

# PSS

# PACKLESS SEALING SYSTEM SHAFT SEAL

BY  
**PYI**  
INC.



[WWW.SHAFTSEAL.COM](http://WWW.SHAFTSEAL.COM)

# APPLICATIONS

**PSS**



**Power  
Boats**



**Ski /  
Wakeboard  
Boats**



**Sail  
Boats**



**Jet Skis**



**Yachts**



**Other  
Applications**



**Work Boats /  
Barges / Push Boats**



**Coast Guards**



**Military  
/ Police**



**Ferries**



US Coast Guard 47' Motor Life Boat

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(20mm - 95mm)

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(100mm - 150mm)

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# OVERVIEW



Never repack a stuffing box or replace a lip seal again with the **PSS Shaft Seal**



CERTIFICAZIONE  
DI PRODOTTO  
BUREAU VERITAS  
Certification



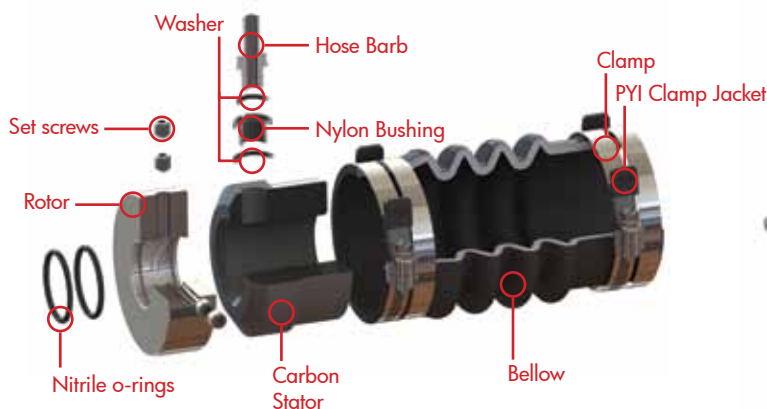
The **PSS Shaft Seal** is  
ABS, Bureau Veritas, and  
RINA Certified

The Packless Sealing System (PSS) Shaft Seal is a mechanical face seal that is created between a rotating stainless steel rotor and a stationary carbon stator. The carbon stator is attached to a convoluted rubber 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 rotor is used to compress the convoluted bellow. The rotor is then secured to the shaft. 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 stator 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 rotor is sealed to the shaft with o-rings. These o-rings rotate with the shaft and rotor and do not experience any 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 which require a clean area for the lip seal to ride on. This type of carbon face seal is not as sensitive to interruption of water flow or operation in silty water, when compared to other sealing options.

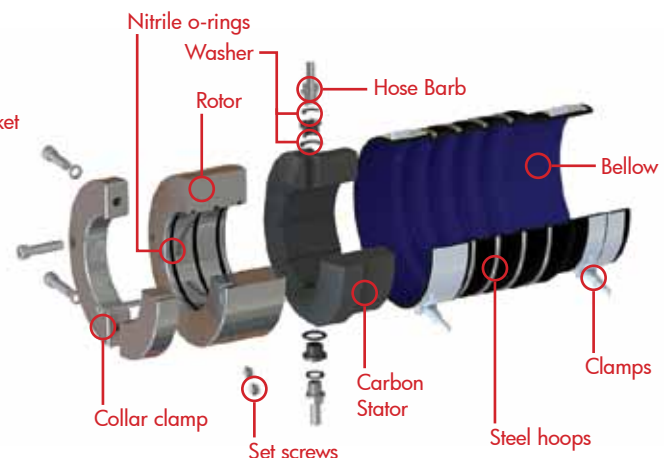
## TYPE A

For shafts  $\frac{3}{4}$ " -  $3\frac{3}{4}$ "



## TYPE B

For shafts 4" - 6"



## » Carbon/Graphite Stator

**TYPE A**



**TYPE B**



The high density, resin impregnated carbon/graphite stator is a space age composite that is first mixed, molded and then formed under pressure. The blanks are then baked, machined and lapped. 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 ½ 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 Rotor

**TYPE A**



**TYPE B**



The Type A stainless steel rotor (316L) is slid down the shaft and is secured to the shaft with set screws at 90 degrees for maximum holding power. The Type B rotor is made from Nitronic 50, and has a clamp assembly in front of it. 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 rotor during the first few minutes of operation. The rotor should not need to be replaced under normal operating conditions.

