STRONG ® SureSeal™ System

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

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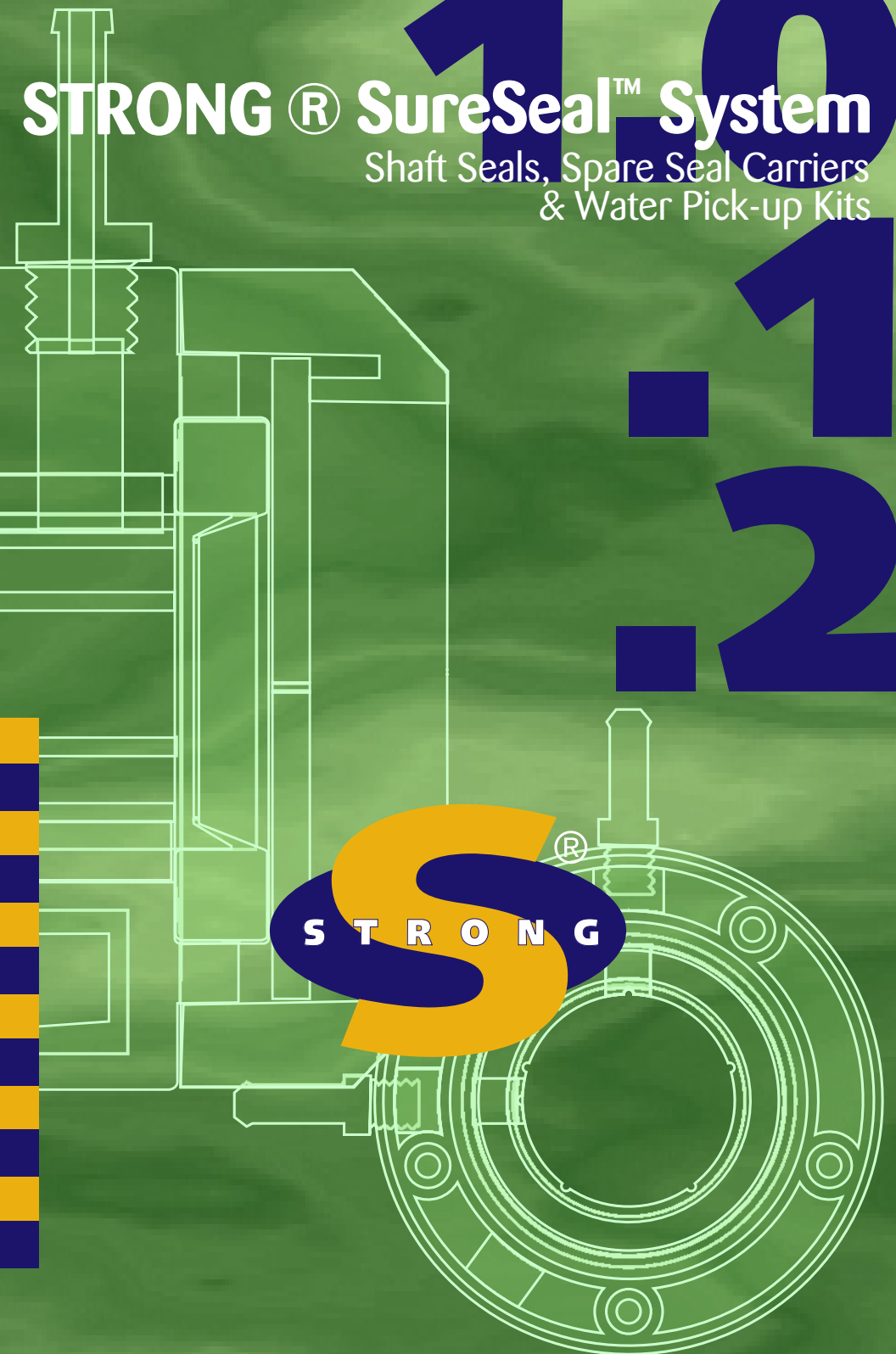


systemoverview

Tides Marine introduced its first commercial STRONG® product line in 1991. Continued design refinements and material improvements have made the STRONG® Shaft Seal System the industry standard. The system is comprised of three components; the SureSeal™ Unit, the Spare Seal Carrier, and the Water pick-up kit.

