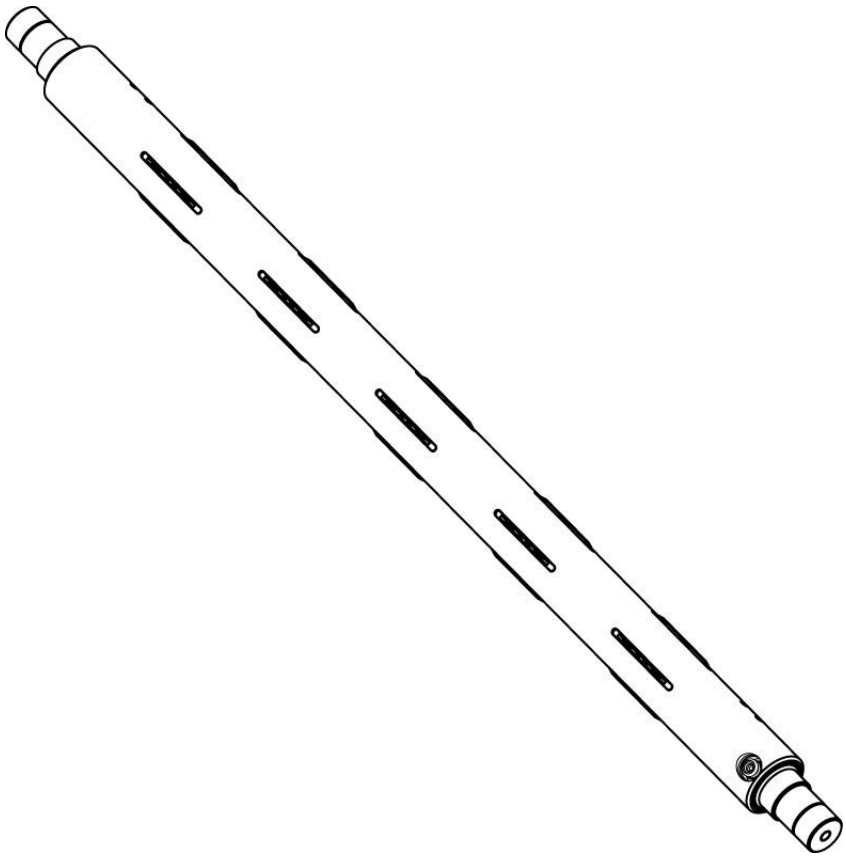
TIDLAND WINDING SOLUTIONS

Tidland Internal Element Shaft

Installation, Operation and Maintenance Manual



EN

Ultrashaft™

MI 27L132426 1 S

IMPORTANT SAFETY INSTRUCTIONS

When using this Tidland product, basic safety precautions should always be followed to reduce the risk of personal injury. Your company's safety instructions and procedures should always be followed. When using this product with any other equipment or machinery, all safety requirements stipulated by that equipment or machinery manufacturer must be followed. Compliance with local, state, and federal safety requirements is your responsibility. No part of these or the following instructions should be construed as conflicting with or nullifying the instructions from other sources. Be familiar with the hazards and safety requirements in your work environment and always work safely.

Read and understand all instructions and shaft design application limits before operation.

Never use this product for a purpose or in a machine that it was not specifically designed for. See Product Safety Data Sheet (PSDS).

Do not exceed the operation loads for this shaft as noted on its PSDS, Product Safety Data Sheet.

Follow all warnings and instructions marked on the product and on the PSDS.

Do not use fingers or other objects to deflate the shaft; Tidland recommends using the Tidland Air Release Tool (see page 4).

Inspect the shaft for wear and/or other safety and functional deficiencies daily, before each use.

Wear safety glasses or proper eye protection when inflating or deflating or otherwise operating the air system.

Do not remove or otherwise alter any setscrews or fastening devices prior to using this product.

Do not operate this product if any setscrews or fastening devices are missing.

Do not lift shaft manually if it is beyond your capacity. Loads over 1/3 your body weight may be prohibitive. Consult your company safety policy.

When lifting a shaft, use proper lifting techniques, keeping back straight and lifting with the legs.

