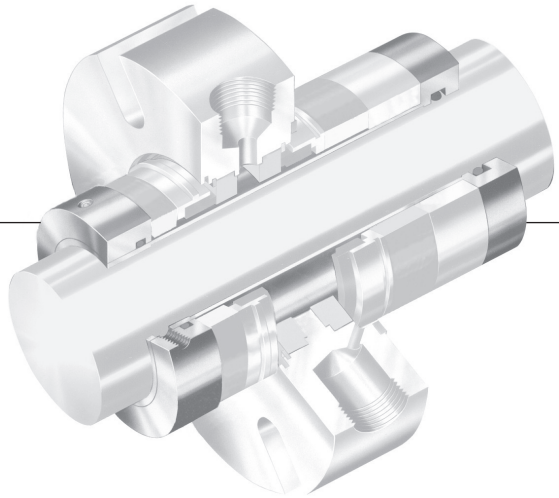


Cartridge Seals**1 Equipment Check**

- 1.1 Follow plant safety regulations prior to equipment disassembly:
 - 1.1.1 Wear designated personal safety equipment
 - 1.1.2 Isolate equipment and relieve any pressure in the system
 - 1.1.3 Lock out equipment driver and valves
 - 1.1.4 Consult plant Safety Data Sheet (SDS) files for hazardous material regulations
- 1.2 Disassemble equipment in accordance with the equipment manufacturer's instructions to allow access to seal installation area.
- 1.3 Remove existing sealing arrangement (mechanical seal or otherwise). Clean seal chamber and shaft thoroughly.
- 1.4 Inspect surfaces under gaskets to ensure they are free from pits or scratches. Break all sharp corners on shaft steps, threads, reliefs, shoulders, key ways, etc. over which gasket(s) must pass and/or seal against.
- 1.5 Check shaft or sleeve OD, seal chamber bore, seal chamber depth, gland pilot, stud diameter, stud bolt pattern and distance to first obstruction to ensure they are dimensionally the same as shown in the seal assembly drawing.
- 1.6 Check seal assembly drawings for any modifications (reworks) to be made to the equipment for mechanical seal installation and act accordingly.
- 1.7 The equipment must be earthed to prevent sparks due to static electricity discharge.

Shaft runout should be checked against the equipment manufacturer's specifications. Generally, should not exceed 0.05 mm (0.002 inch) TIR (Total Indicator Reading) at any point along the shaft for ball or roller type bearings. For sleeve type bearings, refer to manufacturer instructions. If the equipment is not completely dismantled, verify runout near seal location.

The above values apply to shaft speeds in the range from 1000 to 3600 RPM. For values above and below, consult your Flowserve representative. See Figure 1.

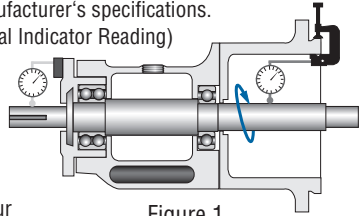


Figure 1

Shaft endplay should not exceed 0.25 mm (0.010 inch) TIR, regardless of thrust bearing type. See Figure 2.

Radial bearing play at seal chamber face should be checked against the equipment manufacturer's specifications. Generally 0.05 - 0.10 mm (0.002 - 0.004 inch) will be applicable for ball or roller type bearings. For sleeve or journal type bearings, values will generally be in the order of 0.10 - 0.15 mm (0.004 - 0.006 inch). If equipment is found outside the general range, contact the equipment manufacturer and your Flowserve representative to verify the equipment's suitability for the seal.

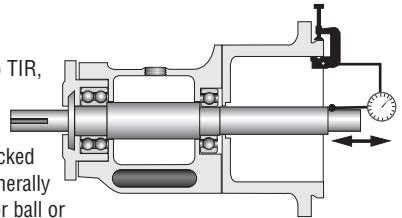


Figure 2

Seal chamber squareness to the shaft centerline should be within 0.0005 mm/mm (0.0005 inch/inch) of seal chamber bore TIR.

Note: make sure that shaft endplay does not affect the reading. Verify the smoothness of the seal chamber face for a good gasket joint. See Figure 3.

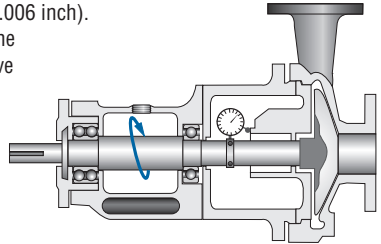


Figure 3

Concentricity of the shaft to the seal chamber bore or gland pilot register should be within 0.025 mm per 25 mm shaft diameter (0.001 inch per 1 inch shaft diameter) to a maximum of 0.125 mm (0.005 inch) TIR. See Figure 4.

