in the vanes must face the leading, or pressure side.

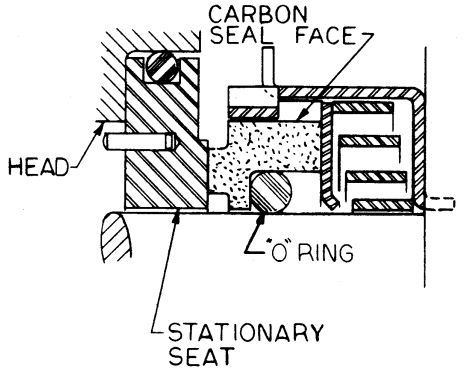

Fig. 4

Next install the disc with the seal recess toward the outside and the relief hole on the discharge side of the pump, approximately 45° from the base of the pump. The head "O" ring should then be put in place. See Fig. 5.

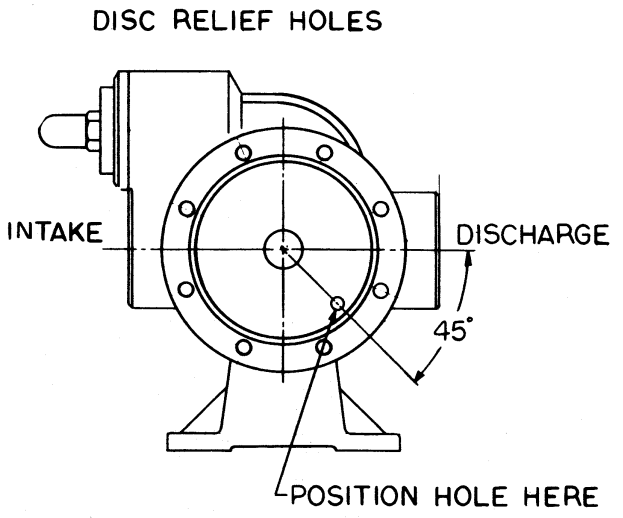

Fig. 5

Before installing the mechanical seal, remove all burrs and rough spots from the shaft which might cut or nick the rubber "O" rings. A small amount of oil applied to the shaft will help slide the parts in place.

Place the rotating half of the seal on the shaft and engage the two driving prongs on the seal jacket with the notches in the shaft shoulder. The polished face of the carbon should be outward and the "O" ring inward. Wipe all traces of dirt and dust from the face of the carbon. Place the stationary seat in the recess in the head with the polished face outward and the drivepin engaged in the slot in the head.

Place the bearing in the recess in the head with the grease shield toward the inside, so that the balls are visible. When placing the head on the shaft avoid striking the polished face of the stationary seat against the end of the shaft. Tighten head capscrews on both heads before locking bearing thrust collars to shaft. Rotate shaft by hand to test for binding.

It is very important that the bearing thrust collars be properly installed. Slide the collar onto the shaft with the counterbored, or enlarged side, toward the bearing. Tap collar against the bearing with a hammer to insure the bearing is properly seated against the back of its recess. Push the collar forcibly against the bearing by hand while tightening the setscrews as tightly as possible. Check for binding once again by rotating shaft by hand. If it turns freely, replace bearing cover and its gasket.

PUMP TROUBLES AND THEIR CURES

LEAKAGE

Mechanical seals can be damaged and begin leaking from using the wrong grease, greasing with a high pressure gun, dirt or abrasive particles entering between the seal faces, cut or otherwise damaged "O" rings.

Leakage will appear at the tell-tale holes under the bearing housing on the pump head. If leakage becomes excessive, the entire mechanical seal assembly should be replaced. After rebuilding a pump, if leakage appears from between the pump cylinder and the head, the head should be removed and its

"O" ring inspected for cuts and nicks. If the "O" ring is damaged, replace it.

VANE WEAR

Vane wear and push rod penetration are usually caused by excessive vapors entering the pump (cavitation) or by abrasives in the liquid. Cavitation causes the vanes to "bounce" violently and sometimes is accompanied by noise and vibration. Intake piping should be at least 1½ inch on short piping; and 2 inch on long piping.

Cavitation can be caused by circulation of liquid through the built-in relief valve on the pump or through the separate bypass valve when improperly piped back into the intake pipe. Cavitation can also happen if the relief valve operates at a lower differential pressure than the separate bypass valve even though the bypass valve discharges into the supply tank. Check the setting of the separate bypass valve.

Cavitation is also caused by restricted intake piping, small or defective excess flow valve, plugged or too fine a strainer basket, and the use of globe valves instead of ball-type or gate-type valves.

One or more vanes installed backwards will usually cause noise and loss of capacity.

ESCAPING GREASE

Grease escaping from the tell-tale holes under the bearing housing or from the grease relief fitting on the bearing cover is normal for s short period of time after greasing the pump. If grease continues to come from these places, the grease relief fitting, the bearing grease shield and the mechanical seal should be inspected for damage. (a slow gas leak past the seal could be washing grease out of the bearing.) If grease escapes around the pump shaft, the seal in the bearing cover should be removed and inspected for damage.

LOSS OF CAPACITY

Probable causes:

1. Closed valve in pipe line . . . it is important to check valves in the system before starting the pump.
2. Cavitation & Vapor binding . . . may be caused by circulation of liquid through the relief valve. This might happen if the separate bypass valve is too small, or if the piping to the valve is too small. It can also be caused by the pump overheating.
3. Pump rotating backward . . . check rotation of the pump with the arrow on the casing.
4. Suction line too long . . . locate pump as close to supply as possible. It is easier for a pump to push liquid through a discharge pipe than pull it through suction pipe.
5. Excessively worn vanes, discs, and rotor ends . . . will increase pump slippage. One or more vanes installed backwards will reduce capacity.

DAMAGED PUMP PARTS

Worn or scored discs and rotor ends can be caused by improper mounting of the thrust collar, (see Assembly). Excessive wear of vanes, discs or rotor ends, increase pump slippage. Worn parts should be replaced. Corrosion of pump parts can also be caused by calcium chloride brine carried over from dehydrators. Corrosion may damage internal parts and weaken the entire system. Corrective action should be taken immediately to eliminate the cause of corrosion.