SureSeal description

Committed to providing our customers with the highest quality products, Tides Marine for 2001 is now shipping the new style **SureSeal™** unit as the center of its Shaft Seal System. Developed to replace our older style UHMW STRONG® Seals, these units are guaranteed for 2500 engine hours or two years (whichever comes first) and offer several performance enhancements including:

- **Housing**- Made from a new fiber-reinforced composite material, the housing is stronger, smaller and more durable than its predecessor. Dimensionally unaffected by temperature changes, the SureSeal will not absorb water.

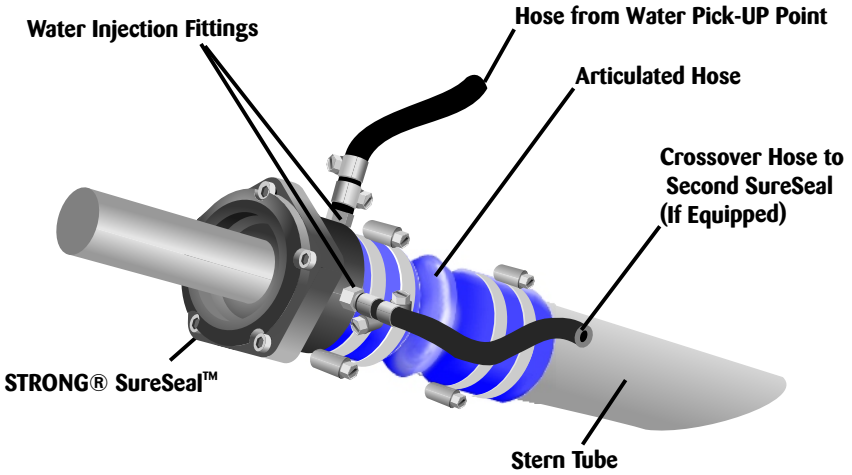
- **Bearing**- A new PTFE bearing offers extended product life under normal operating conditions. If the water injection system (providing lubrication to the lip seal) should become blocked or fail in any way, the unit can run dry for hours.

- **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 1/4" in any direction), extending lip seal and bearing life.

- **Hose Clamps**- The hose clamps themselves are an improved design which won't tear or mar the hose surface, require 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.

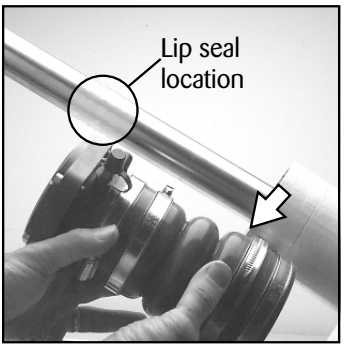
1 Remove shaft from transmission coupling.

2 Disassemble and remove existing shaft sealing system.

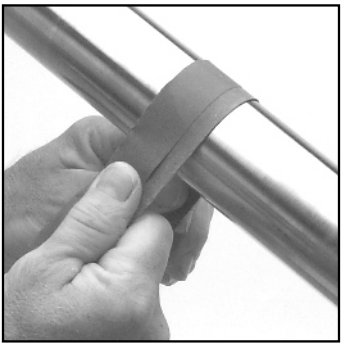
3 Remove the hose clamps and old hose from the shaft log (stern tube). Discard them. **DO NOT RE-USE** these components which will not function correctly with the SureSeal.

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 stuffing box.

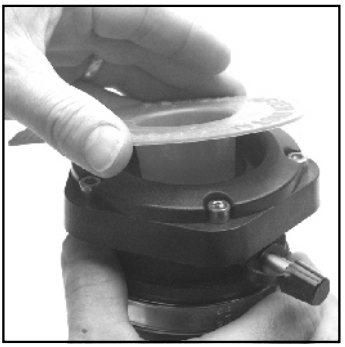
5 Insert the end of the SureSeal unit into the articulated hose and push in as far as it will go.



