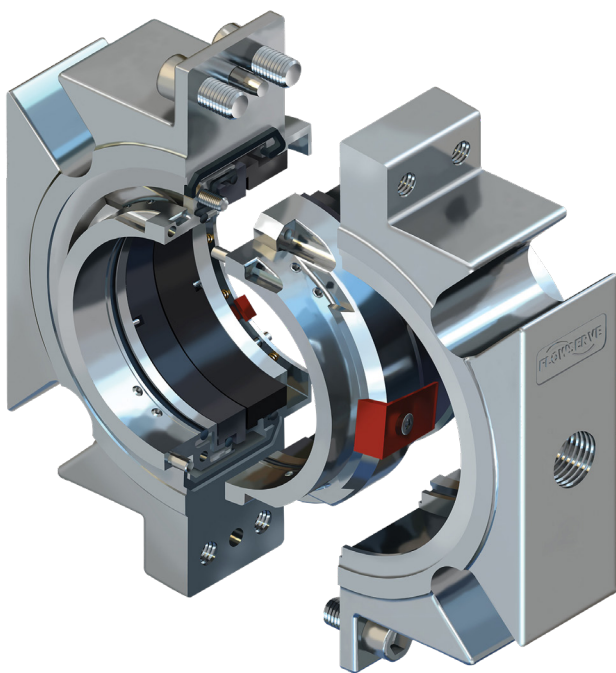


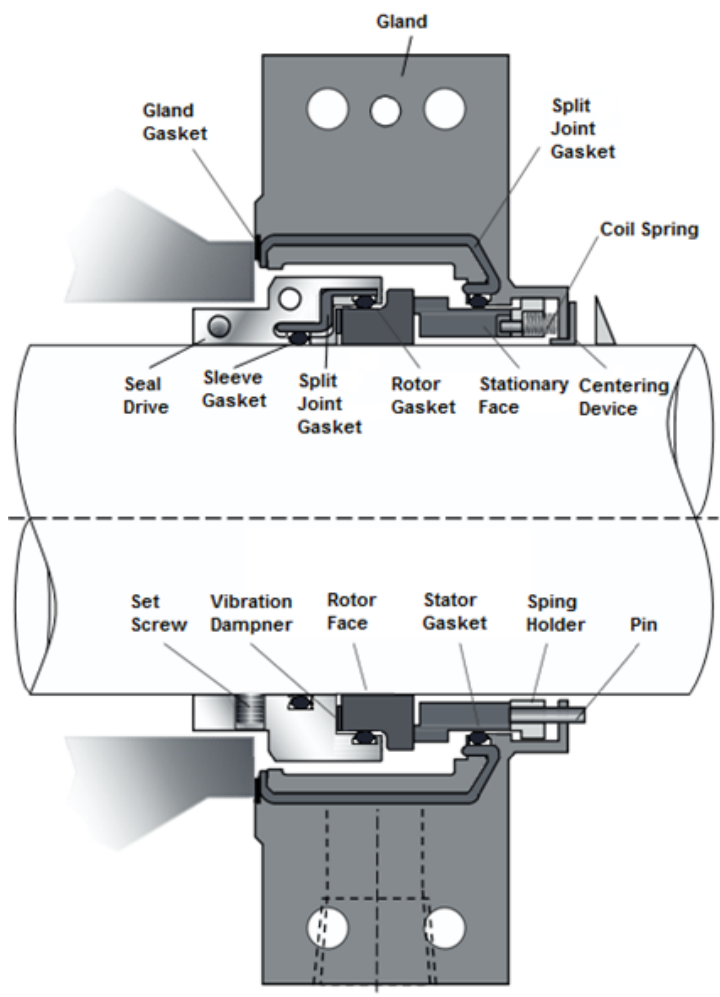


USER INSTRUCTIONS

Installation
Operation
Maintenance

PSS 4 Split Seal Repair





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.

These instructions are to be used in conjunction with the PSS 4 Repair Kit. The Repair Kit contains replacement seal faces, secondary seals, Loctite®¹ 430² adhesive, and gasket lubricant. Other small parts are shown in Figure 1. The repair should be done in a clean, well-lit area. The tools you will need to do the repair include:

- Suitable solvent and rinse
- Ethyl alcohol
- Paper towels and/or swabs
- Safety razor blade
- Flat head screw driver
- Hex key wrenches
- Paper clip
- 206 seal lube

These instructions require the gluing of the gland gasket and seal drive cap screw retainer into position with Loctite 430. As with any cyanoacrylate, extreme care must be used when handling Loctite 430. See the enclosed Safety Data Sheet for details.