Do not carry or lift this product over wet or slippery surfaces.

Use appropriate mechanical lifting devices, such as a hoist or shaft puller, for heavier shafts.

When performing maintenance or repair procedures, do not pressurize the shaft if journal setscrews are loose or missing.

When performing maintenance procedures, do not pressurize the shaft if the journal is missing.

All replacement parts used on this product should be made to original Tidland specifications.

All maintenance and repair procedures performed on this product should be done to Tidland specifications by qualified personnel.

NOTICE

- If shafts with rubber air systems are stored longer than two weeks - store them completely deflated, away from electric motors, away from direct sunlight or florescent light, and in temperatures not exceeding 85ºF (29ºC).
- When storing shafts with constant air pressure, the rubber air systems are subject to distortion or cold flow.

CONTENTS

Important Safety Information 3
Shaft Inspection Guidelines 5
Caution 6
Installation 7
Operation 7
    To Inflate Shaft 7
    To Deflate Shaft 7
Maintenance 8
    Rubber Tube Fitting Designs 8
        Using the hose clamp with bulk rubber tube material 9
        Removing Rubber Tube Assembly 10
        To Disassemble Rubber Tube Assembly 11
        Building the Rubber Tube Assembly 12
        Shaft Assembly Sequence with Complete Rubber Tube Assembly 13
    Replacing Outer Lugs 14
    Replacing a Valve 14
Troubleshooting 15

TIDLAND CUSTOMER SERVICE

+1.360.834.2345 www.maxcessintl.com

Visit the Maxcess Repair and Return Center online to review our return policies or to submit an electronic Return Material Authorization Request.
www.maxcessintl.com/returns

RECOMMENDED TOOLS

- Clean, dry, non-lubricated air supply: 80-120 psi for proper operation.
- Tidland Inflation Tool (Part No. 27L128052)
- Tidland Air Release Tool (Part No. 27L111630)
- Pincers for removing hose clamps, if installed. See page 9.
- *Dow Corning Molykote® 55* o-ring grease
- Low-strength threadlocker (*Loctite® 222 or equivalent*)
- Thread sealant (*Loctite® 545 or equivalent)*
- 1/8” hex drive wrench

For more accessories to help with your winding processes, visit *www.maxcessintl.com*.

SHAFT INSPECTION GUIDELINES

Upon Receipt

Before placing shaft in service, check visually for any damage due to shipping or mishandling. Track each shaft individually by recording its serial number and when it went into service.

Before Each Use

Inspect the shaft daily for wear and/or other safety and functional deficiencies. Check for damaged or missing fasteners.

Body

- Visually check for any damage in fiberglass coatings: cuts greater than 1/16" (1.5 mm) deep and longer than 1/2" (13 mm), gouges or excessive wear.
- Check for cracks in metal sleeves.

Journal

- Visually check for cracks or excessive wear.

If any of these problems are found, remove shaft from service and call Tidland Customer Service.

After One Year

Body – Ultrashaft™

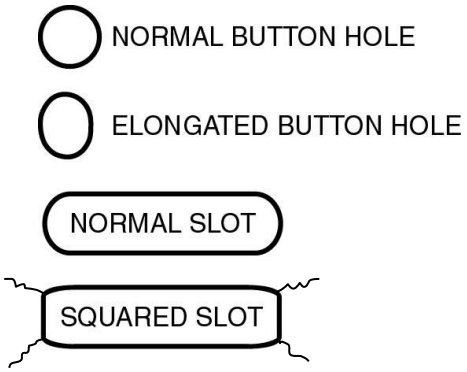
- Check for delamination of the fiberglass or cracks in the metal sleeve in and around lug slots and fastener holes. If delamination or cracks are visible, **remove shaft from service**.

Body – All Shafts

- Inspect lug slots or button holes for excessive wear. Check elongation of button holes or for squaring out at the corners of the lug slots where cracks can develop.

