FLOWSERVE

Installation Instructions

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. The gland studs may need to be removed to properly fit and install the seal.

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 in) 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 1,000 to 3,600 RPM. For values above and below, consult your Flowserve representative. See Figure 1.

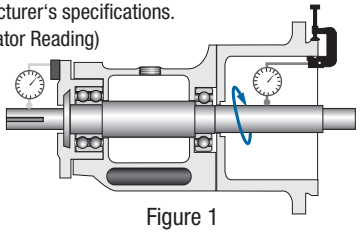


Figure 1

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

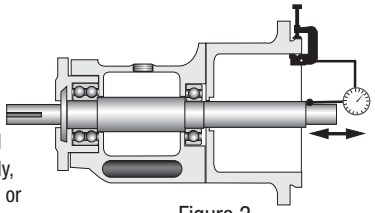


Figure 2

Radial bearing play at seal chamber face should be checked against the equipment manufacturer's specifications. Generally, 0.05 to 0.10 mm (0.002 to 0.004 in) 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 to 0.15 mm (0.004 to 0.006 in). 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 in/in) 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.

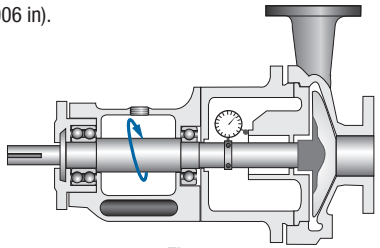


Figure 3

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 in per 1 in shaft diameter) to a maximum of 0.125 mm (0.005 in) TIR. See Figure 4.

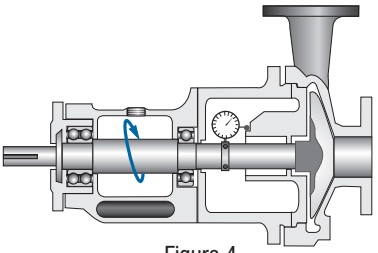
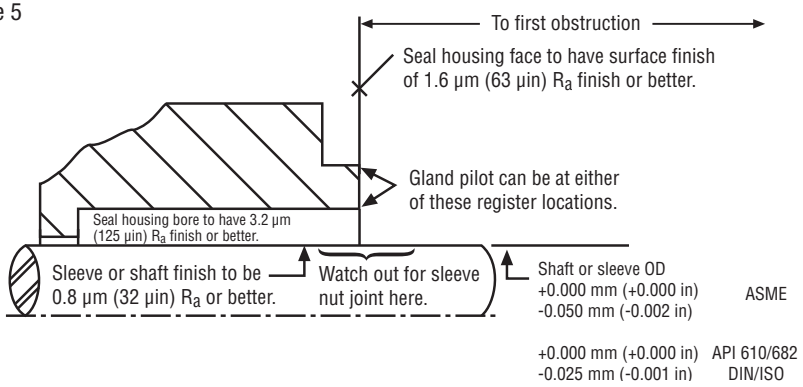


Figure 4

Surface finish requirements

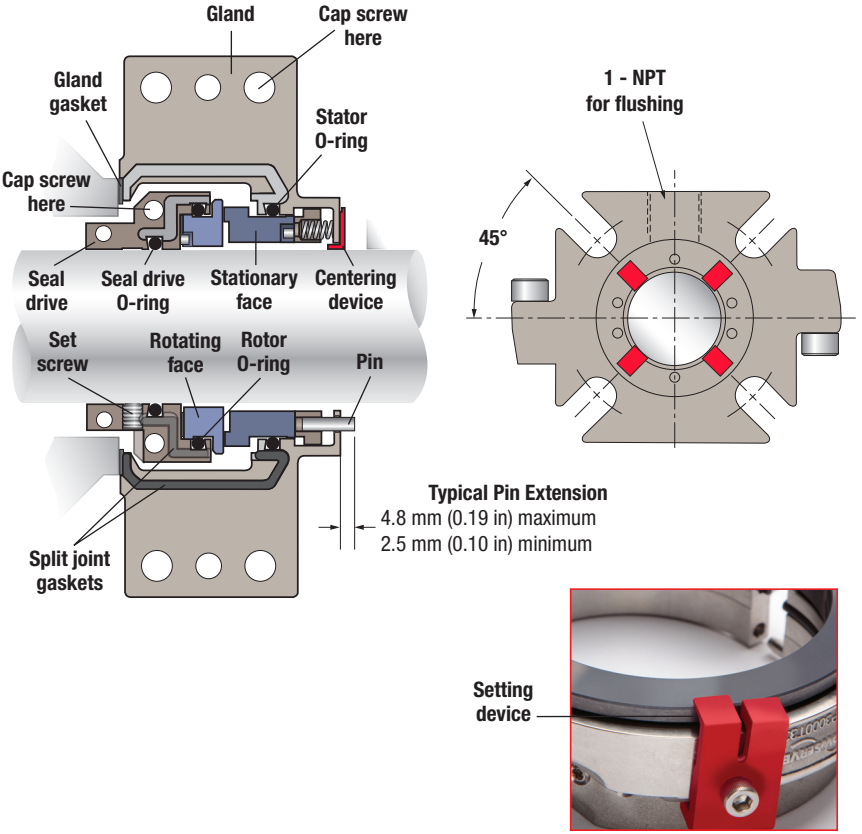
Figure 5



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. The PSS 4 seal has setting and centering devices provided to properly set the seal.

