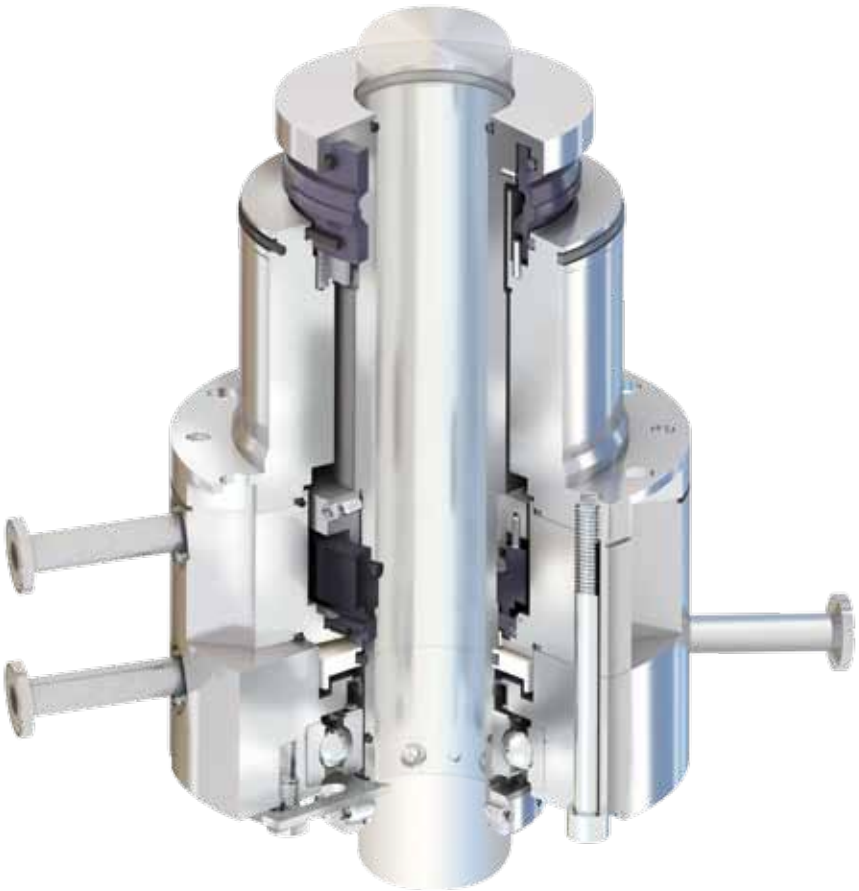




# *Installation Instructions*

## ***ST Series***

ST/QBM, ST/MRA, ST



# 1 Equipment Check

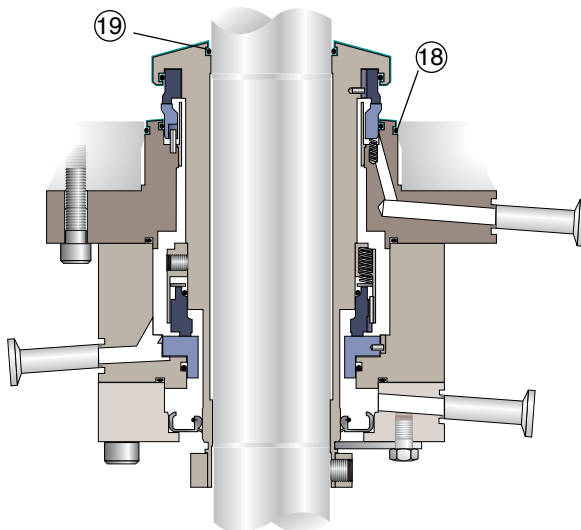
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- 1.1 **Follow plant safety regulations** prior to equipment disassembly:
  - **Consult** the plant Material Safety Sheet (MSDS) files for hazardous material regulation.
  - **Wear** designated personal safety equipment.
  - **Lock out** the mixer or agitator motor and valves to and from the vessel and seal.
  - **Relieve** any pressure in the vessel.
  - Use plant **vessel entry procedure** if it is necessary to enter the vessel.
- 1.2 **Secure the mixer or agitator shaft** in accordance with the mixer or agitator manufacturer's instructions.
- 1.3 **Remove the coupling and/or drive** to access the seal area. Follow the manufacturer's instructions.
- 1.4 **Remove the existing seal assembly.**
- 1.5 **Remove all burrs and sharp edges** from the shaft and vessel flange area over which an O-ring must slide. The shaft and vessel flange must be free of burrs, sharp edges, cuts, dents, and corrosion that may provide a leakage path past the O-rings as illustrated, for example, by O-rings (18) and (19) as may be seen in Figure 1.

