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**GENERAL INSTRUCTIONS FOR USE, INSTALLATION, AND STORAGE OF
MECHANICAL SEALS.**

These instructions can be used for all the series of Microtem mechanical seals unless otherwise decided by the technical department.

All the information contained in this document are provided only for informative purposes and can not be taken as a certification or as operation guarantee.

All the Microtem mechanical seals are realized to obtain high performances in several application areas.

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1. Mechanical seal operation

The mechanical seal is a device created with the purpose of isolating any rotary machine provided with a drive shaft from the external environment, there where there is a movement of fluid.

Usually a mechanical seal is composed of a stationary ring (integral with the case of the machine) and a rotary ring (mounted on the shaft) containing an elastic part to which is entrusted the thrust that joins one against the other the rings. There are then the secondary seals (such as o-rings) which are intended to ensure the sealing at the junction points between the mechanical seal and the machine itself.

The mechanical seal is designed to work in contact with the fluid (fluid process or outside flushing fluid) and it is strongly advised not to use it dry. During operation the fluid ensures lubrication between faces avoiding seizures or burns.

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2. Safety



Microtem products are subject to continuous improvements, so the information contained in this document are subject to change without prior notice.

The staff in charge of the assembly, disassembly, maintenance, and operation of mechanical seal must be high qualified and must meet the necessary requirements for this work.

Microtem commits itself to define more accurately the mounting and use instructions of its mechanical seals. Despite this, given the complexity and the multitude of the existing machines, Microtem refers to the customer and/or user the ultimate responsibility for the selection, installation, operation, and maintenance of their mechanical seals.

Furthermore, the user has got the responsibility to check what may be the consequences on environment and on people in case of failure of a mechanical seal, and take the appropriate safety measures.



Since the mechanical seal is considered as an organ of machine, it is excluded from the provisions of Directive 94/9/CE (Atex 95). The mechanical seals are considered integral part of larger rotary machines. The customer and/or the end-user should contact our technical department to know the temperature limits of the mechanical seal depending on the configuration of it.

The mechanical seal must be applied to machines comply with international regulations on safety, power supply, and to any other regulation in force that would put restrictions on the machine. The mechanical seal must be applied to machines comply with international regulations on safety, power supply, and to any other regulation in force that would put restrictions on the machine.

3. Transport and storage

Microtem mechanical seals must be transported and stored in the original packaging.

Unless otherwise agreed the mechanical seals are shipped in Microtem standard packaging.

The customer and/or end user, upon receipt of the goods, has got the responsibility to make the following checks:

- Integrity of the packaging;
- Make sure that the goods delivered is in accordance with the order;
- Immediately report any non-conformity.

Mechanical seals or parts of them which have been subjected to a hit or an impact must be made recheck by our staff before assembly.

Microtem mechanical seals must be stored in appropriate storage, dust-free and dry, preventing large temperature variations.

If the mechanical seal is stored for more than 48 months in the warehouse, before installation must be made check by our staff who will verify the integrity of the contact faces and of the seals.

If the machine is stored with the mechanical seal mounted for a period longer than 60 days, the seal must be removed and re-checked before starting and then reassembled according to the specifications provided by Microtem.

4. Preliminary inspection of the machine



The following specifications should be checked before installation of the mechanical seal.

Before proceeding with the installation of the mechanical seal, the machine must be properly prepared, making sure that all the appropriate security procedures to protect the environment and personnel have been completed. In order to avoid the formation of sparks, the machine must be connected to earth.

Check that the shaft diameter is in accordance with the specifications provided in our assembly drawing.

Make sure the diameter of the stuffing box conforms to the dimensions listed in our specifications.

Check that the surfaces on which the seals are working are free of scratches.

4.1 Radial tolerance

For speeds of rotation up to 3,600 RPM, the oscillation of the shaft must not be greater than 0.05 mm. For higher speeds our technical department will provide you the adequate tolerance.

4.2 Tolleranza assiale

The axial moviment must non exceed 0.2 mm.

4.3 Ortogonalità

The orthogonality between the axis and the plane of the stuffing box should be between 0.01 and 0.06 for axes until the diameter 100. Over this diameter, our technical department will provide the limit of orthogonality between planes.

4.4 Concentricity

The concentricity must be between 0.02 and 0.05 for mechanical seals mounted on shafts up to 100 mm diameter.