Journal

- Check for reductions in transitional radii between journal diameter steps. If wear is observed, check for cracks. Use magnetic-particle or dye-penetrant, or an equivalent procedure, to detect surface cracks. Measure diameters at those locations where journal, or body, rides on bearings. Measure diameter at those locations where the edges of mounted rolls ride on the shaft body, watching for diameter reduction of 0.015" (0.4 mm) or more.

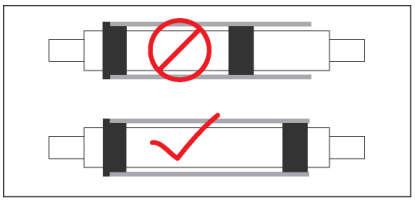


If any of these problems are found, remove shaft from service and call Tidland Customer Service.

These guidelines do not, in any way, extend or modify the Tidland Product Warranty.

CAUTION

- Wear eye protection when using tools or compressed air.
- **Never operate the shaft beyond the limits published in the PSDS and in this document.** Core shaft design and performance is influenced by many dynamic variables. Load limit considerations: beam strength, deflection resistance, bearing centers, beam section, web width, and other critical elements. For other information contact Tidland Corporation.



When using chucks on this shaft, always locate chucks as shown.

Improper placement of chucks will reduce life cycle of the shaft.

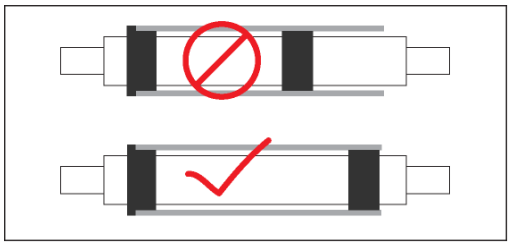
Questions about installation, application or load calculations? Call Maxcess Customer Service.

WARNING	**Do not inflate rubber tube assembly outside of the shaft.** Tube fittings could disengage from assembly and become dangerous projectiles. May result in serious injury.

WARNING	**Do not inflate pad shafts unless all pads are under a core or web.** Pads can be ejected from the shaft when inflated. May result in serious injury.

NOTICE	**Removal or modification of components can affect shaft balance.** Call Tidland to confirm whether your shaft was factory-balanced during manufacturing.

INSTALLATION



Install shaft as required for your application.

When using chucks on this shaft, always locate chucks as shown.

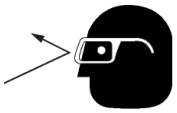
Improper placement of chucks will reduce life cycle of the shaft.

OPERATION

- Keep the Tidland Air Shaft clean and dry.
- Make sure that there are no scratches or burrs on the shaft body.
- Wear eye protection when using tools or compressed air.
- Keep the shaft pressure above 80 psi (5.5 bar) to ensure optimal safety and performance.

To Inflate Shaft

Do not inflate pad shafts unless all pads are under a core or web.
Pads can be ejected from the shaft when inflated.



1. Use the Tidland Inflation Tool. Push the air nozzle firmly into the valve receiver, depressing both the valve button and the tip of the inflation tool.
2. Inflate the shaft until the line pressure air gauge indicates a minimum of 80 psi (5.5 bar). Do not exceed the maximum air pressure of 120 psi (8.3 bar).

To Deflate Shaft

Only use the air release tool.
Do not use finger to release air.
Do not deflate while the shaft is spinning.

1. Using air release tool, push in the quick release air valve allowing the air to escape through the hole in the center of the button.

Rubber Tube Fitting Designs

If your replacement rubber tube assembly looks like this ==========>>>

Remove your old rubber tube assembly (page 10) and install the new one, pushing the tube assembly firmly onto the o-ring connector in the journal.

If you are using re-using your tube fittings with bulk rubber tube material, see instructions starting on page 9.

If your replacement rubber tube assembly looks like this ==========>>>

=== then it is directly interchangeable with older shaft designs. There are fewer parts: rubber tube, tube fitting and hose clamp, pictured at right.

Remove your old rubber tube assembly (page 10) and install the new one, pushing the tube assembly firmly onto the o-ring connector in the journal.

See page 9 for using the hose clamp design with bulk rubber tube material.

If your replacement rubber tube assembly looks like this ==========>>>

=== then the shaft has a hole bored in the journal to accept the rubber tube assembly with a male o-ring connector, pictured at right.

