TIDESMARINE

INNOVATIVE PRODUCTS FOR THE MARINE INDUSTRY

SureSeal™ System

Shaft Seals, Spare Seal Carriers & Water Pick-Up Kits

System Overview

SureSeal™

Spare Seal Carrier

Water Pick-Up Kit

Tides Marine introduced its first commercial shaft seal product in 1991. Continued design refinements and material improvements have made the SureSeal™ shaft seal system the industry standard. The system is comprised of three components: The SureSeal™ Kit, the Spare Seal Carrier, and the Water Pick-Up Kit.

SureSeal™ Description

Committed to providing our customers with the highest quality products, Tides Marine has been shipping the SureSeal™ Shaft Seal System since 2001. The SureSeal™ unit is guaranteed for two years or 2500 engine hours (whichever comes first) and offers several performance enhancements including:

- Housing – Made from a fiber-reinforced composite material, the housing is stronger, smaller and more durable than it's predecessor. Dimensionally unaffected by temperature changes, the SureSeal™ will not absorb water.

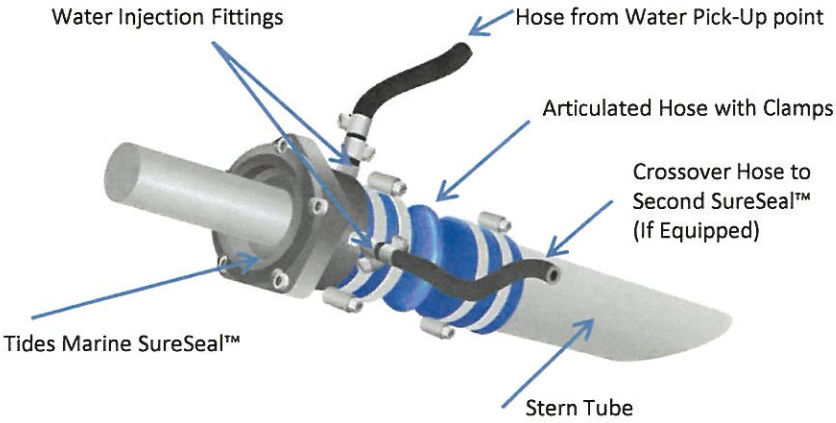
- Bearing – A new PTFE bearing offers extended product life under normal operating conditions. If the water injection system (providing lubrication to the lip seal) should become blocked or fail in any way, the unit can run dry for a period of time.

- Hose – Connecting the SureSeal™ to the boat has been made easier via an all new "articulating" hose. Matched to each housing size, the hose design positions the unit relative to the stern tube so that the required operating clearance is achieved without measurement (simplifying installation). This new hose greatly reduces the side loads to the SureSeal™ when shaft misalignment occurs (as much as ¼" in any direction), extending the lip seal and bearing life.

- Hose Clamps – The hose clamps themselves are an improved design which won't tear or mar the hose surface, requires less tightening force and adjust to the changes in the hose diameter caused by variations in temperature and pressure.

- Seal Replacement – The new design incorporates a removable front cap which allows access to the lip seal making it easier to remove and replace, especially in "cramped quarters".

Installation Overview



INSTALLATION SCHEMATIC

The following is a brief description of a typical SureSeal™ installation. Detailed instructions are included with each product and should be followed closely.

1. Remove the shaft from the transmission coupling.

2. Disassemble and remove existing shaft sealing system (stuffing box).

3. Remove the hose clamps and old hose from the shaft log (stern tube). Discard them. DO NOT RE-USE these components as they will not function correctly with the SureSeal™.

4. Draw the shaft back up against the coupling. This will expose that portion of the shaft that was located under the old hose and shaft sealing system (stuffing box).

5. Insert the end of the SureSeal™ housing into the articulated hose and push it in as far as it will go.

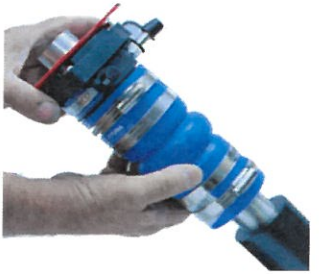
Installation Overview

6 Position the hose as shown next to the stern tube to determine approximately where the lip seal will ride on the shaft.