## » Bellows

**TYPE A**



**TYPE B**

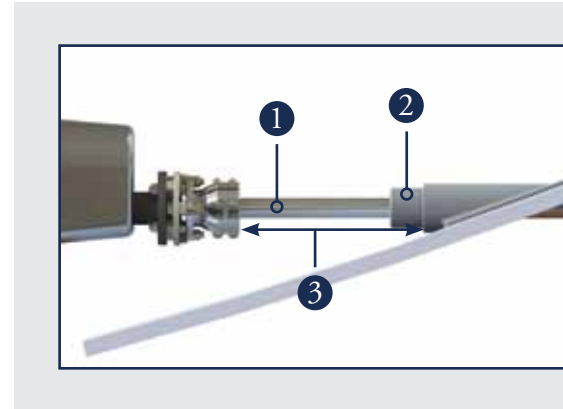
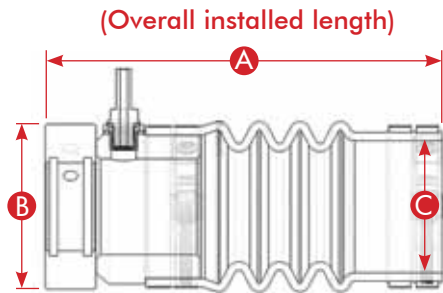


There are two different bellows, one for the Type A Seal and one for the Type B Seal. The Type A Seal is made from rubber (EPDM – Ethylene Propylene), and has a temperature rating of -65 degrees to 300 degrees Fahrenheit (-50 to +145 Celsius). EPDM is known for its good resistance to weathering. The Type B Seal bellow is constructed of five ply aramid/silicone with a fluorsilicone 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. This bellow has a continuous operating temperature range of -90 to +425 degrees Fahrenheit (-70 to +220 Celsius). These bellows provide the best combination of durability, strength and elasticity.

# TYPE A SEAL



For shafts  $\frac{3}{4}$ " to  $3\frac{3}{4}$ " diameter (20mm - 95mm)



## IMPERIAL SIZES

SHAFT DIAMETER	C (STERN TUBE DIAMETER)	A	A (Compressed)	B
$\frac{3}{4}$ ", $\frac{7}{8}$ ", 1", $1\frac{1}{8}$ "	$1\frac{1}{4}$ ", $1\frac{1}{2}$ ", $1\frac{3}{4}$ ", 2", $2\frac{1}{4}$ "	6.975"	6.225"	2.375"
	$2\frac{1}{2}$ "	7.50"	6.75"	2.375"
$1\frac{1}{4}$ ", $1\frac{3}{8}$ "	$1\frac{3}{4}$ ", 2", $2\frac{1}{4}$ ", $2\frac{1}{2}$ "	7.38"	6.38"	2.875"
	$2\frac{3}{4}$ ", 3", $3\frac{1}{4}$ ", $3\frac{1}{2}$ "	8.75"	7.75"	2.875"
$1\frac{1}{2}$ ", $\frac{9}{16}$ ", $1\frac{3}{4}$ ", 2"	2", $2\frac{1}{4}$ ", $2\frac{1}{2}$ ", $2\frac{3}{4}$ ", 3", $3\frac{1}{4}$ ", $3\frac{1}{2}$ "	9.175"	8.175"	3.75"
	$3\frac{3}{4}$ ", 4"	9.25"	8.25"	3.75"
$2\frac{1}{4}$ ", $2\frac{1}{2}$ "	$3\frac{1}{4}$ ", $3\frac{1}{2}$ ", $3\frac{3}{4}$ ", 4"	9.625"	8.375"	4.20"
	$4\frac{1}{4}$ ", $4\frac{1}{2}$ ", $4\frac{3}{4}$ ", 5"	10.375"	9.125"	4.20"
$2\frac{3}{4}$ ", 3"	4", $4\frac{1}{4}$ ", $4\frac{1}{2}$ ", $4\frac{3}{4}$ ", 5"	10.425"	9.175"	5.00"
	$5\frac{1}{4}$ ", $5\frac{1}{2}$ ", $5\frac{3}{4}$ ", 6"	10.875"	9.625"	5.00"
$3\frac{1}{4}$ ", $3\frac{1}{2}$ ", $3\frac{5}{8}$ ", $3\frac{3}{4}$ "	$4\frac{1}{2}$ ", $4\frac{3}{4}$ ", 5", $5\frac{1}{4}$ ", $5\frac{1}{2}$ ", $5\frac{3}{4}$ ", 6"	11.00"	9.75"	6.00"

