

PACKLESS SEALING SYSTEM
PSS SHAFT SEAL

- **DRIPLESS OPERATION**
- **LOW MAINTENANCE**
- **REDUCED COST**
- **ABS AND BUREAU VERITAS CERTIFIED**

SHAFT DIAMETER

- **3/4" - 6" Imperial**
- **20mm - 150mm Metric**



www.shaftseal.com



Pleasure



USCG 47' MLB



Sail

- **DRIPLESS OPERATION**

- Eliminate needless bilge pumping

- **LOW MAINTENANCE**

- No more repacking the stuffing box or replacing lip seals

- **REDUCED COST**

- Eliminates shaft wear in area of packing gland or lip seal
- Minimizes corrosion

- **ABS AND BUREAU VERITAS CERTIFIED**

- American Bureau of Shipping

FOR SHAFTS: 3/4" to 3 3/4 " (20mm - 95mm)



The Packless Sealing System (PSS) Shaft Seal is a mechanical face seal that is created between a rotating stainless steel collar (rotor) and a stationary carbon flange (stator). The carbon flange is attached to a convoluted rubber (EPDM) bellow and the back of the bellow is attached to the shaft log (stern-tube) of the boat with hose clamps. During installation, the stainless steel collar is used to compress the convoluted bellow. The collar is then secured to the shaft with set screws. The compression of the bellow allows the seal faces to remain in constant contact and compensate for the fore-and-aft

movement of the shaft caused by the propellers thrust pushing on the engine mounts. The carbon flange is bored larger than the shaft diameter, allowing it to “float” around the shaft and compensate for most misalignment and vibration problems. The stainless steel collar is sealed to the shaft with two o-rings that are recessed into the bore of the collar. These o-rings rotate with the shaft and collar and do not experience wear during operation. This static o-ring seal enables the PSS Shaft Seal to be fit on shafts that have some wear or pitting, unlike lip seal designs that require a clean area for the lip seal to ride.



Power



Commercial



Sail



CARBON/GRAPHITE FLANGE (Stator)

The high density, resin impregnated carbon/graphite flange is a space age composite that is first mixed, molded and then pressed. The blanks are then baked and machined. The face of our carbon is finished to a flatness of 4 helium light bands (measured .000044" of variation over entire lapped surface). The grade of carbon used in the PSS has an operating temperature over 500 degrees Fahrenheit (+260 Celsius), and can not melt if the seal runs dry, unlike a rubber lip seal or 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 should not need to be replaced under normal operating conditions.



STAINLESS STEEL COLLAR (Rotor)

The one piece stainless steel collar (type 316L) is slid down the shaft and is secured to the shaft with set screws at 90 degrees for maximum holding power. Precision tolerances are maintained by computer controlled lathes. The faces have a number 9 micro finish and are perpendicular to the bore to prevent run-out as the collar rotates. The carbon will polish the face of the collar during the first few minutes of operation. After the initial break-in, there is no measurable wear and the rotor should not need to be replaced under normal operating conditions.



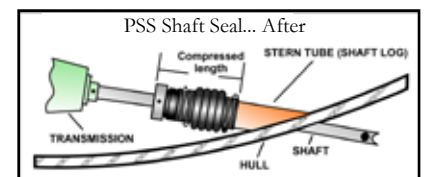
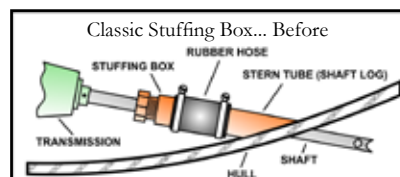
BELLOW

The rubber (EPDM – Ethylene Propylene) bellow has a temperature rating of -65 degrees to 300 degrees Fahrenheit (-50 to +145 Celsius). EPDM is known for its good resistance to weathering. It provides the best combination of durability, strength and elasticity. The convoluted bellow is compressed during installation providing a constant pressure between the stainless steel collar and the carbon flange. Both the shaft and shaft log (stern-tube) diameters are necessary when ordering.