7 Examine this area carefully. Be sure that it is free of pitting, nicks, or surface imperfections which could cause leaking. Clean this area thoroughly. Polish the shaft using 300 grit wet/dry sandpaper or emery cloth working around the shaft. As fore and aft actions could put flat or grooves in the shaft. DO NOT OVER POLISH the shaft. The assembly may be shifted forward slightly by adjusting the position of the hose on the stern tube at the time of installation.

8 Carefully press the red seal protector into the front of the SureSeal™. Make certain it covers the "lip" portion of the seal.

9 Back the shaft away from the coupling to provide enough room to install the assembly.



10 Carefully slide the assembly (hose end first) onto the shaft so that the shaft passes through the red seal protector.

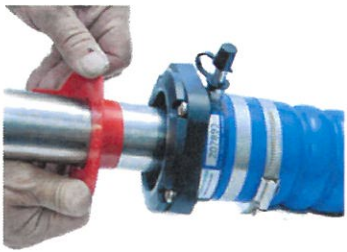
DO NOT USE GREASE!

11 Slide the assembly down the shaft and onto the stern tube. Push it on as far as it will go.

12 Reconnect the shaft to the coupling. Make certain the coupling is firmly secured to the transmission.

Installation Overview

13 Space the two hose clamps over the stern tube end evenly and "snug". Hose clamp screws should be on opposite sides to distribute the pressure evenly. Space the two clamps on the SureSeal™ end of the hose evenly and "snug". Confirm that both the SureSeal™ and stern tube are fully inserted into the articulating hose. Tighten hose clamps.



14 Pull the red seal protector from the SureSeal™. Separate the tabs to split the cone. Remove it from the shaft. You may obtain new seal protectors from Tides Marine if needed.

15 Connect the SureSeal™ to a pressurized water supply source (a point in the engine's raw water cooling system) by attaching the water injection hose to the stainless steel fitting on the housing. If there is a second hose fitting on the SureSeal™, it is used to complete a crossover feed between the port and starboard shaft seals. Complete crossover instructions are included with the Water Pick-Up Kits and should be followed closely.

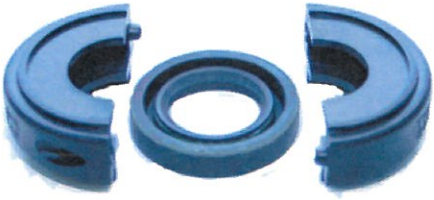
CHECK WATER SUPPLY BEFORE OPERATING THE VESSEL!

MAINTENANCE

Tides Marine SureSeals™ require no winterization. If used, winterization fluids will not harm them. SureSeal™ assemblies should be inspected at least semi annually. Inspect the blue hose for damage. Inspect the hose clamps for corrosion. Remove the water lubrication hoses and make sure they are clear. Inspect all hose fittings and clamps for corrosion. Recheck the water supply with engine(s) running.

MAKE SURE ALL HOSES AND CLAMPS ARE SECURE!

Spare Seal Carrier Description

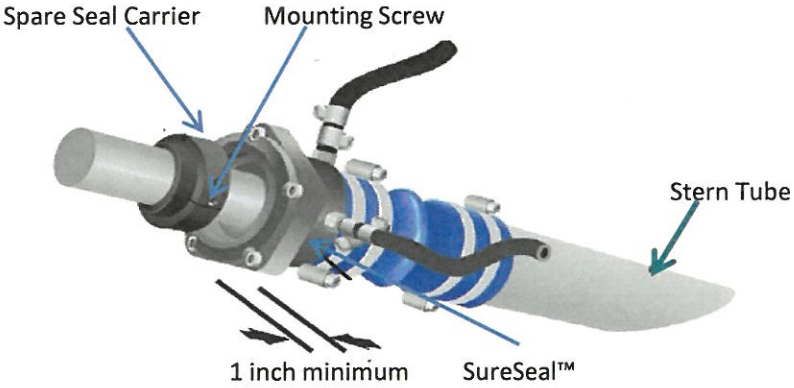


Spare Seal Carriers were developed as a way to protect and store spare lip seals. Installed at the same time as the SureSeal™, these units allow lip seal replacement to be performed without uncoupling the shaft from the transmission and, if necessary, while the vessel is in the water (a haul-out may not be necessary).