4.5 Roughness

The roughness must be between:

- Bellows seals: 0.6 to 1 μM
- Seal O-Ring: 0.4 to 0.6 μM
- Seals with PTFE seal: max 0.2 microns



Make sure the joints are rounded and the edges have the chamfer in accordance with the directives UNI EN 12756.



Observe the roughness required by our specifications. It should be noted that the roughness required minimum (stationary ring seats) is 2.0 microns.

5. Installing a mechanical seal



Follow the specifications required during the installation of the mechanical seal. An incorrect assembling may cause a breakdown of the mechanical seal and the consequent danger to the environment and the operator.



Make sure the seal to be installed is in accordance with the order and with the specifications required by the machine and application.



Incorrect installation of the mechanical seal may cause a break in the seal itself, a break in the machine where it is installed or at least a flow of product into the environment.

5.1 Installing a single seal

5.1.1 Make sure that the mechanical seal is corresponding to the assembly drawing.

5.1.2 Make sure you have all the spare parts to be able to service the machine before proceeding.

5.1.3 Check that the seal has not been subjected to shock or damage in both structure and packaging of it.

5.1.4 Before installation, check that the lapped surfaces of the sliding rings are not scored and are not in any way affected by external agents.

5.1.5 Clean, using a soft cloth moistened with isopropyl alcohol or with a high evaporation solvent, without releasing any residue (contact Microtem to know the recommended product).

5.1.6 Check that the seat of the stationary part is clean and meets the dimensional and surface tolerances required by the specifications.

5.1.7 Lubricate the outside surface of the stationary seal through the use of liquid compatible with the seal itself so as not to spoil it during insertion.

5.1.8 Lubricate the shaft of the machine through the use of liquid compatible with the gasket in order to assist the sliding of the rotary part.

5.1.9 Assemble the closure flange against the stuffing box of the machine.

5.1.10 Tighten the bolts evenly taking care of bringing the flange as planarly as possible with respect to the plane of the casing, thereby avoiding wrong loads of the elastic part of the mechanical seal.

5.1.11 Conclude with the installation of the other parts of the machine.



Do not load the elastic part of the mechanical seal (usually the rotary) over the size expected from specifications. Excessive loads may affect the operation of the mechanical seal.

5.2 Installing a cartridge seal

- 5.2.1 Make sure that the mechanical seal is corresponding to the assembly drawing.
- 5.2.2 Lubricate the shaft of the machine through the use of a liquid compatible with the gasket in order to assist the sliding.
- 5.2.3 Push the seal until it is firmly against the surface of the stuffing box.
- 5.2.4 Place the flange of the seal so that the connections provided on the flange are oriented in the correct way towards the pipes provided for flushing.
- 5.2.5 Tighten evenly the bolts of the stationary flange until they are completely tightened.
- 5.2.6 Tighten the screws of the sleeve shaft taking care to introduce them gradually and tighten them firmly and evenly to prevent misalignment of the rotary part.
- 5.2.7 Unscrew and remove the preloading system (if permitted by the mechanical seal) and put it in the original packaging. The loading system can be reassembled for maintenance of the seal to facilitate the extraction of it.
- 5.2.8 Connect the flushing pipes to the connections provided on the flange of the seal.
- 5.2.9 Check that alignment and ortogonality between the seal and the driving machine comply with the requirements in the design phase.
- 5.2.10 Check that the alignment between the driving machine and equipment conforms to the design data provided by the manufacturer.
- 5.2.11 Bring pressure to the system or to the system of external flushing to verify the correct operation of the mechanical seal. (at this stage a slight drip may occur; this is due to the stationing of the mechanical seal).
- 5.2.12 Complete the installation of the other parts of machinery.
- 5.2.13 Upon completion of installation, check that no foreign body is near the machine so it will not interfere with the rotation and cause damage or injury.

6. Instructions for piping



Respect the Plan or the flushing system provided by the mechanical seal, by the machine or by the plant.

The complete tightness of the pipes is critical to ensure that the seal can receive the correct amount of fluid provided by the project.

The connections on the mechanical seals are always highlighted.

Avoid the pipe line can create bottlenecks that affect the proper functioning of the system.

The length of the piping must conform to the data required by the system design, the machine and the mechanical seal. An incorrect length could result in an incorrect operation of the system and a damage to the mechanical seal itself.