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

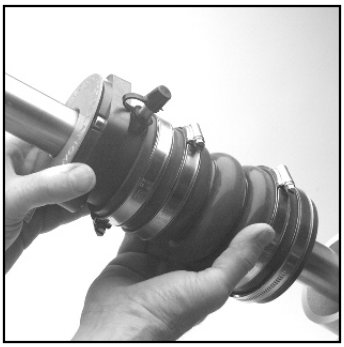


7 Examine this area carefully. Be sure that it is free of pitting, nicks or surface imperfections which could cause leaking. Clean this area thoroughly. Polish the shaft using 300 grit wet/dry sandpaper or emery cloth working around the shaft. Fore and aft actions could put flats or grooves in the shaft. 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.

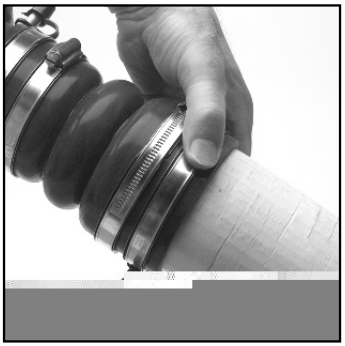
9 Back the shaft away from the coupling to provide enough room to install the assembly.



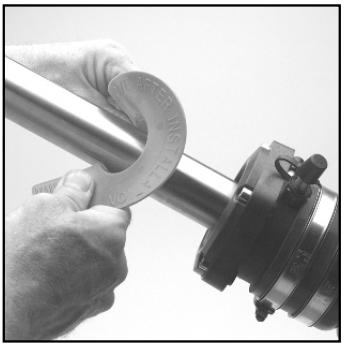
10 Carefully slide the assembly (hose end first) onto the shaft so that the shaft passes through the red seal protector.

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

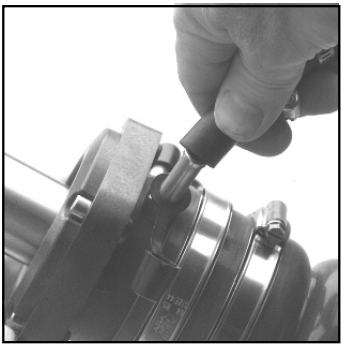
12 Reconnect the shaft to the coupling. Make certain the coupling is firmly secured to the transmission.



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. **DO NOT OVER TIGHTEN OR RATCHET.**



14 Pull the red seal protector from the SureSeal. Separate the tabs to split the cone and remove it from the shaft.



15 Connect the STRONG® SureSeal™ to a pressurized water supply source (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 STRONG® Water Pick-Up Kits and should be followed closely.

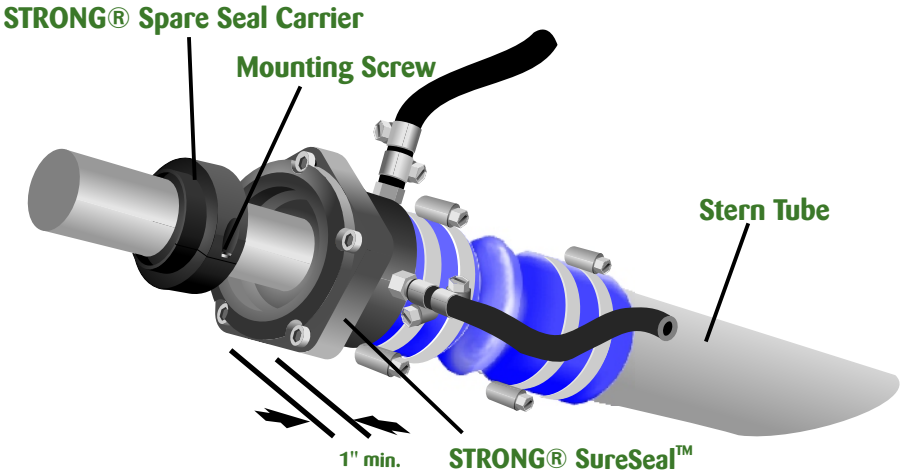
CHECK WATER SUPPLY BEFORE OPERATING VESSEL

spare seal carriers description

STRONG® Spare Seal Carriers were developed as a convenient place to store spare lip seals and as a tool for making the job of seal replacement easier. 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 coupling. Available in both English and Metric sizes, the carriers include one spare lip seal. Certain sizes larger than 2”(50mm) include two spare seals.

