INSTRUCTION MANUAL

ATEX APPENDIX (for pumps in accordance with 94/9/EC)

MIF-0080/01-I

28-06-04

1. GENERAL

1.1. Warning for equipment with this mark

Pumps for dangerous areas are specially designed to comply by the official standards relating to the risk of explosion.

If they are used incorrectly, are not correctly connected or they are modified in any way, they can lose their reliability.

It is important to bear in mind the standards relating to the connection and use of electric devices in dangerous areas, especially the national standards on installation. Only qualified personnel experienced in these standards should handle this type of machines.

The BOMBAS ITUR S.A. pumps marked with the ATEX plate are valid for group II categories 2 and 3, areas 1, 21, 2 and 22 temperature class according to indications on the plate and the Certificate of Conformity.

All repairs carried out by the end user, unless explicitly approved by BOMBAS ITUR S.A., free the manufacturer from its responsibility to comply with the 94/9/EC Directive.

The loose parts supplied as spares should be original parts, supplied and checked by BOMBAS ITUR, S.A.

1.2. Temperature class T5 and/or equipped with temperature sensors

In the event the pump qualifies for T5, several simultaneous malfunctions could make it go over this value. For this purpose, an additional safety device is established to provide the pump with three temperature sensors that are easy to monitor and can cause the equipment to stop before the temperature value reached goes over the T5 limit.

One sensor is placed on each bearing location and another in the mechanical seal box.

The user should use them to immediately stop the pump when the temperature of any of them goes over 95 ºC. The plant operator should follow the attached instructions for the correct use of the sensors.

2. RISKS

2.1. Hot surface

It is responsibility of the plant operator to keep the fluid temperature within the pump classification temperature limit.

2.2. Formation of gas inside the pump or process pipes.

Before starting the equipment, both the pump and the process pipes of the mechanical seal, if present, should be completely filled with liquid.

2.3. Electrostatic loads

If the pump supplied is a bare shaft pump, before commissioning the pump, the earth cable should be connected to an effective earth connection in the installation.

If the pump supplied includes a bedplate, before commissioning the pump, the bedplate's earth connection should be connected to an effective earth connection in the installation.

2.4. Mechanical resistance

If the liquid is inflammable, the parts of the pump casing are built of ductile material and have passed the impact test established in EN 13463-1.

2.5. Operation without liquid in the pump

The pump cannot work without liquid under any circumstances. If this condition is possible, the installation should be equipped with safety devices that prevent the operation of the pump without liquid inside, or to provide automatic devices for the evacuation of the minimum flow by the pump. Please see the minimum flow section.

2.6. Misalignment between pump and motor

To avoid a misalignment between axles the correct installation, confirmation and maintenance of the coupling is required. Please refer to the coupling instructions manual.

2.7. Failure of the mechanical seal

The failure of one or both sides of the mechanical seal can lead to overheating, to correct this situation you should follow the mechanical seal manufacturer's instructions, as regards the mechanical seal assembly and the maintenance of the mechanical seal's auxiliary devices, if present. Please see the section regarding the mechanical seal replacement period in the instructions manual.

Alternatively the pump can be fitted with a surveillance device if specified by the buyer.

2.8. Closed discharge valve

The pump cannot work against a closed discharge valve as this could lead to the overheating of the pumped liquid.

If it is necessary to work with the discharge valve closed, a minimum flow relief device is required at the outlet. This device is not part of the pump and it will be separate from the pump's discharge flange.

The recommended devices are the constant outlet hole plates, constant by-pass valves and the automatic recirculation valves.

For further information please consult BOMBAS ITUR S.A.

2.9. The pump operates at overspeed

To protect the pump in overspeed, the maximum rotation speed will be indicated on a plate engraved on the pump. If it will be necessary to make the pump work at a higher speed in the future, please consult BOMBAS ITUR S.A.

2.10. Fault with the sealed joints

The materials of the pumps have been selected according to the process fluid indicated on the data sheets. If this fluid is modified, you must consult BOMBAS ITUR S.A. about the suitability of the pump for the new fluid.

2.11. Pump bearings failure

The failure of the bearings can cause ignition due to the increased heat on the surface of the bearing and it should be avoided, therefore only authorised quality bearings should be used, supplied as original spares.

2.12. Suction valve closed

The pumps cannot work under conditions where the suction valves are closed. If this condition is possible, the plant operator should use a device to detect the condition and force the pump to stop of if it occurs.

2.13. Bad lubrication of the bearings

The bearings should be well lubricated with grease/oil in good condition, therefore it is imperative to follow the lubricating instructions indicated in the pump Manual.

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2.14. Minimum flow low or maximum flow excessive

Minimum flow required for the pump

The pumps cannot work below the minimum flow specified on the data sheets.

In the event that it is working at lower flows the installation should be equipped with safety devices that prevent the operation of the pump without liquid inside, or to provide automatic devices for the evacuation of the necessary minimum flow by the pump.

