EnviroPump and Seal Inc.
A Stejada Company

Installation Instructions for the Enviropump and Seal Model ZLR-1205 Concentric Double Mechanical Seal

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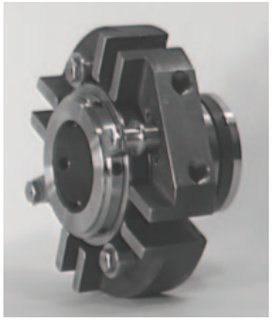

Introduction

Congratulations on your purchase of the most advanced sealing technology available today making your pumps and other rotating equipment safer, more reliable and longer running. Your new concentric double seal provides all the advantages of stationary design, double balance, and easy cartridge mounting as well as the ability to later be upgraded to a full tri-plex design (model ZLR-1310) which provides two separate fluid barriers between your process and the environment. If one seal fails, the second automatically takes over. This "installed spare" provides double the protecion, double the safety, and virtually zero emissions.

Please read these instructions thoroughly and you will find the installation process to be both quick and easy.

Safety

This manual is intended as an aid to supplement the experience and ability of qualified plant personnel in the installation, operation, and maintenance of the mechanical seal. These instructions do not purport to cover all details nor to provide for every contingency to be met in connection with installation, operation, and maintenance of the equipment. It is imperative that you follow your plant safety regulations before working on any piece of equipment. As a minimum, be sure to:

1. Lock out all motors and valves.
2. Wear proper safety equipment and protective clothing.
3. Be thoroughly familiar with the MSDS requirements for all materials that you may potentially become exposed to.
4. Relieve the pressure in all parts of the equipment and drain all fluids.
5. Follow the pump manufacturers recommended procedures in disassembling and reassembling of the equipment.

Equipment Condition

As with any mechanical seal, the condition of your equipment will greatly affect the reliability and service life of your new mechanical seal. Check your equipment as described below.

1. Measure the axial end play of the shaft by mounting a dial indicator base to a stationary spot on the pump frame and place the indicator tip on one end of the shaft (or on any convenient shoulder along the shaft (see figure 1). With a soft hammer, tap the shaft on one end and then on the other end. Record the full indicator movement (FIM). Maximum end play recommended is 0.002" FIM. Replace the bearings if necessary.

2. Measure the radial play of the shaft by mounting a dial indicator base to a stationary spot on the pump frame and place the indicator tip on the O.D. of the shaft close to the location of the face of the seal housing (see figure 2). Lift the shaft by exerting only light force at the impeller end and record the full indicator movement. Maximum radial play recommended is 0.002" FIM. Replace the bearings if necessary.

3. By design, the maximum dynamic shaft deflection at the face of the seal housing due to hydraulic loads on the impeller must not exceed 0.002".

4. Measure the shaft runout at the face of the seal housing by mounting a dial indicator base to a stationary spot on the pump frame and place the indicator tip on the O.D. of the shaft close to the location of the face of the seal housing (see figure 3). Rotate the shaft and record the full indicator movement. Perform the same measurement at the coupling end of the shaft. The maximum recommended runout is 0.002"FIM. Replace the shaft if necessary. If the pump uses a shaft sleeve, be sure that the sleeve is in place and perform this measurement on the O.D. of the sleeve instead.

5. Measure the runout of the face of the seal housing by mounting a dial indicator to the shaft and placing the indicator tip on the face of the seal housing (see figure 4). Rotate the shaft and record the full indicator movement. The maximum recommended runout is 0.003"FIM. Replace or repair the seal housing if necessary.

6. Measure the seal chamber bore concentricity to the shaft by mounting a dial indicator to the shaft and placing the indicator tip on the bore of the seal housing (see figure 5). Rotate the shaft and record the full indicator movement. The maximum recommended runout is 0.005"FIM. Replace or repair the seal housing if necessary.

7. Examine the surface of the shaft, shaft sleeve and seal housing bore and be sure to remove all sharp edges and burrs especially near keyways and threads. Replace or repair these parts if necessary.

8. Measure the distance to the nearest obstruction, the bolt circle of the seal housing studs and the bore diameter of the seal housing and compare against noted limits and tolerances as specified on the seal drawing.

Installation

1. For proper operation and self venting of the internal barrier fluid chamber, it is important that the seal be installed with the correct side up. The glands are marked in this regard and the following is provided as an additional guide. You will note that the seal has four NPT ports, two on one side of the gland (both labeled “B1") and two on the other side of the gland (both labeled “B2"). Only the “B2" ports are used in the ZLR-1205 configuration.

-The ports labeled “B2" are the inlet and outlet for the barrier chamber between the process end seal and the outermost seal (outboard seal) (see figure 6 or 7 as applicable).

CAUTION:
-The ports labeled “B1" are only used in the full tri-plex version. These ports are non-functional in the ZLR-1205 configuration and must be plugged.

While standing at the motor end of the pump:
- If the rotation is clockwise (as with most standard ANSI pumps), the “B1" ports should be on the right and the “B2" ports should be on the left.
- If the rotation is counterclockwise, the “B1" ports should be on the left and the “B2" ports should be on the right.