For special problems encountered during the repair procedure, contact your nearest Flowserve sales and service representative or authorized distributor.

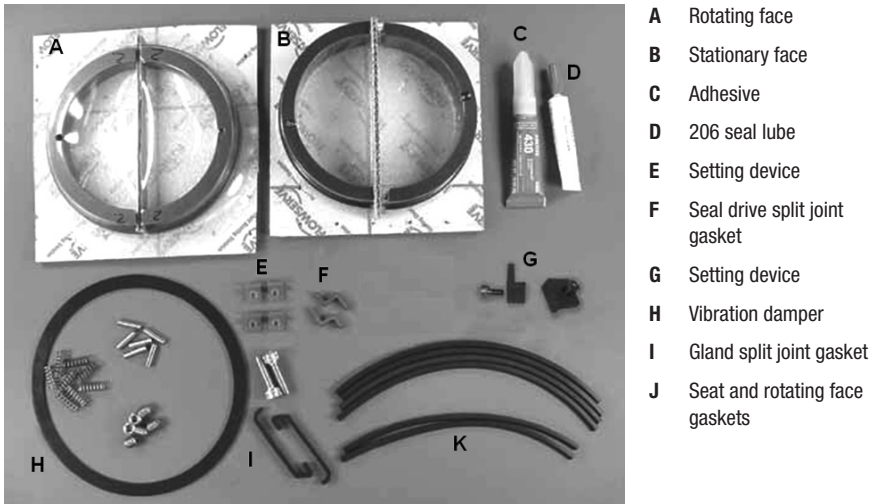


Figure 2

¹ Registered Trademark of Loctite Corporation

² Currently Loctite® 430 is not approved in Europe, alternative European glues are Loctite® 401 and Loctite® 480

1 Disassemble and Clean (If pins are damaged. If not, skip to Section 2)

- 1.1 Remove the cap screws and the set screws from the seal drive and gland.
- 1.2 Remove the rotating and stationary face halves by lifting the center of each face up above their drive or lock pins and sliding the face away from the seal drive or gland.
- 1.3 Remove all the elastomer O-rings and gaskets from the seal drive and gland.
- 1.4 Remove the spring holder by pulling out the lock pins. Be careful not to damage the seal gland. See Figure 3.
- 1.5 Soak the parts in a solvent to remove the gland gasket, cap screw retainers and retaining sleeves, adhesive, grease, etc. Suggested solvents include:



Figure 3

- Loctite X-NMS 768
- Acetone
- Simple Green®

Caution: Follow all Safety Data Sheet (SDS) recommendations when handling these fluids.

- 1.6 Remove any remaining adhesive by brushing or lightly scraping.
 - 1.7 Wash parts in hot soapy water. Rinse thoroughly in clean water.
- Let parts dry.

Caution: Do not sand or bead blast gasket and joint surfaces in the seal drive and gland to avoid damaging them. Glue, rubber or heavy deposits must be carefully scraped off these surfaces before installing the gaskets.

2 Ongoing Inspection

During the assembly process follow these inspection procedures to avoid errors which may not be correctable later.

- 2.1 **Check Adhesion** - Gently tug at the flat gasket to be sure they are properly secured. If they come loose easily, it is likely that the surfaces were not adequately cleaned or rinsed. Clean the surface again and reapply adhesive per the instructions. Apply small dots of adhesive only where specified. Dot size should be 1.00 to 2.00 mm (0.040 to 0.080 in) in diameter.
- 2.2 **Gasket Length** - Be sure that the rotating face gasket, stationary face seat gasket, and seal drive sleeve gasket are longer than the surfaces where they end. See Figure 4, steps 5.2 and 11.2. If they are not, reposition them accordingly. Please ensure the rotor gasket ends do not protrude past the rotor face ends.

Note: For all standard size seals (0.125 in increments), the rotating face gasket, seat gasket and sleeve gasket are cut to the proper length at the factory and require no further trimming. These gaskets will appear to be too long for the groove, see Figure 9. The extra length of the gasket will be compressed into the groove during seal assembly.