Remove your old rubber tube assembly (page 10) and install the new one, pushing the tube assembly firmly into the socket in the journal.

See page 9 for using the hose clamp design with bulk rubber tube material.

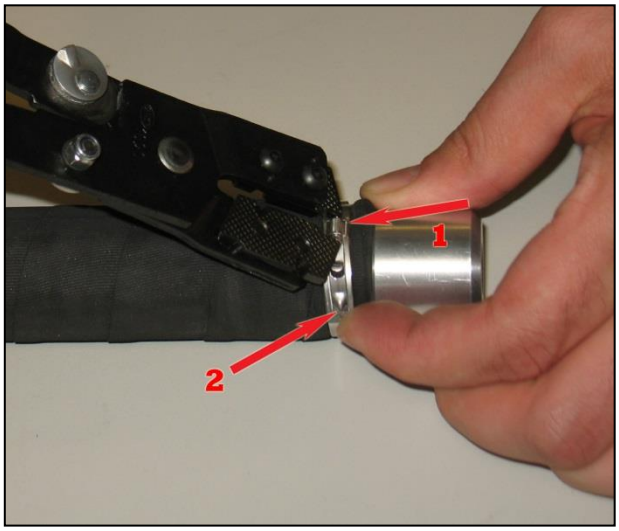
Using the hose clamp with bulk rubber tube material

Removing the hose clamp

Tidland recommends the use of a pincer for safe and easy removal of the hose clamp.

Standard pincer	Tidland Part No. 27L778957
Spring return pincer	Tidland Part No. 27L778958

1. With the pincer, squeeze the tangs **(1)** on the hose clamp until you can lift the load retaining hook **(2)**, and then release the pincer.
2. Remove the fittings and use them again with new rubber tube material. (Remember to reinstall the tube stiffener, if needed.)
3. To close the clamp, squeeze the tangs until you can snap the load retaining hook into place.



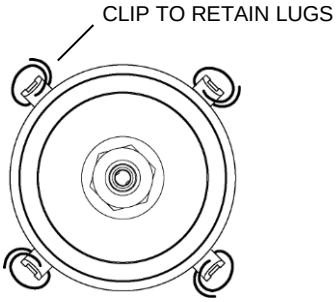
Removing Rubber Tube Assembly

Pad Shafts

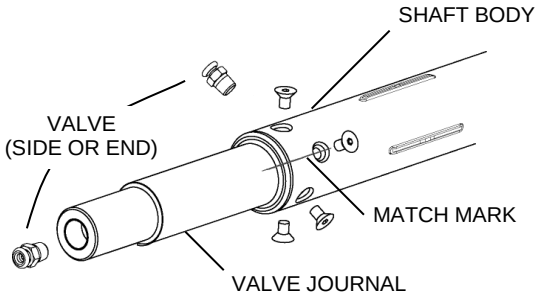
1. Deflate shaft completely. Go to Step 4.

Lug Shafts

1. Inflate shaft to raise lugs.
   Do not exceed 80 psi (5.5 bar).
2. Place retaining fasteners (e.g., paper clip) in lugs to keep them in the expanded position. This prevents the lugs from falling into the shaft body when the rubber tube is removed.
3. Deflate shaft completely.