Once the seal is installed, the upper port on either side will always be the port from which barrier fluid exits the gland and should be connected to the upper port of the barrier fluid tank. The lower port on either side will always be the port by which barrier fluid returns to the seal from the barrier fluid tank and should be connected to the lower port of the barrier fluid tank. Be sure that the position of the barrier tanks is above the elevation of the seal and that all tubes are sloping upward (from the seal to the barrier tank) over their entire length so as not to create air traps that may block circulation.

2. Install the shaft sleeve if used.

3. Lubricate the shaft or sleeve with a suitable and compatible lubricant.

4. Install the seal (with its gasket in place) onto the shaft or sleeve with the ports oriented as described in step #1 above and position the seal close to the bearing housing. Note that the gasket is a compressed non-asbestos fiber material which provides the best assurance that the gland will seal reasonably square with the face of the seal chamber after the gland nuts are tightened. If a different material is required (such as a Teflon based material) use caution when tightening the gland nut to assure that the nuts are tightened very evenly so as not to put the gland out-of-square with the face of the seal chamber.

5. Install the seal chamber. Use caution as the seal housing passes over the body of the seal and be sure that the seal housing studs pass through the corresponding slots in the seal gland. Do not tighten the seal down at this time.

6. Assemble the rest of the pump including the impeller, casing, etc.

7. Perform any required impeller adjustments or any other operations that may require the axial position of the shaft to change before proceeding on to the next step.

8. Position the seal gland against the face of the seal chamber.

Caution:
The gland nuts must be “standard hex nuts”. Do not use “heavy hex” nuts. Depending on their size, heavy hex nuts have a corner-to-corner distance that is too large and may interfere with rotating components of the seal. Also, this seal is provided with special tab washers that allow the nuts to seat properly over the slots without interfering with rotating components. *Use extreme caution if any substitution of these washers is made, so that neither the washers nor the gland nuts can contact any rotating components.*

9. Tighten the gland nuts evenly, cross staggering as you tighten each nut. It is important that the gland remain square to the face of the seal chamber for best performance. The compressed fiber gasket material supplied with the seal was chosen with this in mind. If a different material was substituted (such as a Teflon based material) use caution when tightening the gland nut to assure that the nuts are tightened very evenly so as not to put the gland out-of-square with the face of the seal chamber.

10. Tighten the set screws on the seal collar. Again, it is important that these be tightened evenly, cross staggering as they are tightened so as not to force the seal and sleeve over to one side of the shaft causing it to rotate eccentric to the centerline of the shaft. Tighten each set screw finger tight only in a cross staggering order first. Then repeat this procedure several more times, each time tightening a little further until each set screw is fully tightened.

11. Remove the centering buttons from the face of the gland. Save the buttons and screws for future use.

12. The seal is now ready for connection to the barrier tanks or other source of barrier fluids.

13. Perform an air test on the installed seal and leak test all connections.

Seal Support Systems

1. Your new ZLR-1205 seal is equipped with one barrier liquid chamber. This chamber between the process end seal and the most outboard seal (“B1" ports) must always be supplied with a clean source of barrier liquid. The pressure on this chamber should be pressurized to at least 15 psig above the seal chamber pressure. Consult with your authorized distributor or the factory if assistance is required.

2. The barrier tank should be designed to provide sufficient cooling to the seals. Common barrier fluid includes water, water/glycol (50/50) and various types of oils. Be sure that the viscosity of the fluid used is very close to that of water so as not to hinder the ability of the internal circulating devices to adequately provide circulation. It is recommended that the temperature of the barrier fluid not exceed 170 degrees F. If it does, use a barrier tank with an internal cooling coil. The exact running temperature of the barrier fluid is dependent on many factors including the process temperature, rotating speed of the equipment, pressures applied to the seals, size of the seals, choice of barrier fluid, etc. Consult with your authorized distributor if you need assistance.

3. Tubing used to connect the seal gland ports to the barrier tanks should be at least ½" tubing (stainless steel). Use figures 6 or 7 as a guide for making connections.

Startup Procedure

1. Be sure that all connections have been made as described above.

2. Be sure that the equipment is properly vented.

3. Be sure that all flush sources have been started.

4. Be sure that all cooling water has been started.

5. Turn the shaft by hand and check that it turns freely

6. Follow the pump manufacturer’s recommended startup procedures including a check for proper rotation direction.

7. Monitor the equipment for any type of squealing noises. This usually indicates dry running seal faces which will severely damage the seal. Stop the equipment immediately.

8. Monitor the temperature of the barrier fluids and use the guidelines above if changes are necessary.

9. Check for leakage visually at the pump and also by changes in level in the barrier tanks. It is normal for a seal to leak slightly at startup. Allow a reasonable time for the seal faces to wear-in to each other. Liquids such as oils with a higher degree of lubricating properties will take longer to wear-in.

10. After a seal has been run for a short period of time, a wear pattern will develop on the faces. If a seal is disassembled for any reason after running, it is not likely that the faces will reassemble into the exact same track as before. Therefore, the faces will need to be relapped before reassembly.