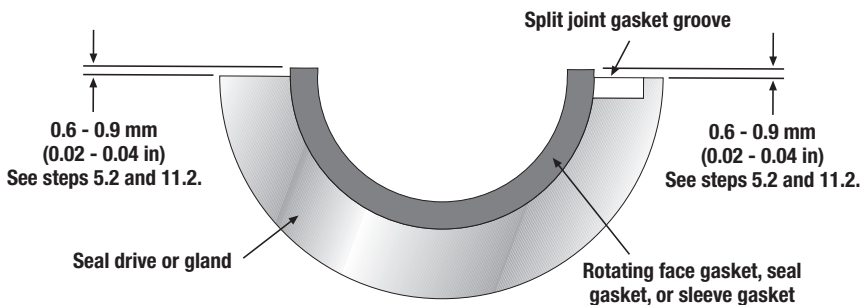


Figure 4

3 Seal Drive Split Joint Gasket and Cap Screw Installation

- 3.1 Each seal drive half has split gasket grooves machined into each joint surface. **The split joint gasket can only be installed in the groove with the 2.032 mm (0.080 in) narrow center channel which helps hold the gasket in place.** See Figure 5.



Figure 5

- 3.2 Wipe the proper split joint gasket groove clean with ethyl alcohol.

Caution: Consult SDS for proper handling of ethyl alcohol.

- 3.3 Press the split joint gasket in the groove and position it as shown in Figure 6. The split joint gaskets should be positioned flush with the groove surfaces as indicated.



Figure 6

- 3.4 The thin flange on the seal drive has a short threaded section which is designed to hold the turned cap screw ready for installation. Lightly coat a seal drive cap screw's threads with 206 seal lube and install it through the clearance hole until it protrudes 1.0 to 1.5 mm (0.040 to 0.060 inch) past the seal drive joint. See Figure 7.

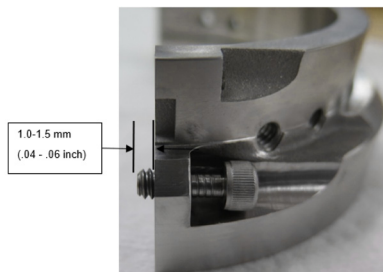


Figure 7

- 3.5 Lubricate all the set screws with 206 seal lube and install into seal drive. Ensure the screws do not extend beyond the ID of the seal drive.
- 3.6 Repeat this procedure for the other seal drive half.

4 Sleeve Gasket and Rotating Face Gasket Installation

- 4.1 Wipe the sleeve gasket groove clean with ethyl alcohol.

Caution: Consult SDS for proper handling of ethyl alcohol.

- 4.2 Install the sleeve gasket into the groove ends. Adjust the gasket in the groove so the end extends 0.6 to 0.9 mm (0.02 to 0.04 in) past the seal drive joint surface.
- 4.3 Check the gasket extensions are even on both sides and do not extend past the split joint gasket. See Figure 8.



Figure 8

Note: For all standard size seals (0.125- in increments), the rotating face gaskets, seat gaskets, and sleeve gaskets are cut to the proper length at the factory and require no further trimming. These gaskets will appear to be too long for the groove, see Figures 9 and 10. The extra length of the gasket will be compressed into the groove during seal assembly.

- 4.4 Press the middle of the gasket length into the groove to fully seat the gasket, taking care not to change the gasket extension lengths. See Figure 8.
- 4.5 Repeat these steps for the rotating face gasket
- 4.6 Repeat this procedure for the other seal drive half.



Figure 9



Figure 10

5 Rotating Face Installation

- 5.1 Wipe off yellow ink markings to align gaskets across from each other. Or proceed to 5.2 if no markings exist.
- 5.2 Check the thickness of the Vibration dampener, match up and align.
- 5.3 Measure the thickness of each of the vibration dampener ends as shown in Figure 11.
- 5.4 Match up the thicknesses of ends and align across from each other. Install each vibration dampener into the gland accordingly - as shown in Figure 12. This will aid in alignment of the face fractures.



