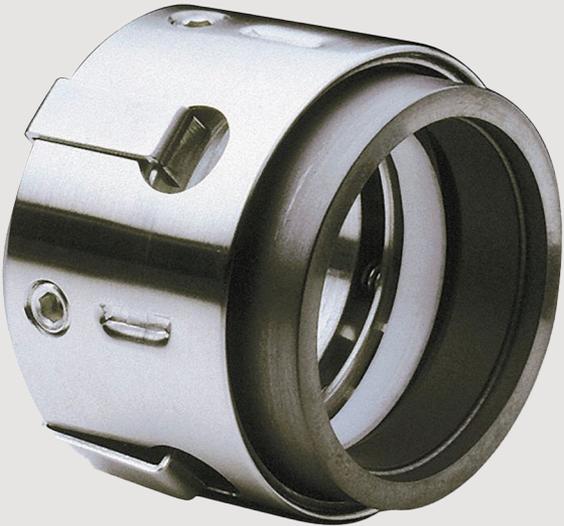


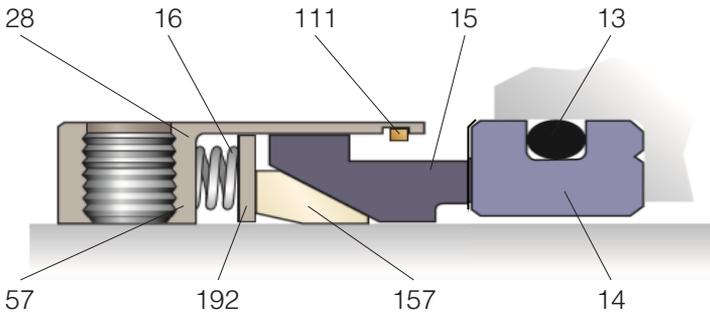


Pac-Seal® Type 9/9T Seal Installation Instructions



DESCRIPTION

The Pac-Seal Type 9/9T seal was designed for both liquid and gaseous extreme service applications involving liquids, industrial chemicals and corrosives, including sulfuric, nitric, phosphoric and hydrochloric acids. It features PTFE wedge secondary sealing elements, which allow for a wide range of applications. It also features positive drive via set screws, which transmit torque from the shaft to the seal. To facilitate installation, the Type 9/9T seal's rotating components are held together with a snap ring to form a semi-unitized design. The Type 9T seal features a small radial cross-section to allow for use in pumps with a small stuffing box diameter.



Note: Settings clip not shown.

Figure 1: Type 9/9T seal nomenclature

Part Reference	Description
13	Seat Gasket/Mating Ring O-ring
14	Stationary Face/Mating Ring
15	Rotating Face/Primary Ring
16	Spring
28	Shell
57	Set Screw
111	Snap Ring
157	Wedge
192	Flat Washer

1 EQUIPMENT CHECK

1.1 Follow plant safety regulations prior to equipment disassembly, including, but not limited to, the following:

- Lock out motor and valves.
- Wear designated personal safety equipment.
- Relieve any pressure in the system.
- Consult plant MSDS files for hazardous material regulations.

1.2 Disassemble pump in accordance with equipment manufacturer's instructions and remove sealing arrangement.

Note: Seal location and relationship to the seal's working height should be reviewed and documented prior to removal. If the pump configuration allows, a scribe mark could be added to locate the back of the rotating assembly, as shown in Figure 2.

1.3 Check seal documentation for seal design and materials of construction.

1.4 Check shaft or pump sleeve outer diameter, seal working height, mating ring width, mating ring bore and stationary assembly bore to ensure they are dimensionally within the tolerances shown on the seal assembly drawing. See Figure 2.