## METRIC SIZES (In mm)

SHAFT DIAMETER	C (STERN TUBE DIAMETER)	A	A (Compressed)	B
20, 22, 25, 28, 30	30, 40, 45, 50, 60	178	159	61
	65	191	172	61
32, 35	45, 50, 60, 65	188	162	73
	70, 80, 85, 90	223	197	73
38, 40, 45, 50, 55	50, 60, 65, 70, 75, 80, 85, 90	233	208	96
	95, 100	135	210	96
60, 65	85, 90, 95, 100	245	213	107
	110, 115, 120, 125	264	232	107
70, 75, 80	100, 110, 115, 120, 125	265	233	127
	135, 140, 145, 150	277	245	127
85, 90, 95	115, 120, 125, 130, 135, 140, 145, 150	280	248	153

# TYPE B SEAL

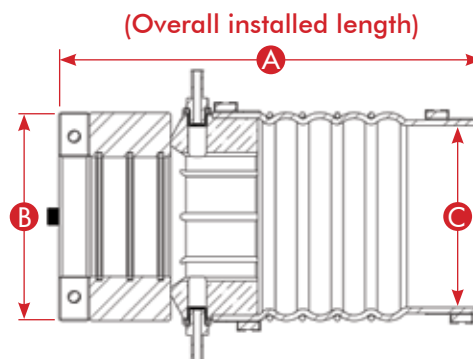


For shafts 4" to 6" diameter (100mm - 150mm)

## BEFORE ORDERING

- 1 Measure your shaft diameter
- 2 Measure your stern tube diameter\*
- 3 Check fore and aft measurements

\* **Tip:** In difficult to access areas, wrap a string around the stern tube, measure the circumference and divide by Pi (3.1416).



## IMPERIAL SIZES

SHAFT DIAMETER	C (STERN TUBE DIAMETER)	A	A (Compressed)	B
4", 4¼"	5½", 5¾", 6", 6¼", 6½", 6¾", 7"	14.75"	13.75"	7.00"
4½"	5½", 5¾", 6", 6¼", 6½", 6¾", 7"	15.00"	14.00"	7.875"
4¾", 5", 5½"	6½", 6¾", 7", 7¼", 7½", 7¾", 8", 8⅝"	15.50"	14.50"	7.875"
6"	6½", 6¾", 7", 7¼", 7½", 7¾", 8", 8⅝"	15.675"	14.675"	8.875"

## METRIC SIZES (In mm)

SHAFT DIAMETER	C (STERN TUBE DIAMETER)	A	A (Compressed)	B
100, 110	140, 145, 150, 160, 165, 170, 180	375	350	178
115	140, 145, 150, 160, 165, 170, 180	381	356	201
120, 130, 140	165, 170, 180, 185, 190, 195, 205, 220	394	369	201
150	165, 170, 180, 185, 190, 195, 205, 220	399	373	226

## TO DETERMINE YOUR PSS SHAFT SEAL PART #

### Imperial Sizes

Shaft diameter: ¾"

Stern Tube diameter: 1½"

02-\_\_\_\_-\_\_\_\_

02-034-112

Shaft diameter Stern Tube diameter

### Metric Sizes

Shaft diameter: 115mm

Stern Tube diameter: 140mm ← Divide by 25.4 to convert to inches. (Round up or down to the closest ¼")

02-115M-512

Shaft diameter Stern Tube diameter

example:  
140 ÷ 25.4 = 5.511 = 5½"

# OTHER APPLICATIONS



## »» Mixing Tanks / Wash Down Tanks / Agitators

The PSS Shaft Seal has made its way in the multitude of specialty mixing tanks. All mixing tanks equipped with a horizontal mixer require a seal, and the PSS Shaft Seal has proven itself as an ideal solution for this industry. Some examples of the types of mixing tanks you will find the PSS Shaft Seal in are mixing tanks for glue, pharmaceutical, food industry, paper pulp mill, etc. Another application is the wash down tanks for fruits and vegetables.



## »» Current Pools

In the last few years this new industry has been using the PSS Shaft Seal in order to seal the propeller shaft of their current pools. The PSS Shaft Seal can be found in training rowing tanks, swimming current pools and hydrotherapy tubs. These sports training pools (rowing for example) are eliminating their leakage problem by using the PSS Shaft Seal.



## »» Specialty Industrial Pumps

The ability of the PSS Shaft Seal to function in a dirty/silty environment, as well as its big tolerance for radial movement, makes it an ideal solution for the irrigation and mining industry.