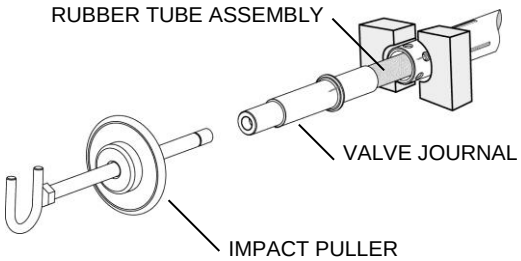


4. Remove valve.
5. Match mark shaft body to the valve journal flange.
6. Remove screws.

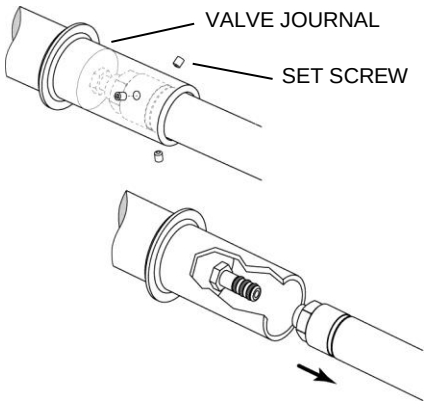


7. Lock the shaft in a vise with a round clamp to protect the shaft body from damage.
8. Attach Tidland impact puller/slide-hammer to valve journal end. Strike the weight against stop.
9. Remove the valve journal, pulling the rubber tube assembly all the way out of the shaft.

   Pad Shafts: The pads will fall inside the shaft body. Remove them and reinstall after rubber tube assembly has been replaced.



10. Loosen the three set screws that secure the rubber tube assembly to the valve journal. Retain the set screws for use during reassembly.
11. Pull the rubber tube assembly from the valve journal.



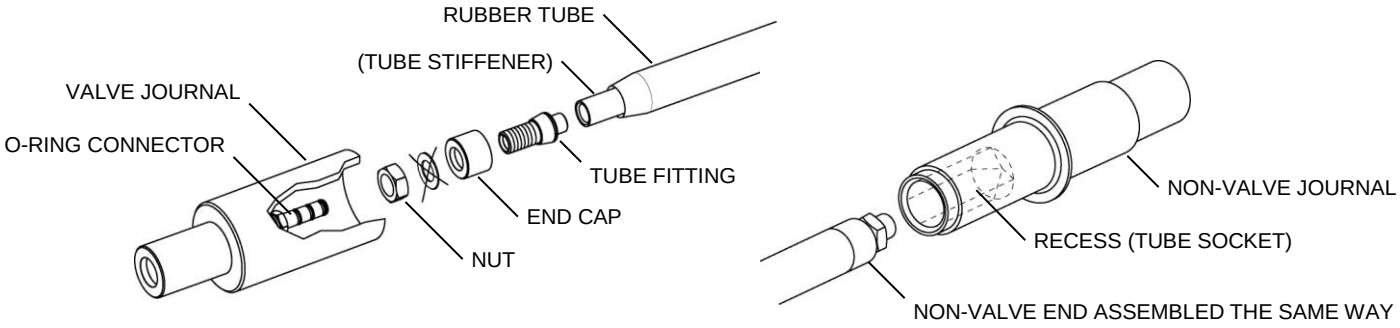
To Disassemble Rubber Tube Assembly

- This assembly consists of four parts: rubber tube element, tube fitting, end cap and jam nut. Some assemblies also include tube stiffener.
- Older assemblies may have a washer, which is no longer necessary if using *Loctite 242* on tube fitting hardware.
- All fittings can be reused with new rubber tube material: if any parts are rusted or worn, Tidland recommends replacing the entire air system.
- Starting with shaft serial number 741576 (December 2011), three set screws were added to the valve end journal to secure the rubber tube assembly. (Set screws are not illustrated here; see page 10.)

1. Remove the nut from the valve end of the rubber tube assembly.
2. Pull the end cap off the tube.
3. Remove the tube fitting from the tube and disconnect the tube stiffener (if installed).

Note the difference in tube fittings

- Valve-end fittings are bored through for air passage; non-valve fittings are solid.



Note: O-ring connector configurations vary. Make sure there is an o-ring in each groove before re-assembly.

WARNING	**Never inflate rubber tube assembly outside of the shaft.** Tube fittings could disengage from assembly and become dangerous projectiles. Can result in serious injury.

