

PSS 4

Split seal

**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, keyways, 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 special instructions or 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.

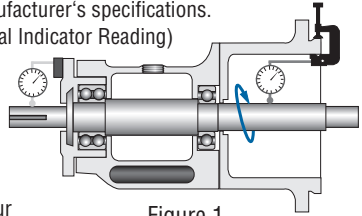


Figure 1

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.

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

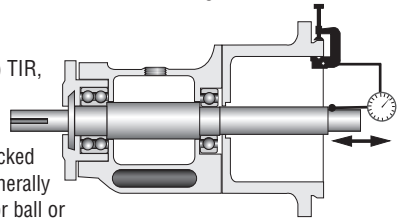


Figure 2

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.

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

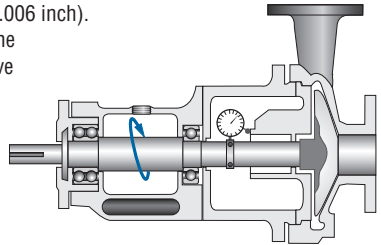


Figure 3

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.

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.

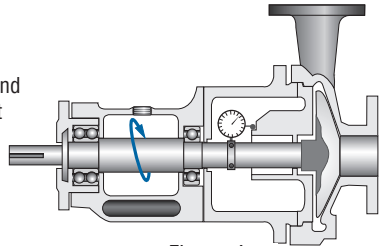
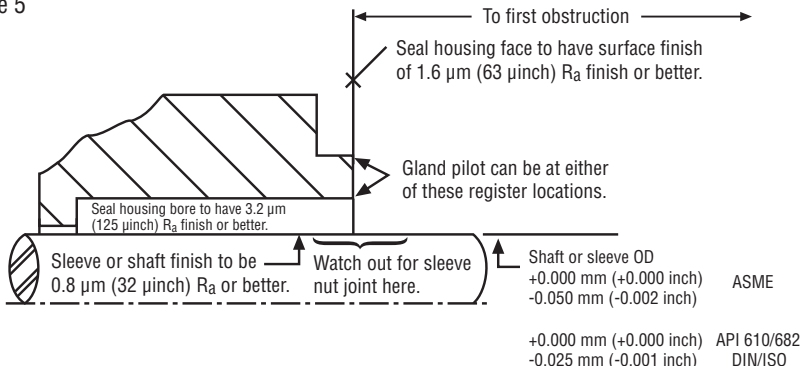


Figure 4

Surface finish requirements

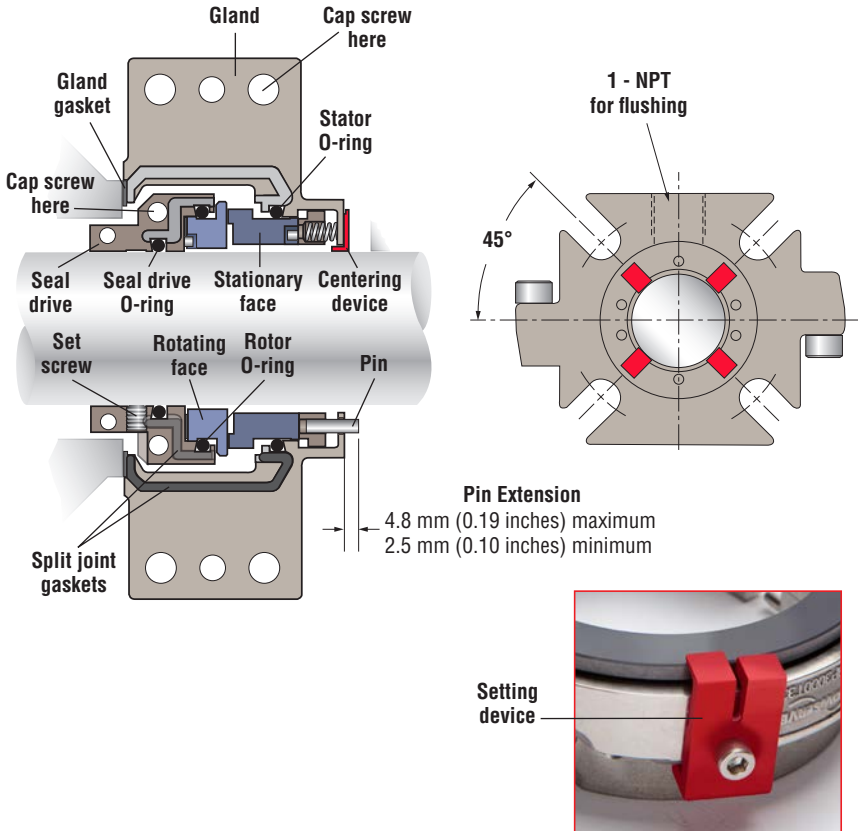
Figure 5



While the PSS 4 has been designed for rugged industrial application and ease of installation, it does require assembly in a clean environment according to the following installation steps. No setting dimensions or measurements are required to install the seal.