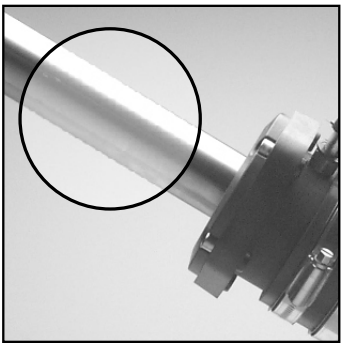
installation overview

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



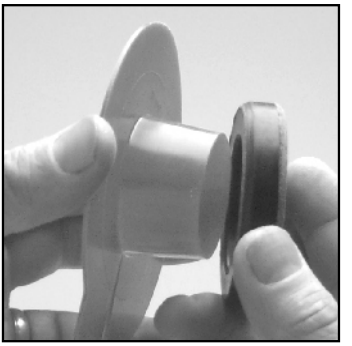
INSTALLATION SCHEMATIC

MOUNTING THE CARRIER

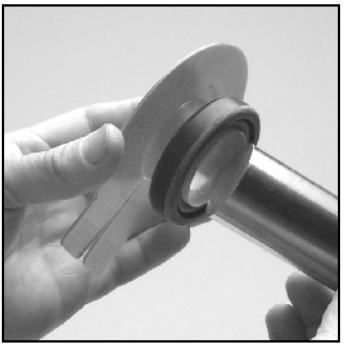


1 Determine where the Spare Seal Carrier will be located on the shaft (minimally 1" from the SureSeal™) and be certain there are no keyways, nicks or corrosion in this area which could damage the lip seal.

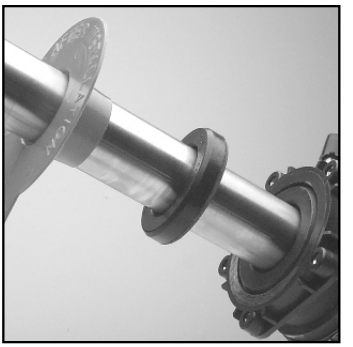
2 Separate the two halves of the carrier by removing the screws. Remove the spare lip seal(s)-two are included with carriers used on certain larger size shafts.



3 Carefully press each spare seal onto the tapered protective cone -smooth side (with part number imprint) first.



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

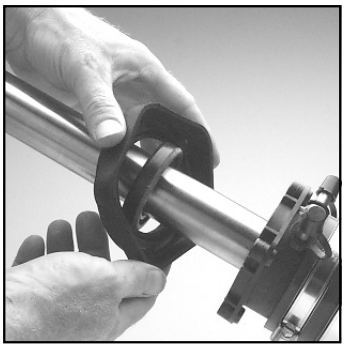


5 Remove the red seal protector and confirm that each spare seal is facing the same direction as the lip seal in the SureSeal™ unit.

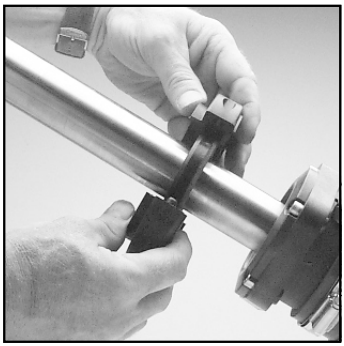
SEAL REPLACEMENT

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

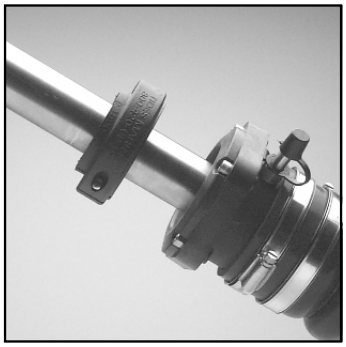
2 Remove the five cap screws from the front of the housing.