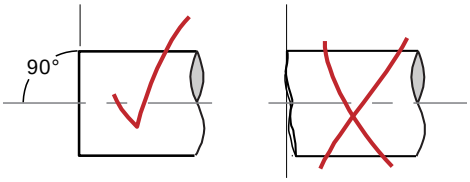
Assembly Torque Requirements
for Standard Tube Fittings

Tube O.D.	Ft·lbs	Tube O.D.	Nm
11/16"	2-4	17 mm	3-5
3/4"	3-8	19 mm	4-11
7/8"	8-15	22 mm	11-20
1"	8-15	25 mm	11-20
1-1/8"	15-28	29 mm	20-38
1-1/4"	15-28	32 mm	20-38
1-3/8"	28-43	35 mm	38-58
1-1/2"	28-43	38 mm	38-58
1-5/8"	43-63	41 mm	58-85
1-7/8"	43-63	48 mm	58-85
2-1/8"	43-63	54 mm	58-85
2-3/8"	43-63	60 mm	58-85
3-3/8"	63-78	86 mm	85-106
4"	63-78	102 mm	85-106
4-3/8"	78-90	111 mm	106-122
4-1/2"	78-90	114 mm	106-122

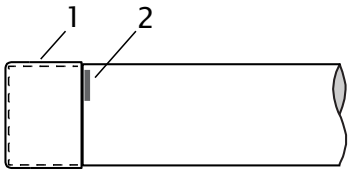
Use this table when reassembling the rubber tube assembly. See next page.

Building the Rubber Tube Assembly

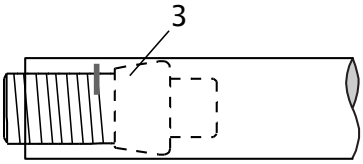
- When cutting rubber tube to length, it is very important to cut the ends square, without nicks or wavy edges. Heavy tin snips work well. Any uneven cuts will not let the rubber tube seat properly in the end cap, resulting in an unreliable assembly subject to failure under pressure.
- Before assembly, clean ends of rubber tube inside and out to make sure all mold release agents or other foreign coatings are removed. This will help prevent the rubber tube from squeezing out of the cap when the retaining nut is tightened.



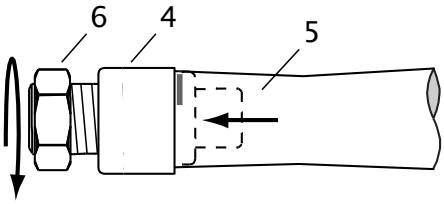
1. Cut rubber tube square at each end.



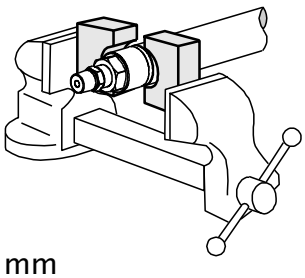
2. Install the end cap **(1)** on the rubber tube and mark its position on the tube **(2)**. Remove the end cap.



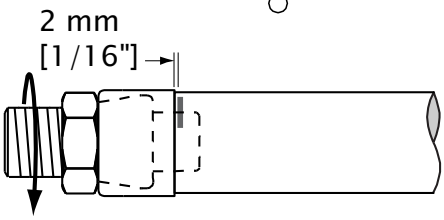
3. Insert the tube fitting **(3)** deep inside the rubber tube.



4. Fit the end cap **(4)** over the tube.
5. Squeeze the tube **(5)** to force the tube fitting back toward the end.
6. Apply Loctite to the tube fitting threads and install the nut **(6)**. Do not tighten.



7. Secure the shaft in a round clamping fixture.

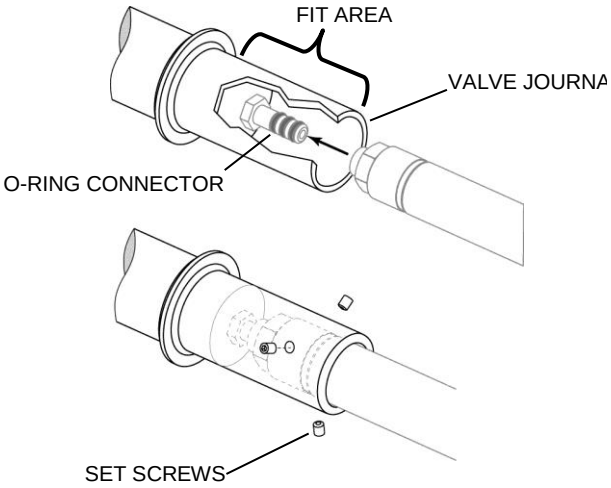


8. Tighten the nut to draw the tube fitting out until fully seated in the end cap.
9. Tighten the nut to torque specified on page 11.
10. The end cap must be within 2 mm of the mark on the rubber tube. Tube fitting threads should be perpendicular to the rubber tube. If crooked, loosen the nut and repeat the procedure.
11. Repeat the procedure for the non-valve end.