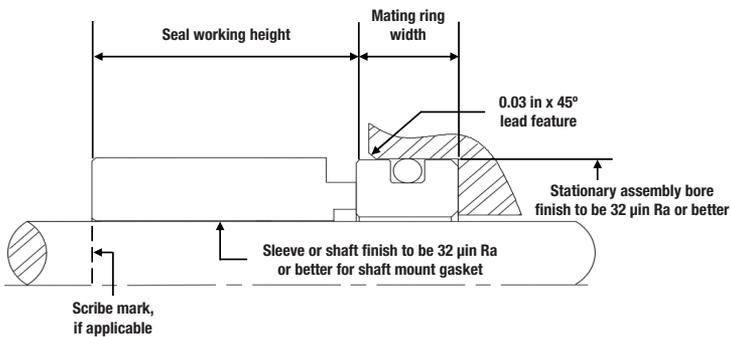


Figure 2: Seal chamber requirements

- Bearings must be in good condition.
 - Maximum lateral or axial movement of shaft (end play) = 0.25 mm (0.010 in).
 - Maximum shaft runout at face of seal housing = 0.05 mm (0.002 in) FIM.
 - Maximum dynamic shaft deflection at seal chamber = 0.05 mm (0.002 in) FIM.
 - Verify proper shaft and bore lead-in chamfers are present and within specifications. Difficulty and even damage can occur during seal installation due to improper lead-in chamfers.
- 1.5** Thoroughly inspect and clean the seal chamber, shaft and/or pump sleeve. Inspect for corrosion and/or any defects. Remove all burrs, cuts, dents or defects that might damage gaskets or allow a leak path. Replace worn shaft or pump sleeve.
- 1.6** Check equipment requirements, as described in Figure 2. Any measurement falling outside the allowable tolerance listed must be brought within specifications.
- 1.7** Handle the seal with care; it is manufactured to precise tolerances. The seal faces are of special importance and should be protected from dirt, lubricants, dust and airborne particulate matter at all times prior to installation. Avoid using excessive force during installation. Do not use a hammer or similar tool which results in excessive force on the seal or adjacent components.

2 INSTALLATION

- 2.1** Ensure seal faces are kept clean throughout the installation procedure. Clean both rotating and stationary seal faces with a lint-free wipe and isopropyl alcohol as needed.

Note: Any oil, grease, assembly lubricant, fingerprints or other residue from the installation process can cause the seal to leak excessively.

- 2.2** Lubricate the bore inner and gasket outer diameters and proceed to press the stationary assembly firmly into the bore, ensuring it is bottomed out and square. This can be hand-pressed or machine-pressed into place, taking care to protect the sealing face from direct contact with any metal object. A plastic installation tool is recommended along with a machine-press mechanism if available.

Note: Use a silicone-based lubricant unless otherwise specified. If a silicone-based lubricant is not available, use a solution of liquid dish soap in water or isopropyl alcohol in water as a lubricant. Never use grease or oil as an installation lubricant. Oil used to lubricate elastomer components will reduce the friction drive or anti-rotation capability of the mating ring gasket significantly.

- 2.3** Lubricate the shaft, then slide the rotating assembly down the shaft. Make sure to clean any excess lubricant from the seal faces prior to mating the seal faces.

Note: The rotating face will not be in full contact until after the clips are removed.

- 2.4** Compress seal to proper axial working height (or scribe line if applicable) and tighten set screws firmly and evenly into the shaft.
- 2.5** Remove the clips from the outside of the shell to allow the springs to apply full pressure between the faces; discard the clips.

Note: Do not remove the clips from the rotating assembly until it is set-screwed to the shaft. The clips keep the Teflon® wedge from being compressed before the seal is installed.

3 OPERATIONAL RECOMMENDATIONS

- 3.1** Remove lock outs on equipment and valves.
- 3.2** Do not start up the pump dry for any reason. Open valves to flood pump and seal chambers with product fluid. Vent air from the casing of the pump and the seal chamber before startup.
- 3.3** Observe the startup. If the seal runs hot or squeals, do not allow the pump to run for any extended duration of time.
- 3.4** The seal is designed to resist corrosion through proper material selection. Do not expose the selected seal materials to products outside of the intended application. Consult Flowserve for additional chemical resistance recommendations.
- 3.5** Do not exceed pressure and speed limits established for the seal.
- 3.6** Do not exceed the temperature limits of the seal, as determined by the materials of construction.



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