Seal Reference

Figure 6



Tools Needed for Installation

- 5/32", 5/16" and 3/32" or 1/8" hex key wrenches (supplied with seal)
- An open end wrench for the gland bolts.
- A flat head screw driver to remove the setting devices and centering devices.
- Torque wrench

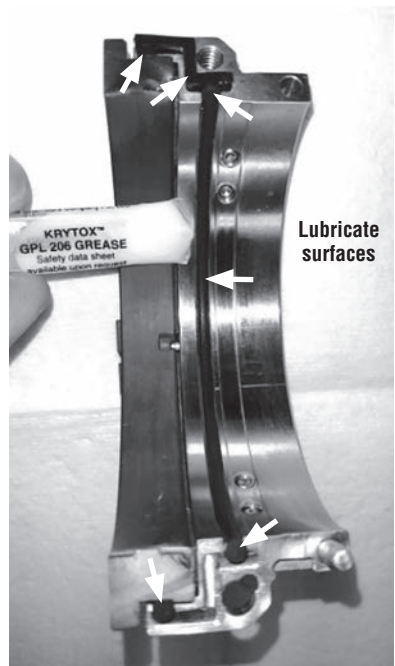
The images of parts shown in these instructions may differ visually from the actual parts due to manufacturing processes that do not affect the part function or quality.

2 Seal Drive Installation

Note: To remove possible obstructions during installation, remove any seal mounting studs from the equipment prior to beginning the seal installation.

Note: When un-packaging the seal, ensure the split joint gaskets are in place. Each seal drive half and gland half has one split joint gasket.

- 2.1 Lubricate the exposed surfaces of the seal drive O-ring and seal drive O-ring ends, rotating face O-ring ends, and seal drive split joint gaskets with the enclosed lube. See Figure 7.
- 2.2 Confirm that the set screws are backed out of the seal drive bore so the set screws do not interfere with seal drive fit around the shaft.
- 2.3 Ensure the rotating face O-ring ends do not extend past the rotor face split joint ends. Adjust O-ring ends as necessary.

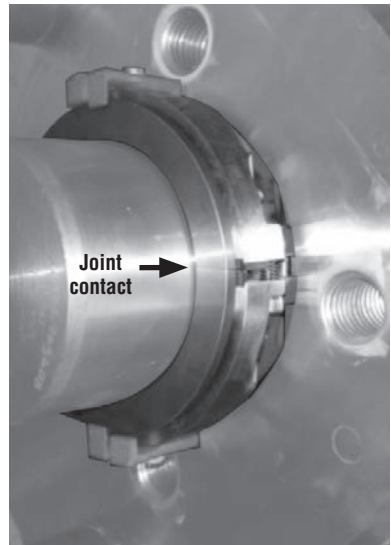


Lubrication Points

Figure 7

Note: Plan ahead to orient the split joint for best cap screw access. It is not recommended to rotate the seal drive assembly on the shaft. Instead, the shaft should be turned to access the screws.

- 2.4 Carefully assemble the seal drive halves around the shaft. Tighten the seal drive cap screws until the rotor face joints are brought into contact and check the face joints for any gross misalignment. See Figure 8. With no gross misalignment of the rotor face joints, continue to tighten the seal drive cap screws until the seal drive ends make contact.
- 2.5 Pushing on the metal seal drive, slide the assembly toward the equipment mounting surface until the rotor unit setting devices contact.



Assemble Seal Drive Halves on Shaft

Figure 8

2.6 Finish torquing the seal drive cap screws to 4.5 N-m (40 in-lbs). See Figure 9.

Note: Small mismatch remaining in the rotor face joint will be corrected by spring load during the gland installation.