# RUDDER SEALS

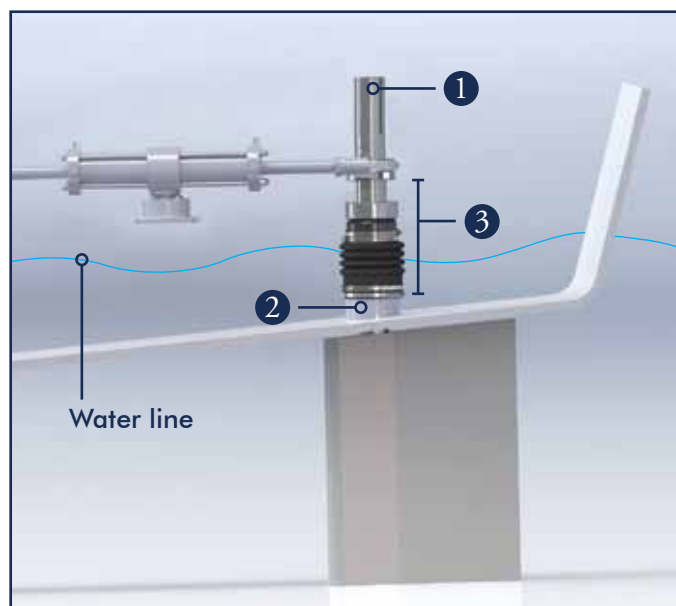


## PSS Rudder Seal key points

- Ultimate Reliability for rudder seals
- Available from 3/4" - 6" (20mm - 150mm)
- Service parts available from stock

## » Rudder Seals

The PSS Shaft Seal can be used as a rudder post seal with the same reliability. Call for application information.



### BEFORE ORDERING

- 1 Measure your rudder post diameter
- 2 Measure your rudder tube diameter
- 3 Check for clearance
- 4 Check hull speed of boat\*

\*Please call **PYI Inc.** engineering to review your custom and production installations at (800) 523-7558.

# ACCESSORIES



## » 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.

INSIDE HOSE Ø	T-KIT PART #
3/4"	07-KIT-034
1"	07-KIT-100
1 1/4"	07-KIT-114
1 1/2"	07-KIT-112

### T-Kit Includes

- T-fitting
- 6' of 3/8" hose
- Hose clamps



Correct T-Kit installation

### 1 BEFORE ORDERING

Measure the inside diameter of the cooling hose which you intend to tee off from before ordering.

## » Maintenance Kit

Prolong the life of your PSS Shaft Seal with a maintenance kit.

As with any rubber hose below waterline, the PSS bellows must be inspected on a regular basis for any sign of wear, aging or chemical deterioration. PYI recommends that the bellows be replaced every 6 years. Bellows may need to be more frequently inspected in an environment where non-sealed batteries emit sulfuric acid. Sulfuric acid vapor will accelerate rubber deterioration, as will an ozonator. This is a cost effective way to expand the life of your PSS Shaft Seal.

### Maintenance Kit Includes

- Set screws
- Instructions
- O-rings
- Bellow
- Wrench
- Stainless steel hose clamps
- Clamp Jackets (hose clamp tail covers)



## TO DETERMINE YOUR MAINTENANCE KIT PART #

### Imperial Sizes

Shaft diameter: 3/4"

Stern Tube diameter: 1 1/2"

07-\_\_\_\_-\_\_\_\_R

07-034-112R

↑ Shaft diameter    ↑ Stern Tube diameter

### Metric Sizes

Shaft diameter: 115mm

Stern Tube diameter: 140mm

07-\_\_\_\_-\_\_\_\_R

07-115-512R

↑ Shaft diameter    ↑ Stern Tube diameter

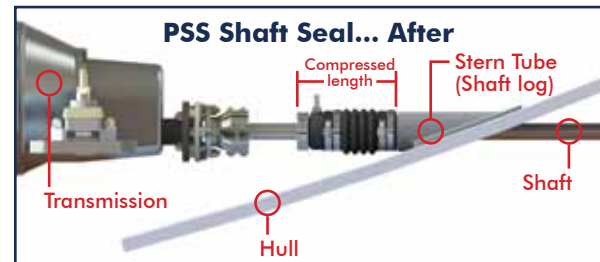
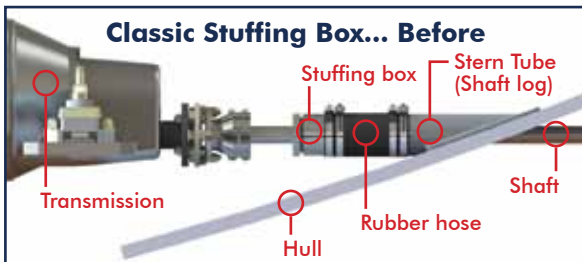
← Divide by 25.4 to convert to inches. (Round up or down to the closest 1/4")

example:  
140 ÷ 25.4 = 5.511 = 5 1/2"