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## ST O-ring Gaskets

Figure 1

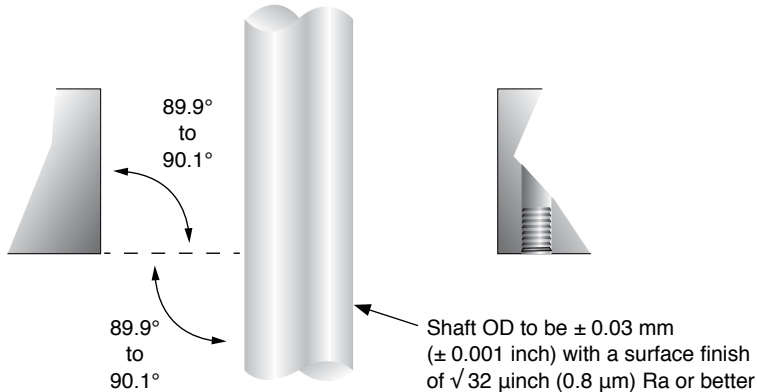


*The images of parts shown in these instructions may differ visually from the actual parts due to manufacturing processes that do not affect the part function or quality.*

- 1.6 Check assembly requirements for platform stability. Refer to Figure 2 for required squareness, concentricity, and surface finish requirements.

## Seal Chamber Requirements

Figure 2



- Bearing, drive, and coupling must be in good condition
  - Maximum vertical shaft movement (axial end play) = 0.13 mm (0.005 inch) FIM
  - Maximum static vessel flange out of concentricity = 0.13 mm (0.005 inch) FIM
  - Maximum dynamic shaft deflection = 0.38 mm (0.015 inch) FIM
- 1.7 **Check the assembly drawing** accompanying the seal assembly for specific seal design data, materials of construction, dimensions and recommended piping connections.
- 1.8 **Check the shaft outside diameter**, vessel flange bolt size, bolt circle, and distance to coupling or drive to ensure that these dimensions agree with the associated seal assembly drawing. Pay special attention to the flange bore dimensions for roundness and concentricity to the shaft.
- 1.9 **Handle the seal assembly with care**, it is manufactured to precise tolerances. These seals are lapped to rigid specifications required for boundary lubrication. If it becomes necessary to disassemble the seals keep these faces clean at all times and protect them from damage since they are subject to impact fracture.

- 1.10 **Pressure testing of the ST/QBM, ST/MRA, ST cartridge canister dual seal prior** to installation is possible but not necessary. If pressure testing is desired then pressure test at 1.7 bar (25 psig) but never more than 3.4 bar (50 psig) with dry nitrogen or instrument air. Prior to testing Flowserve must be consulted to determine acceptable gas leakage rates. If bench testing is desired the tests may be conducted if and only if Flowserve has been consulted regarding the safety of testing the seal canister on the bench. Bench test safety issues may exist and cause physical injury and damage.

**Caution:** Bench test pressure never to exceed 3.4 bar (50 psig)

## **2 ST/QBM, ST/MRA, ST Cartridge Seal Installation**

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### **Tools needed:**

- **Open end wrenches** for nuts or bolts
- **Allen wrenches** for cap screws and set screws
- **Lubricant** for O-rings

- 2.1 **Attach the seal housing to vessel flange and/or gear box.** Each bottom entry mixer may have a different procedure for attaching the seal and mixer drive to the vessel. Follow the assembly instructions and recommendations of the manufacturer of the equipment. Do NOT use the seal canister piping to lift and handle the seal.

- 2.1.1 **Lubricate the shaft and flange bores over which O-rings will slide** with an appropriate approved lubricant. The ST line of seals is typically used in bioprocessing applications where only deionized water is an acceptable lubricant. However, because of the poor lubricating properties of deionized water it is recommended that a better lubricant be used if possible.

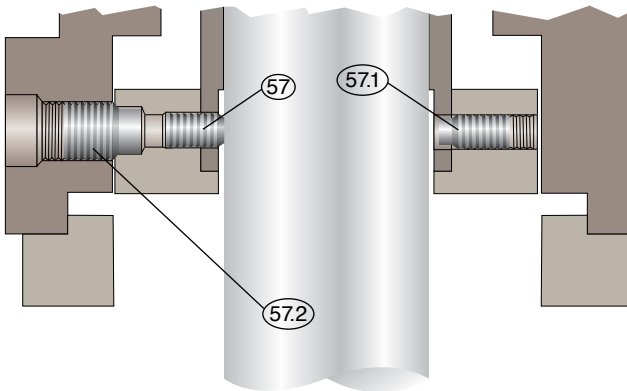
- 2.1.2 **Line up the shaft with the seal cartridge sleeve.** The seal canister will be attached to the bottom of the vessel flange OR to the gear box and vessel flange. In either case the shaft must be slid through the center of the seal cartridge from a position above the seal. This position can contribute to binding and/or twisting of the seal sleeve as the shaft moves through it. **Note:** If the seal canister is attached to a 90° gear box, the weight of the motor off-set to one side puts a large torque on the seal canister which may distort the canister that is fit into the mixer flange.