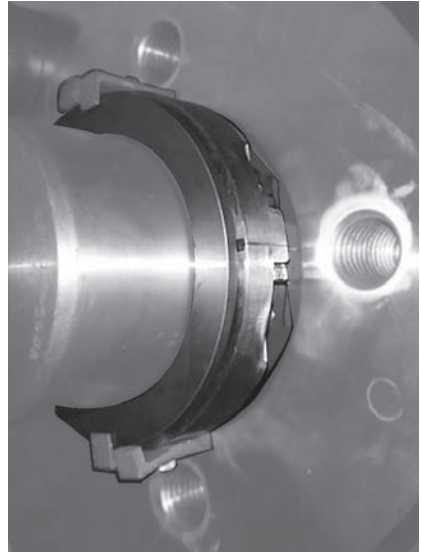
2.7 With the setting devices against the equipment mounting surface, tighten the seal drive set screws. See Figure 10. All seals have eight set screws. Tighten all four located at one split joint. Then tighten the four at the other split joint. Torque all set screws to 2.8 N-m (25 in-lbs) for seal sizes up through 85.7 mm (3.375 inch) and 5.6 N-m (50 in-lbs) for larger sizes.

2.8 Check all set screws to verify they are all torqued to the above specification.

2.9 Remove setting devices by unscrewing the socket head cap screw from the seal drive. See Figure 11.

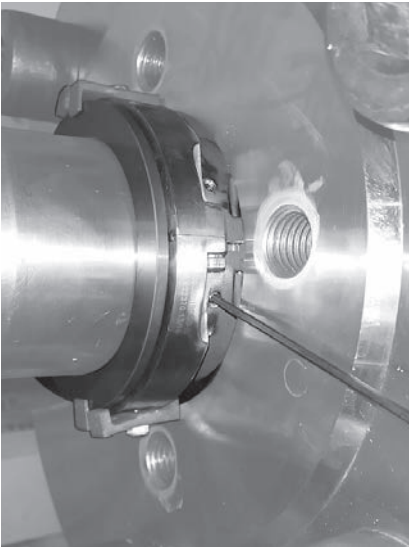
2.10 Clean the seal face with alcohol.

Caution: Consult Safety Data Sheets (SDS) for proper handling of alcohol.



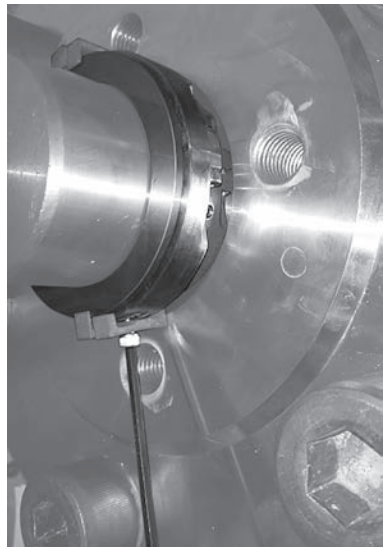
Finish Torquing Cap Screws

Figure 9



Torque Set Screws

Figure 10



Remove Setting Devices

Figure 11

3 Gland Installation

- 3.1 Lubricate the split ends of the stationary face, the stationary face O-ring ends, and the exposed surfaces of the gland split joint gaskets with the enclosed lube.
- 3.2 Clean the stationary seal faces with alcohol.
- 3.3 Carefully assemble the gland halves around the seal drive unit, avoiding any contact between the stationary seal face and the seal drive and/or shaft. See Figure 12.



Note: Plan ahead to install the gland halves so the stationary split joints do not align with the rotor split joints. Also orient the seal flush port at or near the 12 o'clock position.

Gland Assembly

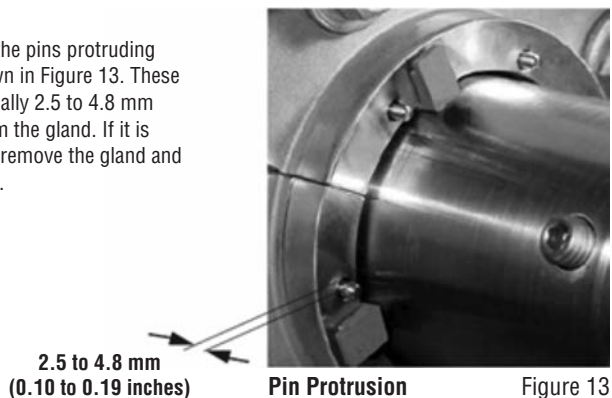
Figure 12

- 3.4 Finger tighten the seal gland cap screws leaving a gap between the splits of the gland halves of about 0.8 mm (0.03 inch).
- 3.5 Install equipment mounting hardware; i.e. bolts or equipment studs with hex nuts. (Further referred to as equipment mounting bolts)
- 3.6 Finger tighten the equipment mounting bolts so the gland is lightly supported at the equipment mounting surface while the cap screws are being tightened.
- 3.7 With the gland now lightly supported against the equipment mounting surface, fully torque the gland cap screws to 16 N-m (144 in-lbs, 12 ft-lbs).
- 3.8 Torque the equipment mounting bolts evenly to the recommendations below until the gland gasket is fully compressed and the gland is squarely seated against the equipment mounting surface.