Figure 11

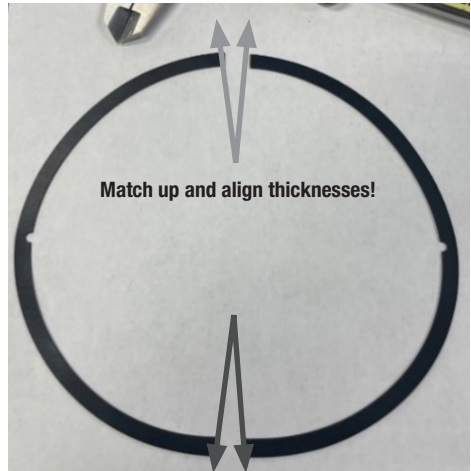


Figure 12

- 5.5 Set the seal drive face up on the bench. Lubricate both sides of the vibration damper with supplied 206 seal lube. Place the vibration damper on the seal drive rotor face support surface using the drive pin as a locator. See Figure 13.

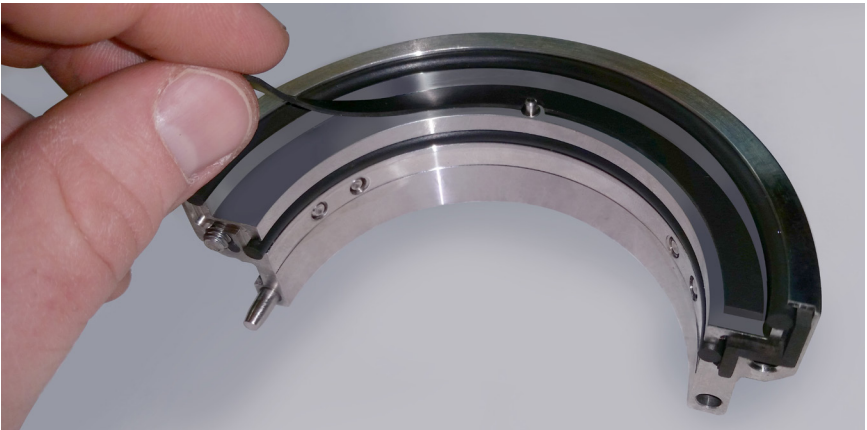


Figure 13

- 5.6 Lubricate the exposed surfaces of the rotor face gasket including the ends and the rotor face shoulder with the supplied 206 seal lube.

- 5.7 Position the rotor face back surface downward over the vibration damper aligning the drive pin with the pin slot.



Figure 14

- 5.8 Push the rotating face radially into the seal drive and then down as the drive pin slips into the drive slot. The rotating face should sit flat on the vibration damper. See Figure 14.
- 5.9 Slide the rotor face radially inward within the seal drive until the drive pin sits flush against the end of the rotor face drive pin slot. Ensure the rotor face gasket ends do not protrude past the rotor face split joint ends (adjust gasket ends as necessary). See Figure 15.

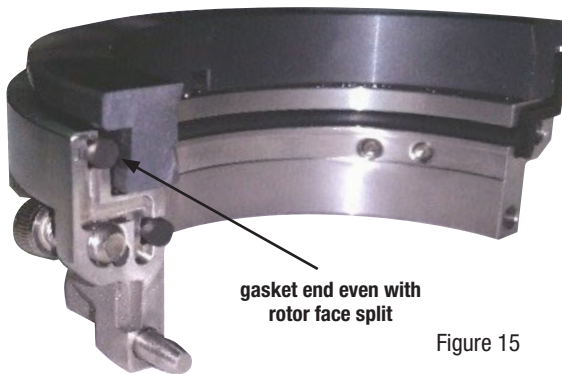


Figure 15

- 5.10 Place the setting device over the locating hole and secure with the cap screw. The setting device mechanically maintains the rotor face offset for installation. See Figure 16 and 17.

- 5.11 Lubricate the exposed surfaces of each sleeve gasket including the ends and the split joint gaskets with supplied grease.

- 5.12 Wipe the rotating faces clean with ethyl alcohol.

Caution: Consult Safety Data Sheets for proper handling of ethyl alcohol.

- 5.13 Repeat this procedure for the other seal drive half.

