OBERDORFER PUMPS

A GARDNER DENVER PRODUCT

Chemical Gear Pumps

Installation

Principal of Operation

All Oberdorfer Chemical Gear pumps are the positive displacement type. A definite amount of liquid is displaced with each revolution of the pump. The displacement capacity will vary directly with the pump speed within specified limitations. These pumps will produce a discharge pressure equivalent to the conditions of the particular installation. If these conditions are in excess of the design capability of the pump, the discharge pressure may rise to a point where the pump will be damaged and/or the driver overloaded.

Inspection:
Upon receipt of any pump or pump unit, check carefully for possible damage or shortages. Be sure that the shaft has not been bent or damaged. Rotate the pump by hand to be sure it is free and without tight spots. If the pump is to be stored, it should be kept in a dry location.

Mounting Bases

Pump units should be mounted on either a concrete or metal foundation of sufficient weight and strength to properly support the entire pump unit. It should be located as close to the liquid source as is practical, while allowing for accessibility for normal pump maintenance. The foundation should be made flat and smooth to ensure correct alignment of the pump. Provisions should be made to bolt the unit securely in place.

Do not locate the pump unit in a pit unless provisions have been made for proper drainage and ventilation.

Alignment: Correct alignment is absolutely essential for satisfactory pump life. Complete pump units are set and aligned at the factory on a flat surface plate and shims are inserted where necessary to provide perfect alignment. However, all baseplates are somewhat elastic and as a result we cannot assume responsibility for mechanical operation unless the shop alignment is reproduced when the unit is secured to its foundation. Since no foundation is perfectly flat or level, it is therefore necessary to shim the baseplate until the pump and motor shafts are level and parallel.

Recommended drive arrangement for pump only is direct motor drive. For belt or pulley drive application, pillow block bearing must be used to achieve acceptable pump life. However, it is important to ensure that the pump and motor shafts are parallel and in line. Recheck the alignment after the piping has been connected to the pump.

After the unit has been completely set and piped, check that the pump rotates freely by hand before activating the driver.

When pumps only are supplied for field mounting, it is important that the proper alignment between pump and drive is maintained. The baseplate should be secured to a flat surface plate and the driver and pump set so that the shafts are level and parallel.

The use of flexible coupling will not compensate for poor alignment. Parallel alignment can be determined by use of a straight edge across the rim of both coupling halves at four positions ninety degrees apart. Couplings aligned in this manner should be true to within .005" at any position. Angular alignment can be check by gauging the coupling gap at several points.

It is particularly important that pumps driven through a flexible coupling be mounted in such a manner as to ensure sufficient gap between the coupling components to allow for any end play in the driver.

Suction Piping: Chemical Gear pumps are capable of operating at 17.7 inches mercury suction (20’ water). If the static lift plus pipe friction losses combine to exceed this figure, pump operation will be erratic or no pumping at all will be realized.

The most desirable pump installations are those with the shortest suction lines. It is therefore important to locate the pump as close to the liquid source as is practical. Suction piping should never be less in diameter than the pump suction opening. When handling thick liquids with appreciable viscosity, the suction pipe should be increased to a greater size than the pump opening.

It is particularly important that the suction line be air tight. Use a good pipe joint compound or tape at all joints. If the suction line is not tight and air is allowed to enter the pump capacity will be noticeably reduced or it may not pump at all.

Be sure that the suction line is completely clean and free of any foreign matter. Avoid high spots in piping which will tend to trap air. It is good practice to install either a foot valve or check valve in the suction line to ensure that the pump will prime quickly when started.

When handling highly volatile chemicals, it is necessary to reduce the suction height to a point where vaporization will not occur. In some instances, a positive suction head will be required.

Suction Strainers: Gear pumps are designed and fitted with very close internal clearances. The entry of foreign material or abrasives will cause rapid wear or extensive damage to the pump. It is therefore necessary to install a strainer at the pump suction.

Select a strainer of proper size and material with as fine a mesh as is practical, being careful that the pressure drop through the strainer will not add to the suction lift to exceed the suction capability of the pump. Install the strainer as near the pump suction as is practical and in such a manner that it can be easily opened and cleaned. Be sure to arrange a regular inspection on the strainer basket to avoid clogging.