INSTALLATION

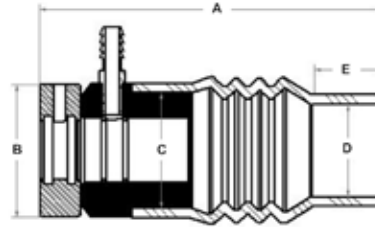
The PSS Shaft Seal is ideal for new construction or retrofit, and will adapt to all new or existing stern-tube arrangements.

INSTALLATION AS REPLACEMENT FOR CLASSIC STUFFING BOX



PSS Dimensions

FOR SHAFTS: 3/4" to 3 3/4" (20mm-95mm)



SHAFT DIAMETER 3/4" - 3 3/4" (20mm - 95mm)	A	A compressed	B	C	D	E
3/4", 7/8", 1", 1 1/8"	6.975"	6.225"	2.375"	2.00"	1 1/4", 1 1/2", 1 3/4", 2", 2 1/4"	1.50"
20mm, 22mm, 25mm, 28mm, 30mm	178mm	159mm	61mm	51mm	32mm, 38mm, 45mm , 51mm, 57mm	39mm
3/4", 7/8", 1", 1 1/8"	7.50"	6.75"	2.375"	2.00"	2 1/2"	1.50"
20mm, 22mm, 25mm, 28mm, 30mm	191mm	172mm	61mm	51mm	64mm	39mm
1 1/4", 1 1/8"	7.38"	6.38"	2.875"	2.50"	1 3/4", 2", 2 1/4", 2 1/2"	1.50"
32mm, 35mm	188mm	163mm	74mm	64mm	45mm, 51mm , 57mm, 64mm	39mm
1 1/4", 1 1/8"	8.75"	7.75"	2.875"	2.50"	2 3/4", 3", 3 1/4", 3 1/2"	2.00"
32mm, 35mm	223mm	197mm	74mm	64mm	70mm, 77mm , 83mm, 89mm	51mm
1 1/2", 1 3/4", 2"	9.175"	8.175"	3.75"	3.25"	2", 2 1/4", 2 1/2", 2 3/4", 3", 3 1/4", 3 1/2"	2.00"
38mm, 40mm, 45mm, 50mm, 55mm	234mm	208mm	96mm	83mm	51mm, 57mm, 64mm , 70mm, 77mm , 83mm, 89mm	51mm
1 1/2", 1 3/4", 2"	9.25"	8.25"	3.75"	3.25"	3 3/4", 4"	2.00"
38mm, 40mm, 45mm, 50mm, 55mm	235mm	210mm	96mm	83mm	83mm, 102mm	51mm
2 1/4", 2 1/2"	9.625"	8.375"	4.20"	3.75"	3 1/4", 3 1/2", 3 3/4", 4"	2.00"
60mm, 65mm	245mm	213mm	107mm	96mm	83mm, 89mm , 96mm , 102mm	51mm
2 1/4", 2 1/2"	10.375"	9.125"	4.20"	3.75"	4 1/4", 4 1/2", 4 3/4", 5"	2.50"
60mm, 65mm	264mm	232mm	107mm	96mm	108mm, 115mm , 121mm, 127mm	64mm
2 3/4", 3"	10.425"	9.175"	5.00"	4.25"	4", 4 1/4", 4 1/2", 4 3/4", 5"	2.50"
70mm, 75mm, 80mm	265mm	234mm	127mm	108mm	102mm, 108mm, 115mm , 121mm, 127mm	64mm
2 3/4", 3"	10.875"	9.625"	5.00"	4.25"	5 1/4", 5 1/2", 5 3/4", 6"	2.50"
70mm, 75mm, 80mm	277mm	245mm	127mm	108mm	134mm , 140mm, 147mm, 153mm	64mm
3 1/4", 3 1/2", 3 3/8", 3 3/4"	11.00"	9.75"	6.00"	5.325"	4 1/2", 4 3/4", 5", 5 1/4", 5 1/2", 5 3/4", 6"	2.50"
85mm, 90mm, 95mm	280mm	248mm	153mm	136mm	115mm, 121mm, 127mm, 134mm , 140mm, 147mm, 153mm"	64mm