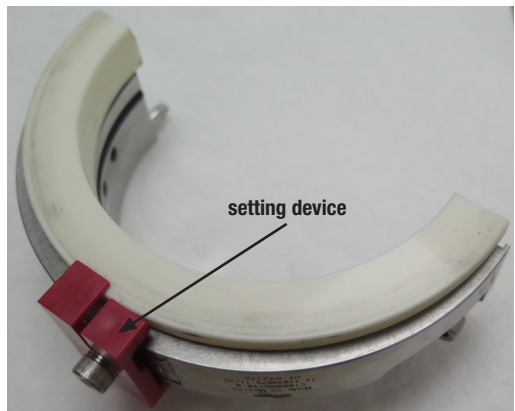


Figure 16

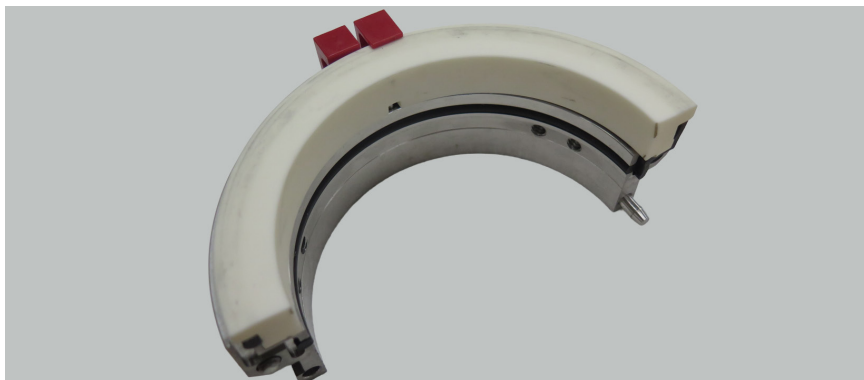


Figure 17

6 Spring Holder Installation (If the pins were removed due to damage in Section 1. Skip to Section 7 if not required).

- 6.1 Place the coil springs in the spring holes. (If pins and springs are removed)
See Figure 18.

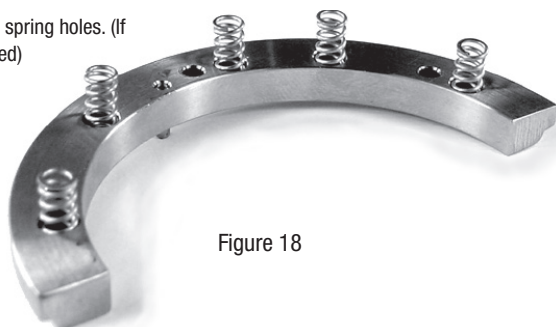


Figure 18

- 6.2 Set the gland half face down on the table and insert half of the spring holder into the gland. See Figure 19.

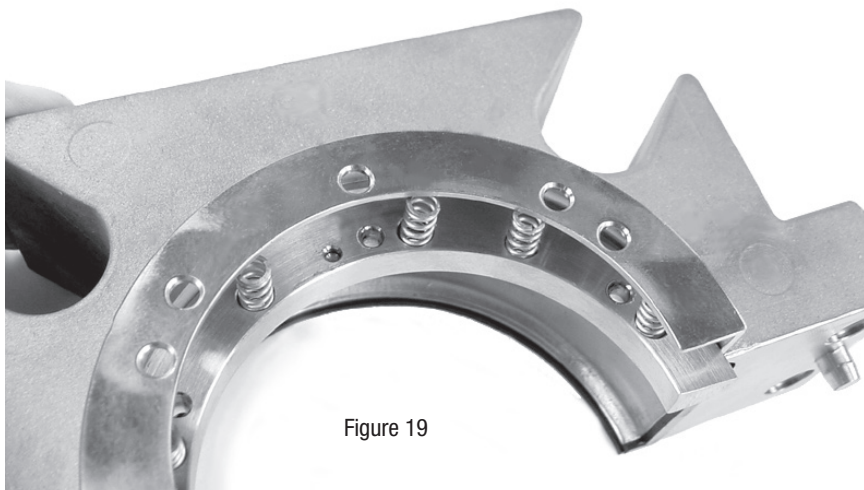


Figure 19

- 6.3 Set the gland half face down on the table and insert half of the spring holder into the gland. See Figure 19.
- 6.4 Lubricate one end of the lock pins and set them into the lock pin holes in the gland and align them with the holes in the spring holder.
- 6.5 Keep the spring holder snug in the gland bore and press the lock pins into the spring holder until the pins extend 1.5 mm (0.06 in) out of the gland. See Figure 20.
- 6.6 Repeat this procedure for the other gland half.