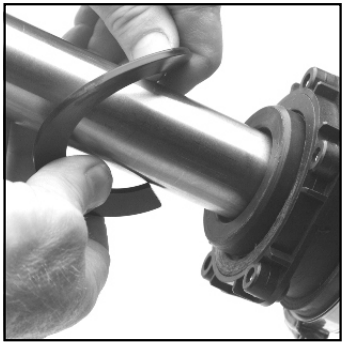
3 Slide the front cap forward passing over the replacement seal.



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™.



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

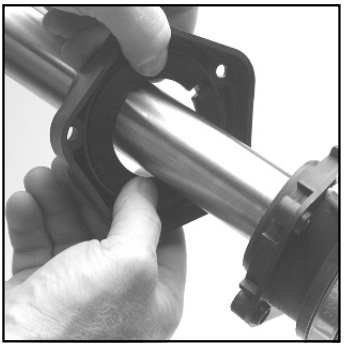


4 Separate the split retaining washer and remove it from the shaft.

5 Pry out the old lip seal with a screw driver working alternately on opposite sides. Cut old seal off shaft with diagonal pliers.

6 Carefully slide the new lip seal down the shaft and into the chamfered opening in the front of the housing.

7 Return the split retaining washer to the shaft in front of the lip seal.



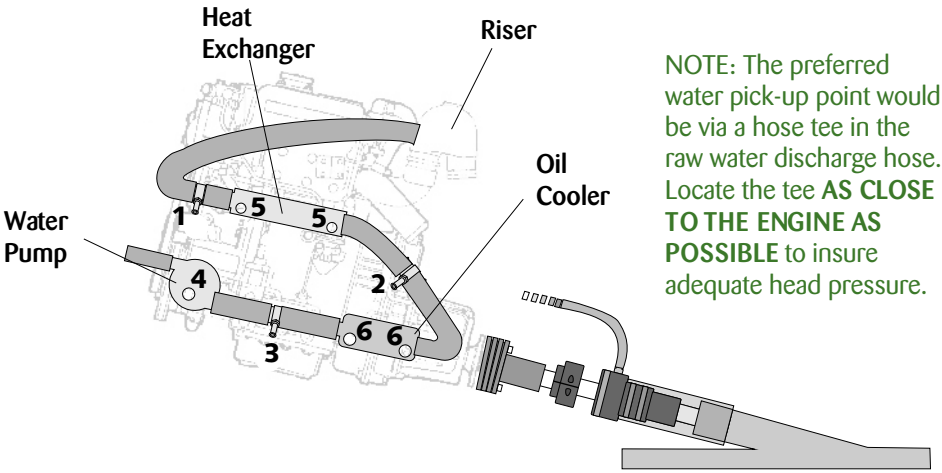
8 Fit the split retaining washer into its recess inside the cap. Slide cap and washer until they touch the lip seal. Align holes and start cap screws.

9 Alternately tighten cap screws in a criss-cross pattern, driving the lip seal into the opening. Seal is seated properly when cap and housing touch.

water pick-up kit description

STRONG® Water Pick-Up Kits are intended for use with STRONG® Self Aligning Shaft Seals only. They are designed to connect the STRONG® Seal unit to a source of pressurized cooling water which is required for safe, long-lasting operation. A variety of types and sizes of fittings are available for installation.

Detailed instructions are provided with each product for proper installation and operational procedures.



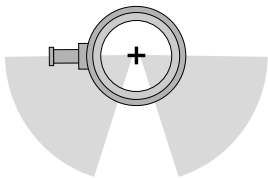
NOTE: The preferred water pick-up point would be via a hose tee in the raw water discharge hose. Locate the tee **AS CLOSE TO THE ENGINE AS POSSIBLE** to insure adequate head pressure.