Discharge: Select pipe of sufficient size to ensure that the resulting friction loss does not add to the discharge head an amount that will exceed the design capability of the pump or motor. It is advisable to install a fitting in the discharge line adjacent tot he pump to allow for priming or venting and installation of a pressure gage for both system and pump performance evaluation. To avoid excessive pressure build-up due to a closed or blocked discharge line, ore due to an increase in liquid viscosity, it is often necessary to install a relief valve in the pumping system.

Chemical Gear pumps are not available with a relief valve built onto the pump. When required, it is necessary that the relief valve be installed in the discharge piping and piped back tot he source of supply. Heat is better dissipated over large surface areas. The relief valve should be set at a pressure of approximately 10 PSI in excess of the designed operating pressure, but not so high as to overload the drive or the pump itself.

Product Contamination:
All Chemical Gear pumps are assembled and tested using a suitable grade of machinery oil. Unless specified, this oil is left in the pump during shipment. It ensures some lubrication during start-up. If this oil is detrimental to the system, it will be necessary to dismantle the pump and clean all parts thoroughly. Before starting, be sure to fill the pump with a compatible liquid.

Operation

Priming:
Before operating the pump, make sure that it is thoroughly primed. If at all possible, use a good grade of light lubricating oil. Failure to properly prime the pump could cause immediate damage to the working parts.

Lubrication:
The internal bearings in all Chemical Gear pumps are lubricated by the liquids being pumped. Outboard pillow block support bearings and motor bearings should be lubricated as covered by the manufacturer’s instructions.

Direction of Rotation:
Upper shaft drive is standard and standard direction of rotation is clockwise when facing shaft end of the pump. When rotated in this manner and the pump and/or piping must be installed so that the suction line is connected to the port on the left hand side of the pump. If the right hand port is to be the inlet or suction, the rotation must be counter clockwise when facing the pump from the shaft end.

Chemical Gear pumps are designed to operated in either direction of rotation.

Repair

Disassembling Pump:
Repair kits are available for all Chemical Gear pump models. Each repair kit includes replacement gaskets, seal, gears, shafts, and bearings.

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Oberdorfer Chemical Gear pumps are constructed of three sections – a rear cover, a body section, and a front cover. The three sections are bolted together with through bolts and nuts.

Remove the through bolts and separate pump sections by tapping lightly while forcing sections apart. Pump body and front cover are doweled together. Ease body and front cover off dowel pins by lightly tapping and forcing apart. Light tapping on exposed pump drive shaft aids separation of pump section. Note that the all plastic gear pump does not use any dowel pins.

Remove rear bearings.

Slide out idler gear and shaft assembly and the front idler bearing.

Slide out the drive gear and shaft assemble.

For mechanical seal models, the drive gear and shaft assembly also includes thrust washer, seal retaining ring, and mechanical seal head.

Two set screws secure the seal head to the drive shaft. Loosen both set screws and slide the seal head from the drive shaft.

Removal of the seal retaining ring (snap ring) allows sliding off the thrust washer and upper front cover chamber – seal wearface and seal seat – can be pried out by using a hook tool or by pushing a 1/8" diameter drift through the push-out hole in the front cover.

Metal gears are pinned or keyed to pump shafts and are normally provided as gear and shaft assemblies.

Plastic gears are driven via woodruff keys and are positioned and retained over the woodruff keys by retaining rings. Plastic gear and shaft assemblies are also normally provided as gear and shaft assemblies.

Replace any parts where wear is evident.

Re-Assembling Pump:

Carefully clean all parts and lubricate lightly.

- Make sure pump body faces are clean and free of nicks or scratches.

-If new bearings are used, try in body and on shaft before re-assembling

pump.

For mechanical seal models:

Prepare the front cover for re-assembly by inserting the seal wearface and seal seat into the cover’s seal chamber.

- Note the slot in the ceramic seal wearface must align with and engage

with a restraining pin projecting internally from the seal chamber end. Its' purpose is to prevent rotation of the ceramic seal wearface. Improper alignment and non-engagement can result in a chipped or broken ceramic wearface when pump sections are bolted together. Seal leakage will result.