shaded area = over sized shaft log

bold = no reducer

T-KIT



PYI offers T-Kits to help facilitate the installation of the PSS Shaft Seal. These T-Kits enable the installer to tee into the raw water discharge hose and plumb water to the hose barb fitting of the PSS Shaft Seal. Some examples of water pick-up points are: between the heat exchanger and riser, between oil cooler and heat exchanger and between the water pump and oil cooler. T-Kits include: T-fitting (specify internal diameter of hose: 3/4", 1", 1 1/4" or 1 1/2"), 6' of 3/8" hose and hose clamps.

SRC SHAFT RETENTION COLLAR

The Shaft Retention Collar (SRC) is designed to help retain the propeller shaft or rudder shaft in your vessel in the event the shaft comes free from its coupling. The SRC can be fit on boats with packing glands, lip seals or the PSS Shaft Seal. The double split design provides the maximum in axial holding power with the benefit of quick assembly with the shaft or rudder post installed. The SRC can be installed with the boat in the water.



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SHAFT DIAMETER

- **4" - 6" Imperial**
- **100mm - 150mm Metric**



www.shaftseal.com



Kvichak Marine
NOAA Research Vessel



Westport 164'
Photo: Neil Rabinowitz



"Jessica W"
Block Island Express

- **DRIPLESS OPERATION**

- Eliminate needless bilge pumping

- **LOW MAINTENANCE**

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- **REDUCED COST**

- Eliminates shaft wear in area of packing gland or lip seal
- Minimizes corrosion

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FOR SHAFTS: 4" to 6" (100mm - 150mm)



The Packless Sealing System (PSS) Shaft Seal is a mechanical face seal that is created between a rotating stainless steel collar (rotor) and a stationary carbon flange (stator). The carbon flange is attached to a convoluted bellow and the back of the bellow is attached to the shaft log (stern-tube) of the boat with hose clamps. During installation, the stainless steel collar is used to compress the convoluted bellow. The collar is then secured to the shaft with set screws. The stainless steel clamp assembly is then fit around the shaft in front of the stainless steel collar. The compression of the bellow allows the seal

faces to remain in constant contact and compensate for the fore-and-aft movement of the shaft caused by the propellers thrust pushing on the engine mounts. The carbon flange is bored and then fluted to enable water to flow freely. The stainless steel collar is sealed to the shaft with three o-rings that are recessed into the bore of the collar. These o-rings rotate with the shaft and collar and do not experience wear during operation. This static o-ring seal enables the PSS Shaft Seal to be fit on shafts that have some wear or pitting, unlike lip seal designs that require a clean area for the lip seal to ride.



Westport 164'
Photo Neil Rabinowitz



Nichols Brothers "Gemini"
San Francisco WETA



U.S. Coast Guard RB-M



Stern Tube Flange with Inflatable Bladder (optional)

CARBON/GRAPHITE FLANGE (Stator)

The high density, resin impregnated carbon/graphite flange is a space age composite that is first mixed, molded and then pressed. The blanks are then baked and machined. The face of our carbon is finished to a flatness of 4 helium light bands (measured .000044" of variation over entire lapped surface). The grade of carbon used in the PSS has an operating temperature over 500 degrees Fahrenheit (+260 Celsius), and can not melt if the seal runs dry, unlike a rubber lip seal or 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 should not need to be replaced under normal operating conditions in clean water.



STAINLESS STEEL COLLAR (Rotor)

The one piece stainless steel collar (type 316L) is slid down the shaft and is used to compress the convoluted bellow. As the bellow is compressed, a set-screw is used to secure the stainless steel collar to the shaft. After the stainless steel collar is secured to the shaft the clamp assembly is fit around the shaft in front of the collar. Precision tolerances are maintained by computer controlled lathes. The faces have a number 9 micro finish and are perpendicular to the bore to prevent run-out as the collar rotates. The carbon will polish the face of the collar during the first few minutes of operation. After the initial break-in, there is no measurable wear and the rotor should not need to be replaced under normal operating conditions in clean water.