Figure 20

7 Gland Cap Screw and Retainer Sleeve Installation

Note: Original PSS4 designs utilized standard full threaded cap screws with red plastic cap screw retainers to hold them in place within the gland halves prior to installation. If you have this design, please skip steps 7.1-7.3 and proceed to step 7.4

- 7.1 The thin flange on the gland has a short threaded section which is designed to hold the turned cap screw ready for installation on the equipment. Lightly coat the gland cap screws with 206 seal lube. See Figures 21 and 22.



Figure 21



Figure 22

- 7.2 Thread the screws in from the outside surface of the thin gland flange until they protrude 1.5 to 3.0 mm (0.06 to 0.12 in) past the gland joint surface. See Figure 23.

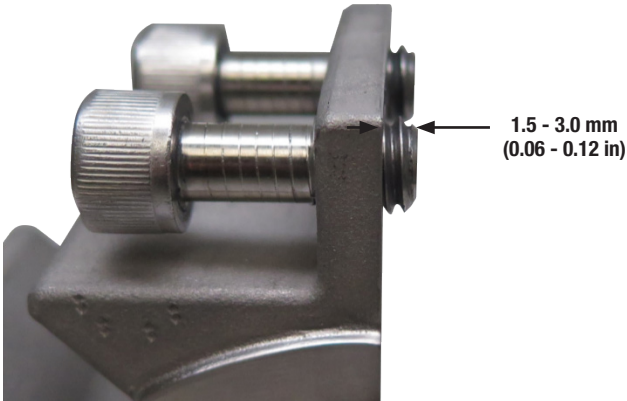


Figure 23

- 7.3 Repeat this procedure for the other gland half.

Gland Cap Screw with Red Retainer (original PSS4 design)

- 7.4 One end of the retainer sleeve has a rib which is flush with the end of the sleeve. The end with the exposed rib is positioned to the machined side of the flange. Insert one retainer sleeve into each clearance hole. See Figure 24 and 25.

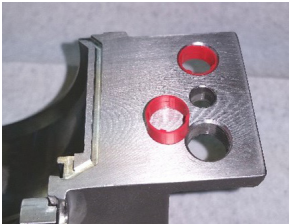


Figure 24



Figure 25

- 7.5 Lightly coat the gland cap screws with 206 seal lube and thread them through the retainer sleeves until they protrude 1.5 to 3.0 mm (0.06 to 0.12 inch) past the gland joint. See Figure 26.
- 7.6 Repeat this procedure for the other gland half.

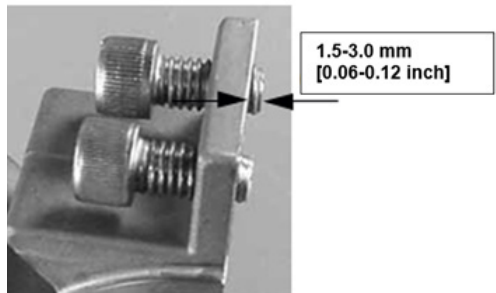


Figure 26

8 Gland Gasket Installation

8.1 Assemble the gland halves. Tighten the cap screws until the gland joints are metal to metal.

8.2 Wipe the gland gasket groove clean with ethyl alcohol.

Caution: Consult SDS for proper handling of ethyl alcohol.

8.3 Using the wire end of a paperclip apply a dot of adhesive in the gland gasket groove about 6.3 mm (.25 in) from each side of the split joints, 4 dots total. See Figure 27.