Equipment Mounting Bolt Torque Recommendation

Seal Size	Torque	Minimum Grade 5 Bolt Size
25.4 - 95.25 mm (1.000 - 3.750")	33 N-m (25 ft-lbs)	3/8 inch
Above 95.25 mm (3.750")	67 N-m (50 ft-lbs)	1/2 inch

- 3.9 Measure the length of the pins protruding from the gland as shown in Figure 13. These pins should extend equally 2.5 to 4.8 mm (0.10 to 0.19 inch) from the gland. If it is more or less than this, remove the gland and recheck the installation.



Pin Protrusion

Figure 13

- 3.10 Pry off the gland centering devices with a flat head screwdriver. See Figure 14.
- 3.11 Connect a flush line to the gland or plug if unused.
- 3.12 Turn the equipment shaft by hand as a final check to be sure nothing is binding.



Remove Centering Device Figure 14

4 Operational Recommendations

Do not start up the equipment dry. Vent air from the equipment before startup. Circulate clean product, Plan 11, or a clean fluid from an external source, Plan 32, through the seal whenever the equipment is in operation unless operating in Zone B of Figure 15 where no flush is required with clean fluids.

Notes for Figure 15:

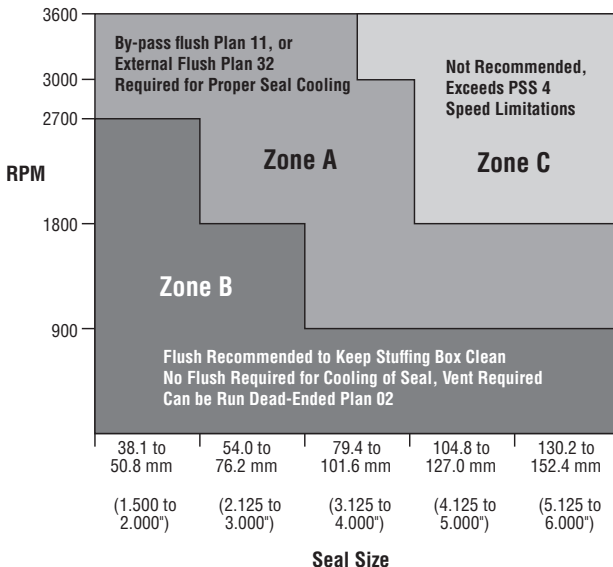
- Recommendations are for use in water or other similar viscosity liquids.
- These recommendations apply to products having a maximum temperature of 71°C (160°F).
- Use Plan 13 on vertical equipment to vent the seal area even when operating in Zone B.

If the seal runs hot, check for proper seal setting, see 3.9, and check the flush line for any vapor locks or obstructions.

If you encounter special problems during installation contact your nearest Flowserve Sales and Service Representative.

Cooling Recommendations for PSS 4

Figure 15





TO REORDER REFER TO

B/M # _____

F.O. _____

7 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 the seal. These parts are available from numerous Flowserve stocking locations. To order replacement parts, refer to the part code number and B/M number. A spare back-up seal should be stocked to reduce repair time. The following parts can also be stocked for emergency needs.

Rotating Face (Split)	Rotating Face O-ring	Gland Gasket
Stationary Face (Split)	Stationary Face O-ring	Joint Gaskets
Seal Drive O-ring	Setting Devices	Centering Devices
Cap Screws	Coil Springs	Set Screws

When seals are returned to Flowserve for repair, **decontaminate the seal assembly** and supply a signed certificate of decontamination. Include an order marked "**Repair or Replace**" and **attach** the filled out Flowserve returned goods sticker to the outside of the shipping container.

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, and returned.

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USA and Canada

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

Europe, Middle East, Africa

Roosendaal, the Netherlands
Telephone: 31 165 581400
Telefax: 31 165 554590

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