It is essential that before tightening bolts the motor/gearbox/seal assembly center of mass be found and that point used to lift the seal housings into position. The bolting to the mixer flange should be complete before the support for the motor/gear box/seal is removed.

- 2.1.3 **Lower the shaft through the seal cartridge.** Great care must be taken to avoid any binding that may cause the seal hardware to support the shaft.
- 2.1.4 **When the shaft has threaded through the seal attach the shaft as required to the mixer drive.** Take care to insure that the shaft is straight and concentric with the bore of the mixer flange. Follow mixer drive manufacturer re datations.
- 2.1.5 **After the shaft is in its final operating position** and no more adjustments will be made to the position of the shaft, double check the seal canister and tighten canister bolting to the mixer flange and/or mixer drive.
- 2.1.6 **Attach the rotating portion of the seal to the shaft.** The seal you are installing is designed to fit your specific piece of equipment. With this in mind refer to the drawing specific to this seal and your equipment. Note that there may be small differences from this instruction in how this step is accomplished. See Figure 3.

## Centering and Attachment Screws

Figure 3



Shoulder screws (57.2) are designed to hold the rotating portion of the seal in proper position to the stationary housings during installation. These screws must not be turned until at least one allen screw (57) has been set firmly to the shaft. Once at least one (57) allen screw has been firmly set to the shaft shoulder screws (57.2) may be removed, and if necessary the shaft can be rotated by hand to align the remaining allen set screws to the opening for tightening.

Dog point set screw (57.1) should never be removed. The only job this screw does is attach the sleeve collar to the sleeve. Those screws will never engage the shaft and must not be backed out of their threaded hole.

The screws may be numbered with different numbers, but the procedure is similar.

There may be special custom installation instructions for your seal on the face of the assembly drawing.

- 2.1.7 **Inspect your installation.** At this point use any visual method possible to insure that the seal is positioned axially and radially in the correct position according to the assembly drawing.
- 2.1.8 **Attach piping to the seal.** Referring to Figure 1 insure that the barrier fluid flow and pressure is injected into the barrier inlet (BI) and that the barrier outlet (BO) is connected to proper piping to carry away the barrier fluid after it passes through the seal cavity.
- 2.1.9 Ensure that the barrier fluid cavity is filled with water before operating the shaft. The condensate works as a lubricant to the upper and lower seal face sets and without being properly wetted they will squeal loudly, or possibly even destroy themselves.

### 3 Seal Operation

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To assure reliable noise free operation of this sealing product, the following operating guide must be observed.

- 3.1 **Maintain barrier fluid flow and pressure.** Begin and confirm Plan 54 barrier flow at least five minutes before starting the shaft. This insures that all high point cavities are properly wetted and delivering lubricant to the rubbing surfaces within the seal.
- 3.2 **Do not exceed the maximum barrier pressure** specified for the seal design.
- 3.3 **Do not exceed the maximum vessel pressure.** Make sure the vessel pressure does not exceed the barrier pressure.
- 3.4 **Do not exceed the maximum vessel temperature specified for the application.** This could exceed the temperature limits of the materials of construction of the seal.
- 3.5 **Do not rotate the mixer shaft during SIP** if steam is injected into the Plan 54 barrier cavity. Steam is not an adequate lubricant for the rubbing surfaces.

### 4 Repairs

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This product is a precision sealing device. The design and dimension tolerances are critical to seal performance. Only parts supplied by Flowserve should be used to repair a seal. To order replacement parts, refer to the part code and B/M number. A spare backup seal should be stocked to reduce repair time.

When seals are returned to Flowserve for repair, **decontaminate the seal assembly** and include an order marked "**Repair or Replace.**" **A signed certificate of decontamination** must be attached.

**A Material Safety Data Sheet (MSDS) must be enclosed** for any product that came in contact with the seal. The seal assembly will be inspected and, if repairable, it will be rebuilt, tested, and returned.



TO REORDER REFER TO  
B/M # \_\_\_\_\_  
F.O. \_\_\_\_\_

FIS167eng Rev 8/13 Printed in USA

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**USA and Canada**

Kalamazoo, Michigan USA  
Telephone: 1 269 381 2650  
Telefax: 1 269 382 8726

**Europe, Middle East, Africa**

Dortmund, Germany  
Telephone: 49 231 69640  
Telefax: 49 231 6964 248

**Asia Pacific**

Singapore  
Telephone: 65 6544 6800  
Telefax: 65 6214 0541

**Latin America**

Mexico City  
Telephone: 52 55 5567 7170  
Telefax: 52 55 5567 4224