The unit is a lightweight, two-piece plastic housing which is clamped to the shaft between the SureSeal™ and the transmission coupling. Available in both Imperial and Metric sizes, the carriers include one spare lip seal. Certain sizes larger than 1 ¾" (50mm) include two spare seals.

Installation Overview

The Spare Seal Carrier should not touch the SureSeal™. Leave at least 1" between the units.



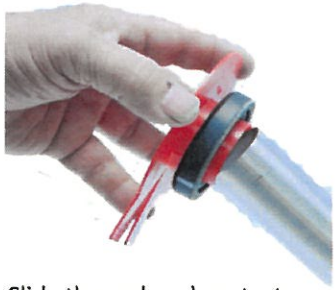
INSTALLATION SCHMETIC

Mounting The Carrier

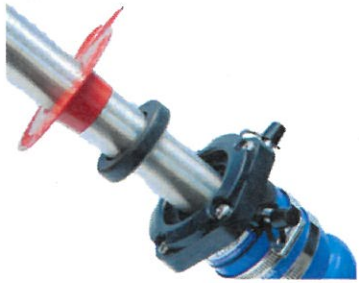
1 Determine where the Spare Seal Carrier will be located on the shaft (minimally 1" from the SureSeal™) and be certain there are no keyways, nicks or corrosion in this area which could damage the lip seal.

2 Separate the two halves of the carrier by removing the screws. Remove the spare lip seal(s). (Two are included with carriers used on certain larger size shafts).

3 Carefully press each spare seal onto the tapered red seal protector – smooth side (with part number imprint) facing the protector.



4 Slide the red seal protector and seal(s) onto the shaft as shown – seal side first.



5 Remove the Red Seal Protector and confirm that each spare lip seal is facing the same direction as the lip seal in the SureSeal™ unit.

Lip Seal Replacement

6 Reassemble the Spare Seal Carrier housing over the lip seal(s) and around the shaft. The long shoulder should face away from the SureSeal™ unit.

7 Check to be sure the housing is at least 1" from the SureSeal™ and tighten the assemble screws. Properly installed, the Spare Seal Carrier should grip the shaft tightly and turn freely with the shaft.

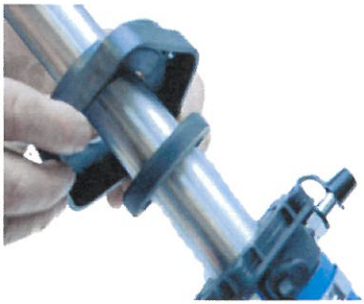
1 Clean the shaft between the Spare Seal Carrier and the SureSeal™ housing. Remove the screws and open the Spare Seal Carrier exposing the replacement lip seal.

2 Remove the five cap screws from the front of the SureSeal™ housing.

3 Slide the front cap forward passing over the replacement lip seal.

4 Separate the split retaining washer and remove it from the shaft.

5 Return the split retaining washer onto the shaft in past the replacement lip seal.



6 Press the Split Retaining Washer into the recess inside the cap. The Split Retaining Washer will snap into the cap and remain there.

7 Pry out the old lip seal with a small flat bladed screwdriver working alternately on opposite sides. Cut the old lip seal off of the shaft with diagonal pliers. Clean the lip seal pocket of any debris.

8 Carefully slide the new lip seal down the shaft and into the chamfered opening in the front of the SureSeal™ housing. Slide the cap and washer until they touch the lip seal. Align the holes and start the cap screws.

9 Alternately hand tighten the cap screws in a criss-cross pattern, which will press the lip seal into the opening. The lip seal is seated properly when the cap and housing touch.