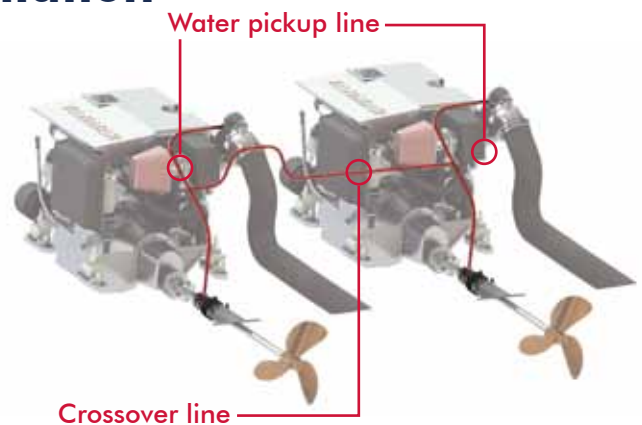
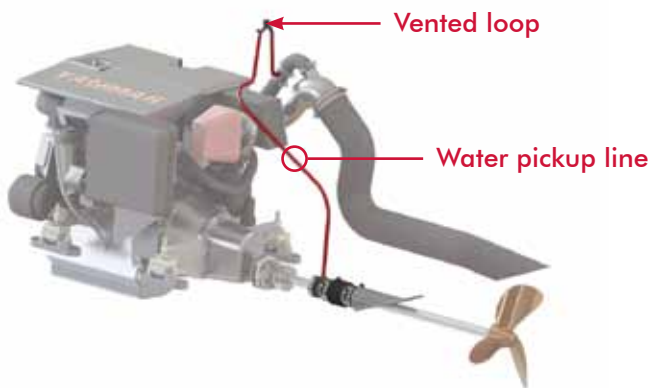
# INSTALLATION EXAMPLES



## » A Replacement Of Classic Stuffing Box



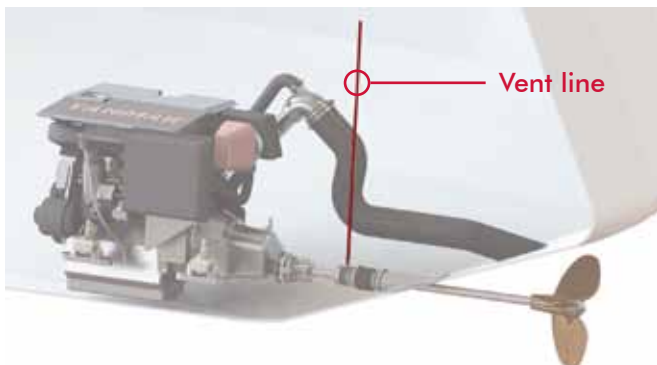
## » Example Of Powerboat Installation



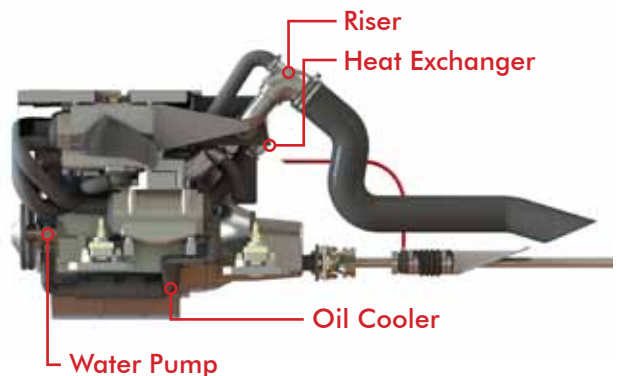
### Caution!

When the pick up point is located below the waterline a vented loop might be required to prevent back-flooding of water through the exhaust system and into the engine. Standard boat plumbing practices should be followed.

## » Sailboat Installation



## » Powerboat Installation



1. T into line after heat exchanges.
2. T into line after oil cooler.
3. T into line after water pump.
4. Hose barb into heat exchanger or oil cooler.

# DISTRIBUTORS



Go to **[www.shaftseal.com](http://www.shaftseal.com)** for distributor details



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