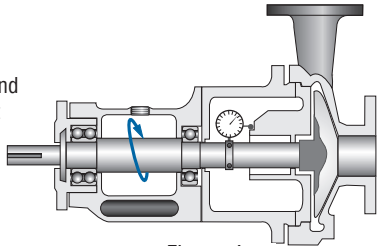
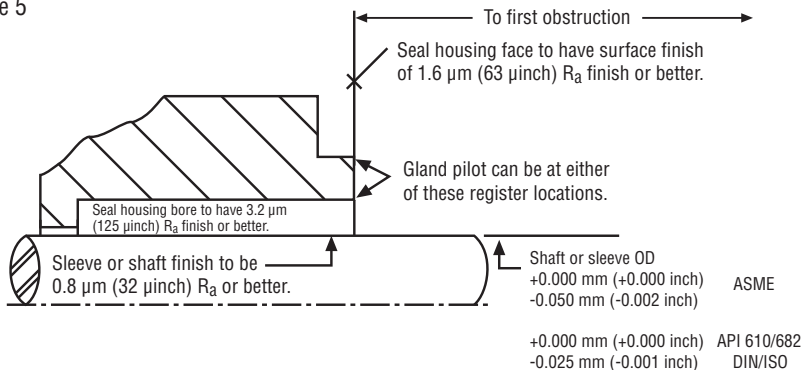


Figure 4

Surface finish requirements

Figure 5



2 Cartridge Seal Installation

- 2.1 Lubricate the shaft or sleeve lightly with lubricant provided with the seal.
- 2.2 Install the complete cartridge seal assembly on the shaft.
- 2.3 For overhung pumps: Position the seal close to the bearing housing with the seal oriented toward the pump. Install the pump back-plate or seal housing and assemble the pump.
- 2.4 Position the cartridge gland against the seal housing face and tighten the gland stud nuts up evenly, cross staggering the adjustment of the nuts.
- 2.5 For between bearings pumps: Assemble the bearings, coupling, etc. and adjust the impeller so that the shaft is in its operating axial position.
- 2.6 For end suction pumps: Adjust the bearings, coupling, and impeller so that the shaft is in its operating axial position.
- 2.7 Tighten the set screws on the seal cartridge drive collar.

Note Any subsequent axial adjustment of the shaft requires resetting of the seal.

- 2.8 Disengage or remove setting devices. Eccentric washer or slotted plate type setting devices should be repositioned clear of rotating parts and locked to the gland in a neutral position. Centering type devices cap screwed to the sleeve drive collar should be removed and stored for future seal removal and repair. All setting device types need to be reinstalled for resetting the seal when repositioning the pump impeller.
- 2.9 See Operational Recommendations, paragraph 3 and 4, before starting pump.

3 Operational Recommendations for Single Cartridge Seal

- 3.1 Do not start up the equipment dry. Vent air from the casing of the pump and the seal chamber before startup. Check the seal assembly drawing for the recommended piping plan and follow any special instructions. Plan 11 is a good default flush plan if none are specified for horizontal pumps.
- 3.2 If the seal runs hot, check for proper seal setting, seal housing dimensions, and check the bypass or flush line for obstructions. Do not allow the equipment to run for any extended time if the seal gets hot or squeals.

4 Operational Recommendations for Dual Cartridge Seal

- 4.1 A dual seal must be supplied a clean buffer/barrier fluid compatible with the product.
- 4.2 Dual pressurized seals must at all times maintain barrier fluid pressure at least 172 kPa (25 psig) above the maximum product pressure in the seal chamber.
- 4.2 The recommended piping for a dual pressurized seal with the use of a Supply Tank is shown in Figure 6, Plan 53A. Circulation from an external source is shown in Figure 7, Plan 54. Other mechanical seal support systems are also available from Flowserve.
- 4.3 Turn on any cooling water to the supply tank or other support system.
- 4.4 Start-up the seal barrier fluid system before starting pump.
- 4.5 Do not start up the equipment dry. Vent air from the casing of the pump before startup.
- 4.6 If the seal runs hot, check for proper seal setting, seal housing dimensions, and check the barrier fluid system. Do not allow the equipment to run for any extended time if the seal gets hot or squeals.

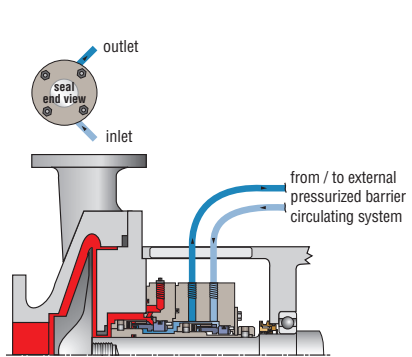
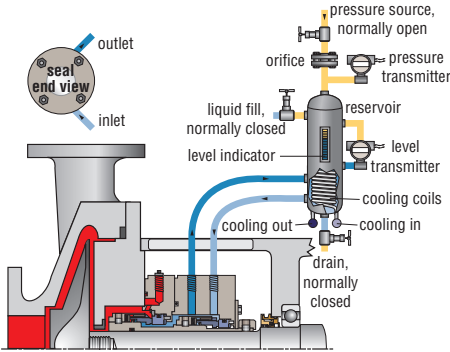
For special problems encountered during installation, contact your nearest Flowserve Sales and Service Representative or Flowserve Authorized Distributor.



TO REORDER REFER TO
 B/M # _____
 F.O. _____

Plan 53A - Dual pressurized seal with circulation through a supply tank Figure 6

Plan 54 - Dual seal circulation from an external source Figure 7



5 Repair

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 Safety Data Sheet (SDS) 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.

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