Seal Reference

Figure 6



Tools Needed for Installation

- Hex key wrenches (typically supplied with seal)
- An open end wrench for the gland bolts
- A flat-head screwdriver 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

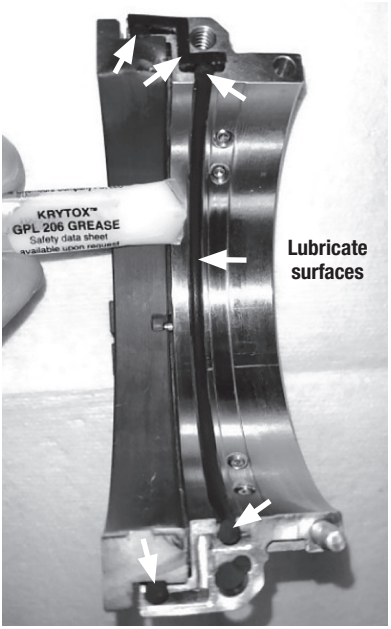
Note: To remove possible obstructions during installation, remove any seal mounting studs from the equipment prior to beginning the seal installation.

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. This is an important check to make sure you don't pinch a gasket at the face splits. If O-ring appears like it is higher on only one side,
it might be possible to push edge of the face to make the face split at or above the end of the O-ring.

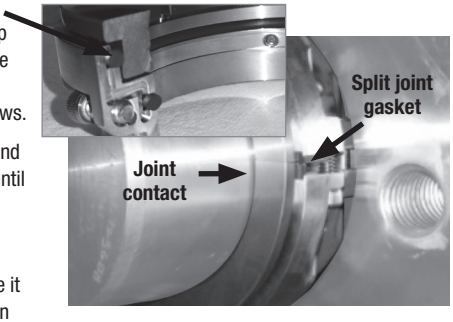


Lubrication Points Figure 7

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 split joint gasket makes contact with the other seal drive half.
Use a scale/feeler gauge/small flat-head screwdriver to push on the gasket and ensure it fits into the mating groove. Continue to tighten the 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.

Ensure that the setting device is perpendicular to the seal face so that the setting device will make flat contact against the seal chamber face. See Figure 9.



Assemble Seal Drive Halves on Shaft Figure 8

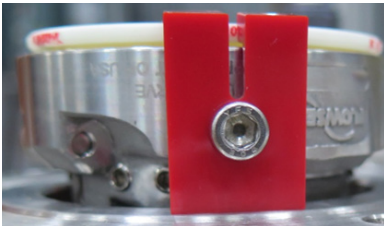


Figure 9

2.5 Pushing on the metal seal drive, slide

the assembly toward the equipment mounting surface until the rotor unit setting devices contact.

2.6 Finish torquing the seal drive cap screws to the values noted on the seal drawing. See Figure 10.

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

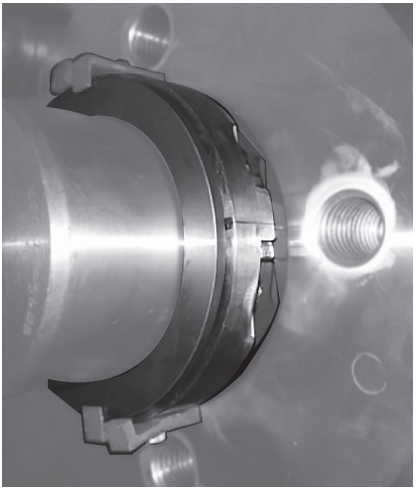
2.7 With the setting devices against the equipment mounting surface, tighten the seal drive set screws. See Figure 11. All seals have eight set screws. Tighten all four located at one split joint. Then tighten the four at the other split joint. Torque all set screws to the values noted on the seal drawing.

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

2.9 Remove setting devices by unscrewing the socket head cap screw from the seal drive. See Figure 12.

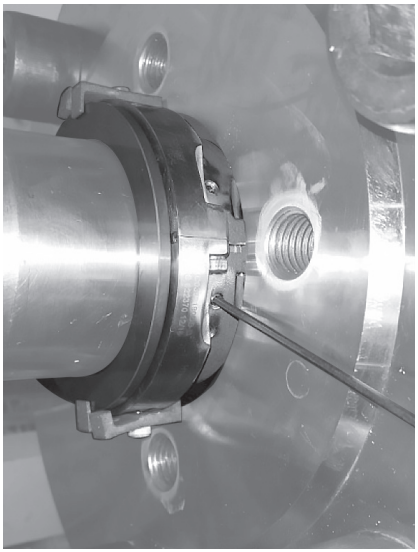
2.10 Clean the seal face with alcohol.

