ABS Dry Installed Waste Water Pumps Series FR

Start-up and Running Maintenance

Close-coupled, Bearing Assemblies 3R, 4R, 5R, 5F and 6F

Both suction and discharge valves must never be closed when the pump is operating. This can lead to an explosion of the pump.

2.1 Before Start-up

ATTENTION

- ☐ **Lubricate** the bearings with fresh grease, if the pump has been standing for a long time since delivery, see Para 2.6.1.
- ☐ **Check** that the seal lubrication chamber for mechanical seals is filled with lubricant, 60% water, 40% glycol (Close-coupled, Bearing Assembly 3R, 4R and 5R).
- ☐ **Check** that the pipes for sealing liquid outlet from gland packing is not blocked.
- ☐ **Check** the Start-up instructions for the priming unit.
- ☐ **Fill** the pump casing by opening the suction valve (if no priming unit is used), or through a filling pipe. Vent the casing by opening the discharge valve, or ventcocks when fitted.
- ☐ **Ensure** that the pump shaft turns freely by hand. If it does not, check for foreign matter in the pump, an over-tightened gland or pipe stresses causing the impeller to seize in the casing.
- ☐ **Check** the direction of rotation by running the motor for a few seconds.

2.2 Starting

- ☐ **Start** the pump against a closed or partially open discharge valve.
- ☐ **Check the shaft seal**:

ATTENTION

Mechanical Seal: Check that overheating does not occur. Mechanical seals must never be run dry.

Soft packed gland: Check that the gland is dripping adequately. If overheating occurs, back-off the gland-nuts to increase the leakage and thereby the cooling effect. If leakage is excessive, tighten the nuts 1/6 turn at 5-10 minute intervals. Leakage at 10 drips per minute is normal - somewhat more for hot liquids. These adjustments should preferably be made with the pump stationary.

- ☐ **Gradually open** the discharge valve, until the required pumping capacity is attained. If the rated capacity is significantly exceeded, it is possible that the motor may be overloaded.

2.3 After Start-Up

- ☐ **Check the shaft seal**. A packed gland should be dripping, otherwise the packing will heat-up and rapid shaft sleeve wear will occur. A Mechanical Seal should be virtually leak-free.
- ☐ **Check bearing temperatures** and noise. Bearing temperatures will normally stabilise between a few hours and one day after start-up, see guideline temperatures in Table 1.
- ☐ **Check that the sound and vibration levels** do not increase.
- ☐ **Check sealing chamber** for sealing liquid.

Table 1
The temperature of the bearing assembly

Speed	1st day	Normal operation
≤ 1500 rpm	70°C	60°C
≤ 3600 rpm	95°C	80°C

2.4 Matching the Pump to the System Requirement

If in normal operation the discharge valve is heavily throttled, this indicates that the pump head rating is too high. This can be rectified by reducing the impeller diameter appropriately and rebalancing. This will save on energy costs, and bearings and shaft seals will last longer.

Nearest sales company will help choosing the correct diameter when the correct flow and head are known. Note: Before turning down the impeller, refer to the relevant machining drawing.

2.5 Stopping

☐ **Close** the discharge valve.

☐ **Stop** the motor.

ATTENTION

☐ **Close** the sealing and cooling liquid valves where applicable.

2.6 Running Maintenance

2.6.1 Grease-Lubricated Bearings

ATTENTION

In dry, comparatively dust-free premises, bearings should be lubricated twice a year. In more adverse conditions, particularly in damp atmospheres, lubrication once a month may be advisable.

For the first re-lubrication, the quantities in Table 2 should be increased two to three-fold. Sub-sequently, avoid over-greasing as this may cause over heating.