For liquids other than water the minimum flow is determined by the following formula:

$$Qmin = \frac{3.600.000 \times Pa}{Pe \times Ce}$$

Where:

Qmin: Minimum flow in m^3/h.
Pa: Power absorbed by pump in kW with valve closed.
*Ce: Specific heat of the fluid in J/Kg*ºC.*
Pe: Specific weight of the fluid in Kg/m^3

Maximum flow allowed by the pump

Unless different information is indicated on the data sheet, the maximum flow allowed is 1.1* optimum flow of the pump with impeller diameter supplied.

2.15. Oil is dirty, inadequate or the level is low

The lubrication oil should be clean and at its appropriate level to avoid high temperatures in the bearings support.

For this purpose, it is imperative to follow the instructions indicated regarding the replacement frequency and periodic oil level check.

2.16. Pump fluid temperature excessive

The operation temperature allowed is indicated on the data sheet. If the pump is going to work at a higher temperature or if the data sheet is not available, please request information from BOMBAS ITUR, S.A.

2.17. Creation of an explosive atmosphere inside the casing and mechanical seal box.

It is important to avoid the formation of an explosive atmosphere in the interior. Although there are interior evacuation ducts that eliminate the possibility of air being occluded in the interior, it is necessary to proceed to the total venting of the pump and its process pipes, if present, before starting the pump.

2.18. Pump turns incorrectly

The incorrect turning of the pump can cause the mechanical seal to operate incorrectly and its sides to heat up. Therefore, it should be avoided and the correct turning direction should be found by following the arrow marked on the pump with the pump completely full of liquid and correctly vented.

2.19. High suction pressure

High suction pressure can overload the bearings and lead to their overheating. This condition should be avoided and for this purpose, the suction pressure must not go over the pressure indicated on the data sheet, either by manual control of operators or by equipment stopping devices due to excessive pressure.

2.20. The coupling suffers a malfunction

The coupling can produce a source of ignition or high temperature in the event of its malfunction. The coupling must be classified, as non-electrical equipment, by meeting with at least the same type of area and temperature as the pump. It is important to follow the instructions indicated in the coupling manual that is attached with the pump manual.

2.21. The motor suffers a malfunction

The motor can produce a source of ignition or high temperature in the event of its malfunction. Therefore the motor must be classified with at least the same type of area and temperature as the pump. It is important to follow the instructions indicated in the motor manual that is attached with the pump manual.

2.22. The coupling cover rubs against the coupling

Before and during the pump operation, the coupling cover should be in place and firmly fixed. It should be checked periodically to avoid problems that can occur if it is out of place or not correctly fixed.

The coupling cover should be free from foreign objects.

2.23. Loose connections on auxiliary pipes of the mechanical seal

If the pumping liquid is flammable and an escape could lead to its ignition this eventuality must be avoided by the constant control by the plant operator of the watertightness of joining areas of auxiliary pipes.

2.24. The oil/grease lip seals seize up

A lack of oil/grease in the bearings support can lead to the lack of lubrication of the lip seals which would then be dry when they rub against the shafts. This friction can lead to a rise in temperature of the shaft that would cause ignition. To avoid this, periodic controls should be carried out on the oil/grease level on the bearings support.

2.25. The deflector ring rubs

The good condition of the deflector ring should be checked periodically, and it should be replaced in the event of deterioration.

2.26. Excessive effort of the pulleys on the pump shaft

The pump is not designed to support a pulley directly on the pump shaft.

If you want to use pulleys, an independent support should be used for the pulley and both shafts should be joined, the pump shaft and the pulley shaft, using a suitable flexible coupling.

2.27. The bearing support heats up excessively due to lack of refrigeration.

If the bearings support suffers impediments that prevent the correct air refrigeration then this will lead to an excess temperature that may be excessive for the temperature class classification. Therefore, this support must be free of obstacles to help the natural air refrigeration.

2.28. The impeller rubs against the wear plate due to incorrect regulation.

When you have a semi-open impeller, after the regulation of the clearance between the impeller and wear plate, you should check that the power consumed never goes over the nominal operating power.

3. SPECIAL RISKS OF VERTICAL SUMP PUMPS

3.1. Dirty or unsuitable oil.

Pumps with mechanical seal have an auxiliary deposit for its lubrication. Dirty or unsuitable oil can mean that the mechanical seal works when it is dry during start-up periods, or when warming up and this can cause high temperatures in the mechanical seal box. To avoid this matter please follow point 2.15.

3.2. Submergence level

An insufficient submergence level of the liquid can mean that some of the parts of the pump work when dry with the resulting heating up of the friction parts. This condition should be avoided and therefore in-plant operatives should be used so that the submergence level is never lower than the indicated submergence level, either through manual control by plant operators or equipment stopping devices due to low level of liquid in the suction sump.

3.3. Wear on bearings.

The excessive wear of the bearings can cause the friction of metallic parts with a local increase in the temperature. The pump will have forced refrigeration from the actual pumping fluid if it is clean, or with external lubrication of clean liquid if the pumping fluid is dirty.

In this last case, the plant operator should maintain a permanent inflow of clean liquid to assure the correct maintenance of the ducts and bearings refrigeration fluid.