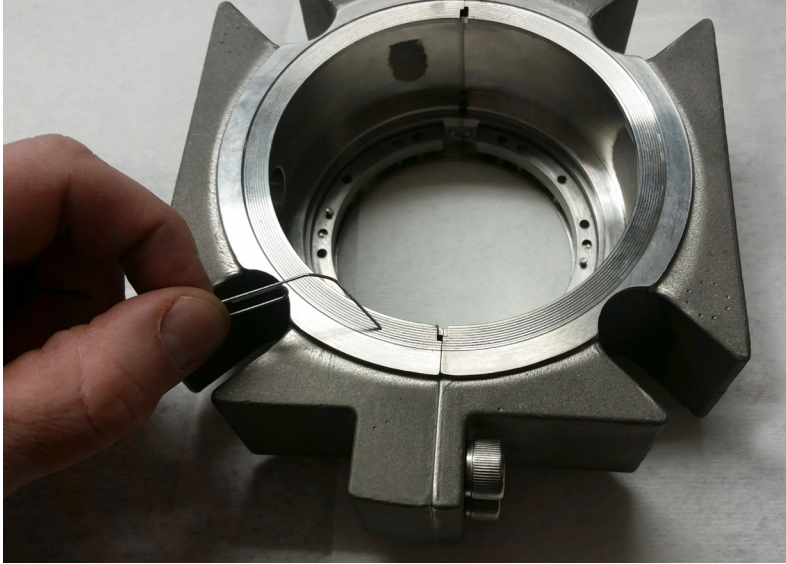


Figure 27

8.4 Then apply dots of adhesive in the gland gasket groove, space about 12.7 to 25.4 mm (0.50 to 1 in) apart. Do not apply adhesive closer than 6.3 mm (0.25 in) to the split joint.

- 8.5 Center the gland gasket in the gasket groove and hold it in place with hand pressure for 10 seconds until the adhesive sets. On larger sizes use a flat plate to ensure firm equal pressure around the entire circumference. See Figure 28.
- 8.6 With the safety razor blade at a 20° to 30° angle from the vertical, cut the gasket 3.0 to 3.8 mm (0.12 to 0.15 in) from the split joint opposite the gland cap screw heads. Repeat on the opposite side, 180° from the first cut. See Figures 29 and 30.
- 8.7 After cutting, if the overlapping gland gasket ends are stuck to the gland, use the sharp blade to gently lift them to break the bond.

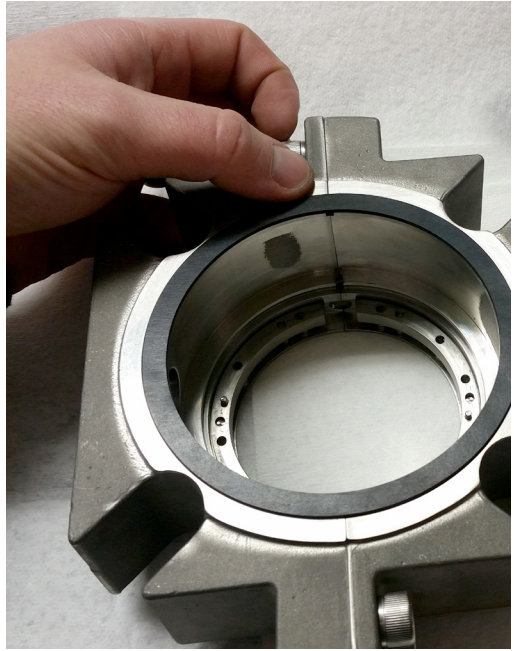


Figure 28



Figure 29

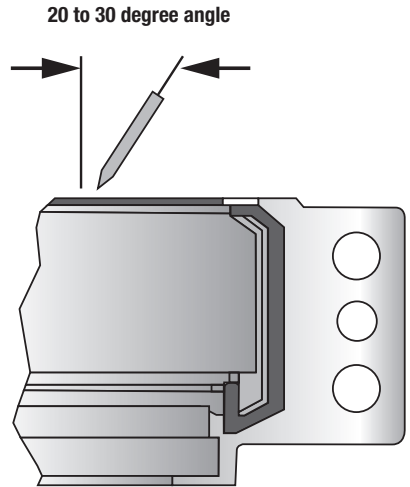


Figure 30

9 Gland Split Joint Gasket Installation

- 9.1 Loosen the gland cap screws and completely separate the gland halves.
- 9.2 Each gland half has split joint gasket grooves machined into each joint surface. The split joint gasket should be installed in the groove of the joint surface where the gland cap screw holes are located.
- 9.3 Wipe the gland split joint gasket groove clean with ethyl alcohol.

Caution: Consult SDS for proper handling of ethyl alcohol.

- 9.4 Place the split joint gasket in the groove. The split joint gasket should fit snugly into the gland gasket groove surface, See Figure 31.
- 9.5 Repeat this procedure for the other gland half.



Figure 31

10 Seat Gasket Installation

- 10.1 Wipe the gland seat gasket groove clean with ethyl alcohol.

Caution: Consult SDS for proper handling of ethyl alcohol.

- 10.2 Install the seat gasket into the groove ends. Adjust it so the gasket ends extend past the gland joint surface. See Figure 32.
- 10.3 Repeat this procedure for the other gland half.