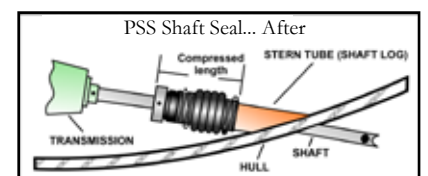
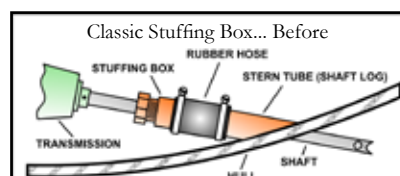
BELLOW

The bellow is constructed of five ply aramid/silicone with a fluoro-silicone outer. Both ends of the bellow are sealed. The five ply cloth inlay provides excellent strength and resistance to abrasion. The strength of the bellow is greatly increased by fitting stainless steel hoops in the convolutions of the bellow. The materials provide the best combination of durability, strength and elasticity. The bellows have a continuous operating temperature range of -90 to +425 degrees Fahrenheit (-70 to +220 Celsius). The convoluted bellow is compressed during installation providing a constant pressure between the stainless steel collar and the carbon flange. Both the shaft and shaft log (stern-tube) diameters are necessary when ordering.

INSTALLATION

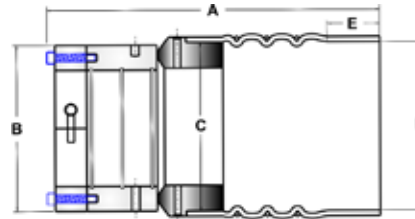
The PSS Shaft Seal is ideal for new construction or retrofit, and will adapt to all new or existing stern-tube arrangements.

INSTALLATION AS REPLACEMENT FOR CLASSIC STUFFING BOX



PSS Dimensions

FOR SHAFTS: 4" to 6" (100mm - 150mm)



SHAFT DIAMETER	A	A	B	C	D	E
4" - 6" (100mm - 150mm)		compressed				
4", 4 1/4"	14.75"	13.75"	7.00"	6.50"	5.5", 5.75", 6" , 6.25", 6.5", 6.75", 7"	2.50"
100mm, 110mm	375mm	350mm	178mm	166mm	140mm, 147mm, 153mm , 159mm, 166mm, 172mm, 178mm	64mm
4 1/2"	15.00"	14.00"	7.875"	6.50"	5.5", 5.75", 6" , 6.25", 6.5", 6.75", 7"	2.50"
115mm	381mm	356mm	201mm	166mm	140mm, 147mm, 153mm , 159mm, 166mm, 172mm, 178mm	64mm
4 3/4", 5", 5 1/2"	15.50"	14.50"	7.875"	8.00"	6.5", 6.75", 7" , 7.25", 7.5", 7.75", 8" , 8.625"	2.50"
120mm, 130mm, 140mm	394mm	369mm	201mm	204mm	166mm, 172mm, 178mm , 185mm, 191mm, 197mm, 204mm , 220mm	64mm
6"	15.675"	14.675"	8.875"	8.00"	6.5", 6.75", 7" , 7.25", 7.5", 7.75", 8" , 8.625"	2.50"
150mm	399mm	373mm	226mm	204mm	166mm, 172mm, 178mm , 185mm, 191mm, 197mm, 204mm , 220mm	64mm

bold = no reducer

T-KIT



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STERN TUBE FLANGE WITH INFLATABLE BLADDER (Optional)

PYI is pleased to introduce an optional Stern Tube Flange with Inflatable Bladder. The flange is designed and machined to bolt-up to your existing bulkhead. When inflated, the bladder stops the flow of incoming water and is intended as a secondary safety measure. The design also enables inspection or servicing of the seal without dry docking the vessel.



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