Table 2
Re-lubrication grease quantities in grammes

Bearing Location	Approx. quantities for Bearing Assembly				
	3R	4R	5R	5F	6F
Non-Drive End	20	25	40	40	60
Drive End	30	50	85	85	120

Manufacturer	**Suitable Greases**
BP	Energrease LS2
Q8	Rubens WB
SHELL	Alvania G3
SKF	LGTM 2, LGTM 3
STATOIL	Uniway L1 42
TEXACO	Multifak EP2

2.6.2 Shaft Seal

2.6.2.1 Mechanical Seal

Normally leak-proof, mechanical seals may nevertheless occasionally drip. Should heavy leakage begin the seal must be replaced right away. Check the sealing chamber once a month.

2.6.2.2 Gland Packing

Check the gland packing 2-3 times per week. Leakage should be 10 drips per minute - slightly more for hot liquids. Lower leakage can cause overheating and the packing lubricant will disappear, resulting in excessive shaft sleeve wear. When external sealing liquid is used, the flow and pressure should be periodically checked. See Instruction No. 3 "Shaft Seal" Table 3 Para 3.2.

When stuffing box leakage is excessive, tighten the gland-nuts 1/6 turn and re-check leakage after 10 minutes. If it is still excessive, re-tighten the nuts another 1/6 turn. Allow packing to resettle, then re-check. These adjustments should preferably be made when the pump is stationary.

After a period of operation the packing will have shrunk due to loss of lubricant. Another ring or two of packing can be inserted, but this topping up should not be repeated again. When the gland is no longer effective, complete re-packing is necessary, according to Instruction No. 3 "Shaft Seal" Table 3 Para 3.2.

2.7 Operational Problems

Various problems may arise. Some are listed here, together with likely causes.

When investigating, always note important data such as capacity, discharge head and power consumption. Check for correct direction of rotation.

2.7.1 Pump Capacity Inadequate

1. Wrong direction of rotation
2. Air in the pump inlet, due to
   - suction tank level too low
   - air separation in liquid
   - air pockets or leaks in suction piping
   - air being sucked through shaft seal
3. Bad design of suction piping, causing eddies or cavitation
4. Suction lift too high or, particularly for hot liquids, positive suction head to low, causing cavitation
5. Impeller clearance too large
6. Impeller blocked
7. Friction losses in suction or discharge piping too large

2.7.2 Shaft Seal Leakage

2.7.2.1 Mechanical Seal

1. Vibrations
2. Incorrect seal assembly
3. Seal blocked by impurities
4. Cracks in seal faces
5. Damaged bellows or O-rings
6. Sealing liquid pressure too low/high
7. Worn-out
8. Dry running
9. The shaft is throwing

2.7.2.2 Gland Packing

1. Vibrations, «beating» the packing
2. Badly worn shaft sleeve
3. Burnt packing rings
4. Stuffing box incorrectly packed
5. No sealing liquid or pressure too low
6. The shaft is running eccentrically.

2.7.3 Bearings Over-heating

1. Faulty lubrication, e.g., moisture or dirt in the lubricant
2. Misalignment
3. Clearance at the back of the impeller too large, causing high axial thrust
4. Impeller back vanes worn, causing high axial thrust load
5. Shaft diameter too large or bearing house too small

2.7.4. Vibrations

1. Solids trapped in the impeller
2. Pump unit inadequately secured
3. Misalignment
4. Faulty inlet conditions
5. Over-throttling, i.e. the flow is too small
6. Cavitation (the pump is noisy)
7. The system natural frequency has the same value as the vane frequency of the impeller.
8. For 1-channel impellers the system must have a natural frequency higher than 35 Hz.

2.8 Replacement of Motor

ATTENTION

After temporary disconnection or replacement of motor, the unit must be re-aligned (Bearing Assemblies) and the direction of rotation must be checked. (See Instruction 1 "Installation", Para 1.6). When checking rotation see last part of Para 2.1.

2.9 Shut downs

During lengthy shut-downs, the pump shaft should be occasionally rotated to prevent binding of bearings and other moving parts. In unheated plants, the system should be completely drained.

If the pumped liquid is likely to solidify or block the mechanical seal when drying, the seal housing must be thoroughly flushed out when shutting down.

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