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

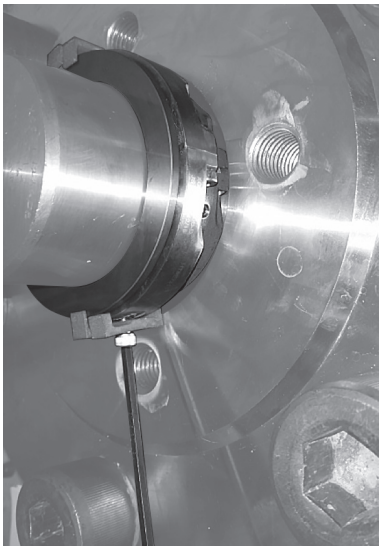


Finish Torquing Cap Screws Figure 10

Note: You can use the fingernail test to check for a gross mismatch between face halves. If your fingernail catches on a significant step, you will have to loosen the set screws and cap screws and try again. If necessary, with the cap screws a bit loose, take a flat object (another face half, gauge block, etc.), and press down on the split as you tighten the cap screws. This could help the face split to come together better.



Torque Set Screws Figure 11



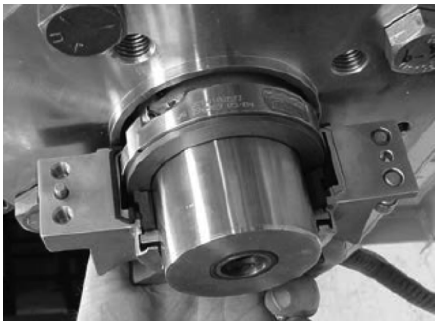
Remove Setting Devices Figure 12

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. Check that the stationary face gaskets do not stick above the face split.

3.2 Clean the stationary seal faces with alcohol.

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. Pay attention to the flat gasket attached to the bottom of the gland, and take care not to dislodge it or damage it during install.



Gland Assembly Figure 13

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 13.

3.4 **For horizontal shafts**, finger tighten the seal gland cap screws, leaving a gap between the splits of the gland halves of about 0.8 mm (0.03 in).

For vertical shafts, gently support the gland assembly by resting the stationary faces on the rotating faces. Be sure to keep the gland halves perpendicular to the shaft when moving them into place. Then finger tighten the seal gland cap screws, leaving no gap between the splits of the gland halves.

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 the values noted in the seal drawing.

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. Be careful not to over-tighten the mounting bolts, which can warp the glands and cause leakage (especially on two-bolt designs).

3.9 Measure the length of the pins protruding from the gland

Typical Pin Extension Figure 14

Equipment Mounting Bolt Torque Recommendation

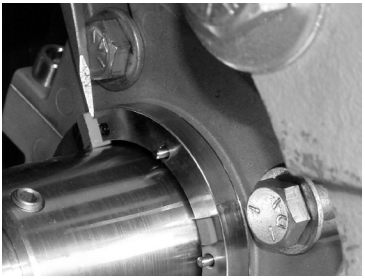
Seal Size	Torque	Minimum Grade 5 Bolt Size
25.4 to 95.25 mm (1.000 to 3.750 in)	33 N-m (25 ft-lbs)	3/8 in
Above 95.25 mm (3.750 in)	67 N-m (50 ft-lbs)	1/2 in

as shown in Figure 14 (page 6). These pins should extend equally, typically between 2.5 to 4.8 mm (0.10 to 0.19 in) — see seal drawing. If it is more or less than this, remove the gland and recheck the installation.

3.10 Pry off the gland centering devices with a flat head screwdriver. See Figure 15.

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 15

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 16 where no flush is required with clean fluids.

Notes for Figure 16:

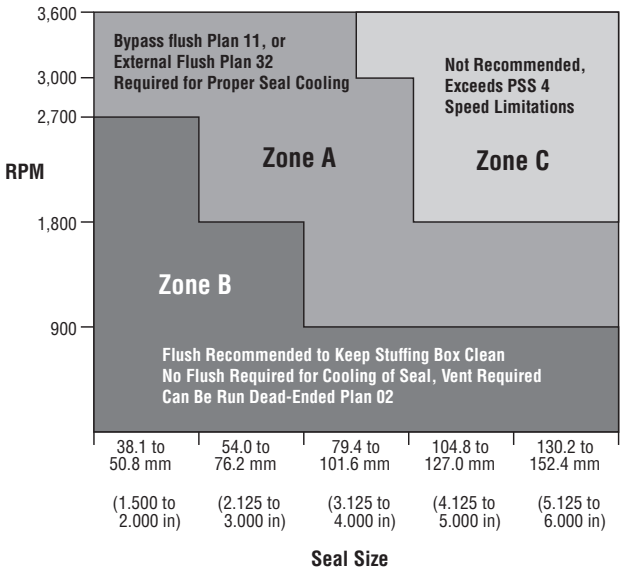
- Recommendations are for use in water or other similar viscosity liquids.
- These recommendations apply to products having a maximum temperature of 71°C (160°F).
- Use Plan 13 on vertical equipment to vent the seal area even when operating in Zone B.

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 16



TO REORDER, REFER TO

B/M # _____

F.O. _____

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 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.

To find your local Flowserve representative and find out more about Flowserve Corporation, visit www.flowserve.com

Tell us how your installation experience went using this link. We appreciate your feedback!

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