Next, prepare the drive gear assembly by sliding on the front bearing, gasket and thrust washer.

Install seal retaining ring into the groove provided on the shaft.

Slide the mechanical seal head onto the shaft-metal end first – and position against the seal retaining ring.

- Note the lapped black carbon sealing face on the other end of the

  mechanical seal head must be clean and lubricated with light oil. It must also be free of marks or scratches when in contact with the seal wearface.

Tighten the two seal head set screws to insure it will rotate with the shaft and carefully insert the complete drive gear and shaft assembly into the pump body.

Next assemble the lower front carbon bearing into pump body.

Insert idle gear shaft assembly and remaining bearings into the pump body section.

Assemble front cover by engaging dowel pins into body.

Insert all (8) cover bolts into front cover and body, assemble rear cover with gasket and (8) acorn nuts. Tighten bolts carefully drawing the three pump sections together. Tighten bolts in diagonal sequence. Rotate drive shaft by hand to insure alignment and pump looseness.

Note: Chemical Gear pump internal tolerances are held extremely close. Pump parts are manufactured to precise dimensions and most rigid quality control standards. The smallest foreign particle or damage in the form of a nick or gouge could jam the gears and bind the pump. Extreme cleanliness and care is essential for proper pump assembly.

Operating Temperatures and Pressures:
For metal Chemical Gear pumps (stainless steel and Alloy C) several gear options are available. A combination of Alloy C drive gear and Teflon idle gear offers maximum corrosion resistance with limits of 100 psi pressure and 100^0 F temperature. Drive and idle gears of W88 stainless steel are suitable for 150 psi pressure and 450^0 F temperature. Drive gear and idle gear of Teflon offer excellent corrosion resistance, low noise level and economy, but are limited to 50 psi pressure and 100^0 F temperature. Teflon gears have lower life expectancy than metal gears.

For Plastic Chemical Gear Pumps: Temperature extremes are detrimental to service life and should be avoided. Basic materials of construction allow temperature range of –40 to 180^0 F and pressures up to 100 psi. High pressures accelerate pump wear and reduce service life.

When handling products with temperature in excess of 200^0 F, care should be taken to avoid sudden temperature shock by introduction of high temperature to a cold pump or reverse. It is advisable to bring the temperature up gradually. Freezing liquid in pumps can deform or damage pumps.

Starting:

Never start or run the pump dry. This will inevitably cause galling or seizing of the internal parts. Always prime the pump with a clean, light lubricating oil or with liquid to be pumped.

Before starting, rotate the pump by hand. It should rotate freely without tight spots.

Check that all suction and discharge valves are open and that any relief valves have been "backed off".

After priming, start the driver and allow pump to operate at a reduced load while observing for unreasonable noise, heat, or vibration. Check to be sure pump is delivering liquid. If not, shutdown immediately and review foregoing instructions.

Gradually bring pump up to operating pressure by tightening relief valve adjustment until the pressure gauge indicates that the system design pressure has been reached. Again check pump for excessive noise, heat, or vibration. Check that the pump is delivering the required capacity and that the vacuum is not in excess of design conditions. If it is determined that the pump is meeting the required conditions, it is important to check that the driver I not overloaded.

Be sure that the overload protection for the electric motor is properly sized. Check that the electric motor is operating within the nameplate amperage limitations.

Maintenance

General:

Chemical Gear pumps are designed to be lubricated by the liquid being pumped and therefore do not require lubrication maintenance. Barrel type carbon bearings are self-lubricating.

Lubrication for reduction gear drives, outboard bearing supports and electric motors should be maintained as specified in the manufacturer’s instructions furnished with the shipment.

Stuffing Boxes:

Pumps equipped with packing will require adjustment periodically to avoid excessive leakage. The packing gland should be tightened as needed, but only when the shaft is rotating.

Do not attempt to tighten gland to the point where leakage is completely stopped.

Allow for a small continuous leakage of approximately one drop per minute to ensure lubrication and cooling at the packing area. Eventually all the packing in the pump will become deteriorated and will have to be replaced.

Pumps equipped with mechanical seals require no adjustment.