Make sure that the circuit does not contain traces of air or steam, and in any case vent system before turning on the machine.

In case barrels or heat exchangers were provided (API-Plan 21, 53, 41, 52, 53 A-B-C) consider that the correct assembly is provided above the inlet connection of the circuit in the sealing of at least 50 cm.

Mechanical seals, in which there is provided a system of detection of leaks, must be connected (via connection to the hole provided in the seal) to the exhaust system. Such a device may be a collection tank (tank of decantation) or a dedicated line which is conducted to the system of disposal plant (line torch). In both cases, the unloading line must be made so as to facilitate the expulsion.

7. Testing the machine



Follow the operating specifications provided by the manufacturer of the machine.

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Before proceeding with the test make sure that there is no presence of foreign bodies which could interfere with the rotation of the machine and that can create damage to property and persons.

Check that the system is properly filled up and that the flushing circuit (if fitted) is purged and functioning properly. In the case of mechanical seals immersed in the product (internal mounting the pump) make sure that the fluid is present and has filled the seal chamber before the test.

Make sure that the circuit of flushing has been adequately purged.



All staff should get proper clearance before proceeding with the testing of the machine.

Remind that the mechanical seals are tested by Microtem with water, unless specifically requested by the customer. Seals which provide hard sliding faces (tungsten carbide), if tested with water, must provide for gradual acceleration ramps and short testing time in order to avoid overheating or damage to the mechanical seal.

Prevent the mechanical seal comes into contact with liquids other than those for which it was designed.



It is essential for proper functioning that the staff always adopt common sense, and if you notice any malfunction of the mechanical seal or machine, before working again, all the necessary precautions have to be taken. This rule should be kept in mind when you first install the seal and whenever the seal needs with further maintenance.

8. Removing the mechanical seal



Before disassembling the mechanical seal make sure that the machine was stopped and isolated from the supply voltage. In no way should appear the possibility that machinery may operate during maintenance.



Make sure that the machine has been depressurized, drained and in the case of hazardous fluid adequately decontaminated.



Personnel must act with all necessary protections (gloves, goggles, clothing, masks) because during disassembly of the mechanical seal there may be a leaking fluid. Personal protection must be appropriate to the type of fluid pumped into.

8.1 Removing a single seal

8.1.1 In case you need to uninstall a single seal proceed with the gradual loosening of the bolts of the stuffing box cover, making the operation gradually.

8.1.2 Remove the cover slowly, taking care not to damage the shaft (please note that at this stage there may be a leakage of fluid).

8.1.3 Remove the rotary part (if screws with shaft are provided make sure make sure that they have been removed) and place it on the work surface.

8.1.4 Depending on the type of machine, operations may be reversed. Always follow the logic of disassembly of the machine.

8.1.5 If the seal was mounted in a double configuration (tandem) continue with removing even the secondary seal

8.2 Removing a cartridge seal

8.2.1 If the seal has been provided with a preloading system, reassemble it in the position showed by the assembly drawing.

8.2.2 Loosen the bolts of the stationary flange of the mechanical seal gradually.

8.2.3 Loosen the clips provided on the rotary part of the seal which bind the seal to the rotation shaft (usually grub screws)

8.2.4 Use the extraction holes (if provided on the flange of the seal) or using two flat levers or an extractor to move the stationary flange.

8.2.5 Remove the mechanical seal taking care to do the operation in a uniform manner in order to avoid damage to the mechanical seal.

8.2.6 Place it in the box in which it was delivered at the time of delivery.

The cartridge mechanical seal can be reconditioned and therefore we recommend that you always have a spare seal in stock in order to avoid unnecessary stops of the system.

If the mechanical seal is sent to Microtem for reconditioning, it must be decontaminated and cleaned before shipment.

9. Service on the mechanical seal

Microtem has developed an advanced laboratory for the reconditioning of its mechanical seals or of other manufacturers.

The principle of the recondition is to report a mechanical seal completely worn to the same conditions as when it is delivered for the first time.

The recondition, besides being an important economic saving, enables the user to reduce the waiting times especially when it comes to mechanical seals for specific application or specific machinery.

Microtem has developed different types of service on the mechanical seal or on the equipment itself.

Contact directly the company's sales offices to know the most suitable product to your needs.