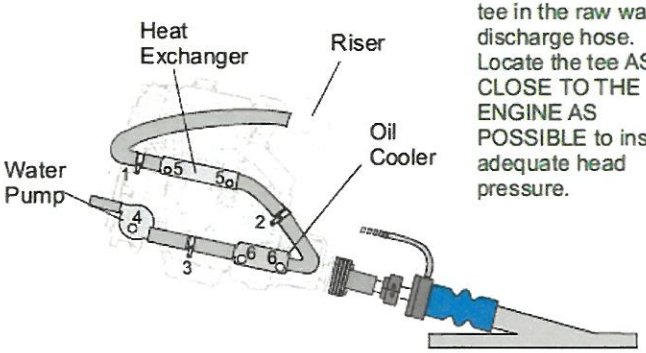
Water Pick-Up Kit Description

Water Pick-Up Kits are intended for use with SureSeals™ only. They are designed to connect the SureSeal™ unit to a source of pressurized cooling water which is required for safe, long-lasting operation.

There are two types of Water Pick-Up Kits available:

1. Tee Kits for tapping into flexible cooling hoses .
2. Straight Fitting Kits for tapping into fixed points.

Each kit includes 8 feet of Type B Fuel hose, a Tee or straight water fitting and four stainless steel hose clamps. Extra hose and clamps are provided free of charge for crossover installations when two units are purchased together.



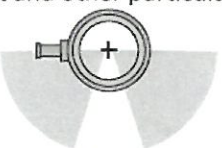
NOTE: The preferred water pick-up point would be via a hose tee in the raw water discharge hose. Locate the tee AS CLOSE TO THE ENGINE AS POSSIBLE to insure adequate head pressure.

WATER PICK-UP POINTS

1. Tee – In line between the heat exchanger and riser (as close to the heat exchanger as possible).
2. Tee – In line between the oil cooler and heat exchanger.
3. Tee – In line between the water pump and oil cooler.
4. Drain Plug – Back of the water pump. Be sure the drain is on the pressure side of the pump.
5. Drain Plugs – In the Heat Exchanger.
6. Drain Plugs – In the Oil Cooler (if Oil Cooler is on the pressure side of the pump and bore is at least .200").

WATER PICK-UP Fittings

Tides Marine recommends the use of Tee Fittings installed in the engine's raw water system to provide cooling/lubricating water to its shaft seals. When positioned as shown below, the engine's raw water flows past the branch fitting in a manner which reduces the collection of sediment and other particulate matter which could cause blockage.



Correct
Orientation Range

In situations where Tee Fittings cannot be used, certain fixed points on the engine may be used with a straight Water Injection Fitting.

DO NOT USE FITTINGS SMALLER THAN 1/4" NPT.

When selecting a pick-up point on the engine, gear cooler, heat exchanger, etc... it is important to note that these points will require additional maintenance over the life of the shaft seal. For instance:

- Manifold pick-up points will have to be inspected regularly to eliminate rust and scale from inside and around the fitting.
- Pick-up points at the bottom of elbows may fill with sand / debris if the vessel operates in shallow water / runs aground. These should be inspected regularly by the vessel owner.
- Some pick-up points may be "dry" locations. It is important to check for adequate water flow BEFORE operating the vessel.
- Some pick-up points may require the use of a 90-degree fitting rather than straight ones. Each such turn (in the fitting or hose) may restrict the water flow as sediment / sand / debris may build up over time. Regular inspection is necessary to ensure proper water flow.

BEFORE OPERATING THE VESSEL, CHECK TO MAKE CERTAIN THAT THE PICK-UP SYSTEM DELIVERS WATER AT IDLE SPEED. WE ASSUME THAT WATER FLOW AT IDLE SPEED INCREASES WITH THROTTLE. GOOD FLOW AT IDLE SPEEDS IS EVEN BETTER AT HIGHER SPEEDS.

WATER PICK-UP HOSE

Hoses should be routed from the water pick-up point to the shaft seal in a manner which eliminates/minimizes the possibility of chafing, burning or kinking. Turns made by the hose should be minimized to improve water flow. Support clips used to "dress the hose" should not be so tight as to crush the hose / restrict water flow. Tides Marine suggests that a bit of slack be left in the hose at the shaft seal end to allow for some movement / eliminate "loading" of the shaft seal on the shaft.

If you should have any questions about the water pick-up system as it relates to your vessel, please call one of the technicians at Tides Marine.