WATER PICK-UP POINTS:

1. Tee- In line between heat exchanger and riser (as close to heat exchanger as possible).
2. Tee- In line between oil cooler and heat exchanger.
3. Tee- In line between water pump and oil cooler.
4. Drain plug- Back of water pump. Be sure the drain is on the pressure side of the pump.
5. Drain plugs- In heat exchanger.
6. Drain plugs- In oil cooler (if cooler is on pressure side of 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.



Correct
Orientation Range

When using Straight Water Injection Fittings, carefully select a pick-up point on the engine, gear cooler, heat exchanger, etc. that optimizes water flow under a variety of conditions over time. **DO NOT USE FITTINGS SMALLER THAN 1/4" NPT.** The following is a list of things to consider when selecting a pick-up point for a Straight Water Injection Fitting:

What will the pick-up point look like in three, four or five years?

Will a manifold point clog with rust or scale?

Will a heat exchanger pick-up point still provide water if the heat exchanger is not serviced regularly?
If you select a drain fitting location, will this pick-up point remain clear over time?

Is scheduled maintenance going to be possible?

Is there sufficient water flow to lubricate stern bearings located aft of the Tides Marine shaft seals?

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

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 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.

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 end.

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 PREVIOUS PAGE.**

3a. If using a threaded fitting-type pick-up, remove the appropriate plug or drain. Using a small screwdriver or awl, poke/scrape the inside of the opening to dislodge and or remove any engine scale, sediment, debris, etc. which could clog the line. Coat the threads of the fitting with sealant and install.

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 the hose clamps.

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

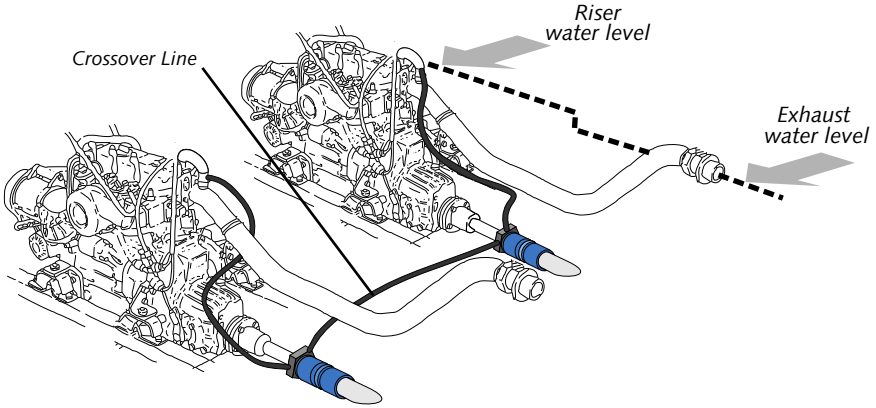
6. Take the black plastic cap off the fitting on the STRONG® Seal (leave tethered to fitting). Attach the hose and secure with the remaining two small hose clamps.

6a. For twin-engine applications, we recommend the use of a crossover line between STRONG® Seals to insure proper lubrication to both seals in the event that only one engine is running. For this "Double Injection" set-up, a second fitting is required on each STRONG® Seal unit.

7. Route the crossover hose between the two seals keeping it low, below engine fitting. Remove caps and connect the two ends to the STRONG® Seals with the clamps as before.

CAUTION: TO PREVENT BACK-FLOODING OF THE ENGINE IN CROSSOVER INSTALLATIONS THE WATER LEVEL IN BOTH RISERS MUST BE HIGHER THAN THE LEVEL OF THE EXITING EXHAUST WATER

CAUTION: BEFORE OPERATING THE VESSEL YOU MUST TEST THE WATER SUPPLY.



8 When the boat is back in the water, remove the water pick-up hose from the fitting on the STRONG® Seal and place the end into an empty container. Temporarily cap the injection fitting (to prevent water from back-flowing through the STRONG® Seal). 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 2 PSI 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 clamps. Dress the hose and secure with cable ties (loosely).

8a To test a "Double Injection" set-up, remove the crossover hose from one STRONG® Seal. Cap the injection fitting as above. 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 process for the other engine. Dress the crossover hose and secure with cable ties (loosely).

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