

PSS PRO Shaft Seal Features & Components



- 1)** Two nitrile O-rings seal the stainless steel rotor to the shaft and will not experience wear.
- 2)** A primary set screw and a backup set screw (2 sets) are used to secure the stainless steel rotor to the shaft.
- 3)** A seal is created between the two mating faces of the carbon stator and the stainless steel rotor.
- 4)** Raw water is fed to the PSS Shaft Seal for cooling / lubricating the seal faces on high speed vessels.
- 5)** The stationary carbon stator is attached to the bellows, which is secured to the stern tube (shaft log).
- 6)** The Shaft Retention Collar is attached to the shaft and helps retain the propeller or rudder shaft in your vessel in the event of catastrophic failure of the coupling or if the shaft comes free from the coupling.

- 7) Stainless steel rings are fit to the bellow for increased strength, support and durability. *External rings come standard on sizes 2-1/4" (60mm) to 3-3/4" (95mm) and optional for smaller sizes.*
- 8) 316 SS hose clamps with rolled edges and non-perforated band.
- 9) Rubber safety "jackets" cover hose clamp tails.

Shaft Seal Components

Shaft Retention Collar

The PYI Shaft Retention Collar is designed to help retain the propeller shaft or rudder shaft inside your vessel in the event of a catastrophic failure of the shaft coupling or if the shaft comes free from the coupling due to set screw failure.

The double split design provides the maximum in axial holding power with the benefit of easy assembly even if the shaft is installed. The collar fully engages the shaft without marring it and is easily installed when major drive system disassembly would otherwise be required. This design provides greater axial holding power than set screw style or one-piece clamping collars. It is effective on both hard and soft shafts.



Rotor

The rotor on the PRO seal is manufactured out of 316L stainless steel and the face is machined to a 9Ra finish on precision CNC lathes. It is secured on the shaft using 2 pairs of set screws positioned at 90 degrees to each other.

For use in particularly corrosive environments, an optional Nitronic 50 Stainless Steel alloy rotor is available which provides a combination of corrosion resistance and strength not found in any other commercial material available in its price range. This austenitic stainless has corrosion resistance greater than that provided by Types 316 or 316L, plus approximately twice the yield strength.

In addition, the previously mentioned locking safety collar is placed in front of the rotor where it further retains the propeller or rudder shaft in the case of a catastrophic shaft coupling failure.

The carbon stator (see below) further polishes the rotor face during the initial hours of operation. This rotor does not need replacement under normal operating conditions.



Carbon Stator

The high density, resin-impregnated carbon stator is manufactured from a space age composite which is first mixed and molded, then formed under pressure. The stator is then baked, machined, and lapped to a measured flatness of 4 helium light bands (measured at 0.000044" of variation over its entire lapped surface).

The grade of carbon composite used in the PSS Shaft Seal has a maximum operating temperature of 500°F (+260°C) and cannot melt if the seal runs dry for a short period of time – unlike a lip seal or a plastic face seal. The high density of the carbon greatly increases the longevity and wear resistance. Several commercial vessels have recorded over 40,000 (over 4-1/2 years of continuous operation) engine hours on the same, original components. The carbon stator should not need to be replaced under normal operating conditions.



Bellow

The bellow on both the PRO and Type B PSS seal is constructed of high temperature silicone laminated with either 4 or 5 plies of polyester fabric (aramid in larger sizes) and covered with a layer of fluorosilicone. In addition both ends of the bellow are sealed so no water can soak into the polyester/aramid fabric. The 4 or 5 fabric inlays provide excellent strength to abrasion and resistance to high pressure without loading the silicone. On larger models, the bellow strength is greatly increased by the use of stainless steel hoops laid into the convolutions of the bellow.



Hose Barb

For high speed vessels (planning hulls or vessels powering over 12 knots) it is required that a positive water supply be plumbed to the PSS Shaft Seal for the purpose of lubricating and cooling the seal faces. There are many possible sources of water supply; please review the PSS Shaft Seal Installation Instructions for more information, and note that all plumbing must follow the standards and practices of proper boat plumbing.

In most cases a slow speed boat that does not have a bearing in the shaft log does not require positive water feed and can simply be "vented" overboard. Ideally the vent line will be run at least 2-3 feet above the water line and as close to the boat's centerline as possible to ensure the vent hose is never below the water line, even if the boat heels. Review the PSS Shaft Seal Installation Instructions for more details on venting the seal.



Bellow Rings

Stainless steel rings are fit to the bellow for increased strength, support and durability. *External rings come standard on sizes 2-1/4" (60mm) to 3-3/4" (95mm) and are optional for smaller shaft sizes.*



Additional Important Information

PSS PRO Maintenance Kit

To ensure longevity and proper function of the PSS PRO Shaft Seal, PYI provides a PSS PRO Maintenance Kit to follow the PYI's recommended maintenance schedule. As with any rubber / silicone hose below waterline, the PSS bellow must be inspected on a regular basis for any sign of wear, aging or chemical deterioration. PYI recommends that the bellow be replaced once every 8 to 10 years. During the bellow replacement it is also recommended that the o-rings & set screws in the stainless steel rotor are replaced, as well as the hose clamps. PYI includes all of the necessary replacement parts in the PSS Maintenance Kit.



Set Screws

You should never use the same set screw on the shaft twice. There are two set screws in each of the two holes in the stainless steel rotor. One is tightened onto the shaft and the other is tightened onto the first to lock it in place against the shaft. The set screws are made **with a cup at the tip that deforms** onto the shaft to ensure a secure grip. When re-installing the rotor you should use new set screws.

In the unfortunate case that you do not have spare set screws, the stacked set screws in the rotor should be reversed so there is an unused cup being compressed onto the shaft.

If you need new set screws, you can purchase a PSS O-Ring Kit. This comes with 2 new O-rings, 5 set screws, an Allen wrench, Clamp Jackets, and Thread Locker.