Water Pick-Up Installation Overview

1 Locate the point in the engine's cooling system where water will be taken. (SEE PREVIOUS PAGE).

2 If using a Tee-type pick-up, cut the engine hose cleanly and squarely and add two loose hose clamps to each side.

3 Next, insert the Tee so that the branch fitting is oriented properly, not aiming straight down (to prevent sediment from accumulating at the opening) or straight up (possibly out of the water stream) **SEE ILLUSTRATION ON THE PREVIOUS PAGE.**

4 Add two small hose clamps to one end of the Water Pick-Up hose and attach it to either the Tee or threaded fitting. Tighten all of the hose clamps.

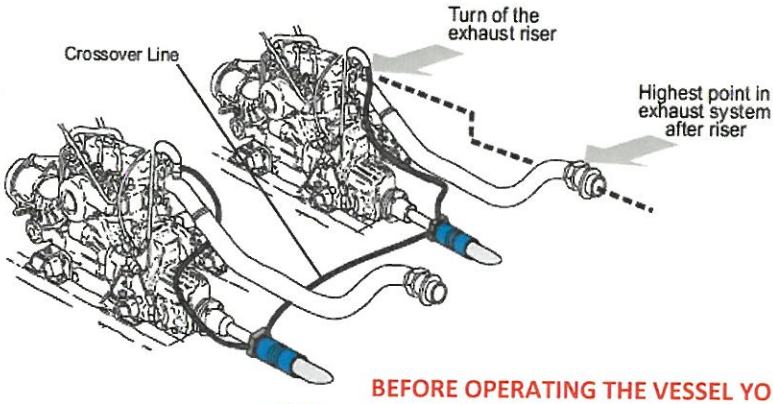
5 Route the hose to the water injection fitting on the SureSeal™ so that it will not be subject to kinking or pinching which could restrict the flow of water. Cut the hose to length if needed.

6 Take the black plastic cap off the injection fitting on the SureSeal™ (leaving the cap tethered to the fitting). Attach the hose and secure it with the remaining two small hose clamps.

6a For twin-engine applications, we recommend the use of a crossover line between port and starboard SureSeals™ to insure proper lubrication to both seals in the event that only one engine is running. Before using a crossover line you must inspect the vessel's raw water exhaust system.
DO NOT USE A CROSSOVER LINE IF the highest point in the exhaust system is above the turn of the exhaust riser. "Back flow" could occur while running on only one engine causing serious damage to the other engine/turbo. For all crossover installations, a second fitting is required on each SureSeal™.

7 Route the crossover hose between the two SureSeals™ keeping it low, below the engine fitting. Remove the caps and connect the two ends to each SureSeal™ with the clamps as before.

THE TURN OF THE EXHAUST RISER MUST BE ABOVE THE REST OF THE EXHAUST SYSTEM. (SEE NO 6a ON THE PREVIOUS PAGE).



BEFORE OPERATING THE VESSEL YOU MUST TEST THE WATER SUPPLY. THE WATER SUPPLY SHOULD ALSO BE TESTED SEMI ANNUALLY OR IF YOU RUN AGROUND.

8 When the boat is back in the water, remove the water pick-up hose from the fitting on the SureSeal™ and place the end into an empty container. Temporarily cap the injection fitting (to prevent water from back-flowing through the SureSeal™). Start the engine and run in neutral. Raise the container one foot above the water pick-up point and confirm that there is water flowing from the hose (**approximately 1 gallon per minute at engine idle**). Increase engine speed and confirm that there is a constant flow of water throughout the full RPM range. Reconnect the hose and tighten the clamps. Dress the hose and secure with cable ties (loosely).

8a To test a "Double Injection" set-up, remove the crossover hose from one SureSeal™. Cap the injection fitting as previously describe in step 8. Start the other engine and run in neutral. Hold the end of the crossover hose above the level at which the cooling system water enters the manifold. A steady flow of water indicates there is sufficient pressure for proper function. Reconnect the hose and repeat the process for the other engine. Dress the crossover hose and secure with cable ties (loosely). Make sure all hose clamps are tight.