Figure 32

11 Centering Device Installation

- 11.1 Place one gland half on the table face down.
- 11.2 Position the centering devices at the gland locating holes and press their tabs into the locating holes. The locating holes are positioned 45 degrees from the split joints and are even with the bolt slots. See Figure 33.
- 11.3 Repeat this procedure for the other gland half.

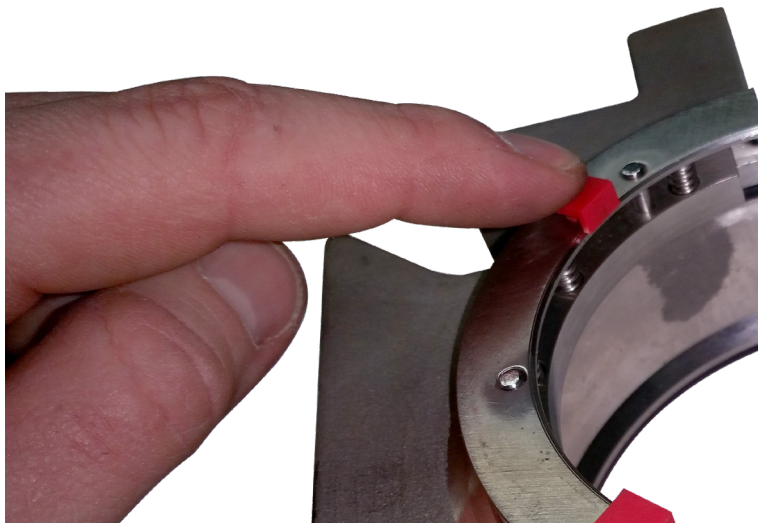


Figure 33

12 Stationary Face Installation

- 12.1 Lubricate the exposed surfaces of the seat gasket including the ends, the stationary face shoulder, and the stationary face back surface that contacts the spring holder with the supplied 206 seal lube.
- 12.2 With the gland half sitting on the bench, position the stationary face over the spring holder as shown in Figure 34.
- 12.3 Align the drive pin a with the drive pin slot.
- 12.4 Push the stationary face radially into the gland and then down as the drive pin slips into the drive pin slot. The stationary face should sit flat on the spring holder. See Figures 35 and 36.
- 12.5 Lubricate the exposed split joint gasket surfaces with supplied 206 seal lube.
- 12.6 Wipe the stationary faces clean with ethyl alcohol.
- 12.7 Repeat this procedure for the other gland half.

Caution: Consult SDS for proper handling of ethyl alcohol.

For proper seal installation, please refer to Flowserve publication FIS231

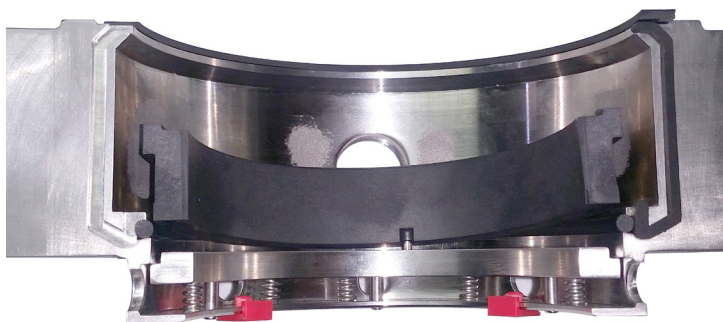


Figure 34



Figure 35

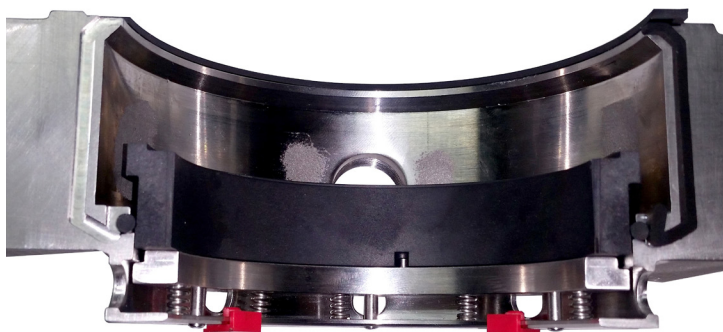


Figure 36

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