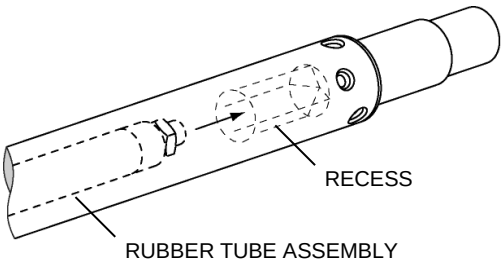
Shaft Assembly Sequence with Complete Rubber Tube Assembly

Note:
O-ring connector configurations vary. Make sure there is an o-ring in each groove before re-assembly.

1. If replacing the o-ring connector, use a thread sealant (liquid or pre-applied).
2. Apply o-ring grease to the o-rings on the o-ring connector. Push the valve end tube fitting fully over the o-ring connector in the valve journal. You should feel a positive stop.
3. Install each of the set screws and tighten only until they make contact with the tube cap.
4. Now torque all of the set screws to 60 in·lbs (6 Nm).

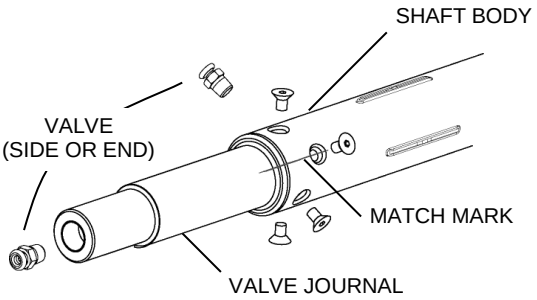


5. Insert the non-valve end of the rubber tube assembly into the shaft. Slide it all the way in until it seats in the recess in the non-valve journal.



6. Apply a light coating of o-ring grease to the fit area of the valve journal.
7. Align the match marks on the valve journal and the shaft body; tap the journal into place with a rubber mallet.
8. Apply small amount of low-strength threadlocker to threads of the journal screws. Reinstall screws and torque to 20-25 ft·lbs (27-34 Nm).
9. Reinstall the valve (use thread sealant unless pre-applied) and torque to 8.8-10 ft·lbs (12-13 Nm).

   Pad Shafts: Push pads into slots from outside the shaft. A very small amount of air in the rubber tube will help keep the pads seated during installation.



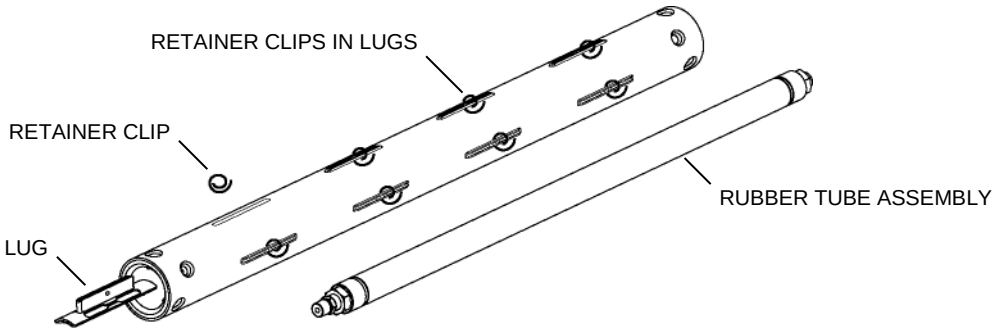
Replacing Outer Lugs

With the rubber tube removed (page 10), the outer lugs (at ends of shaft) can be replaced.

1. With the retainer clips in place, remove and replace **one lug at a time**. Install a retainer clip on the new lug before proceeding to the next lug.
2. Install the rubber tube assembly (p. 13).

Note: Lugs will jam inside shaft body if clips are removed more than one at a time.

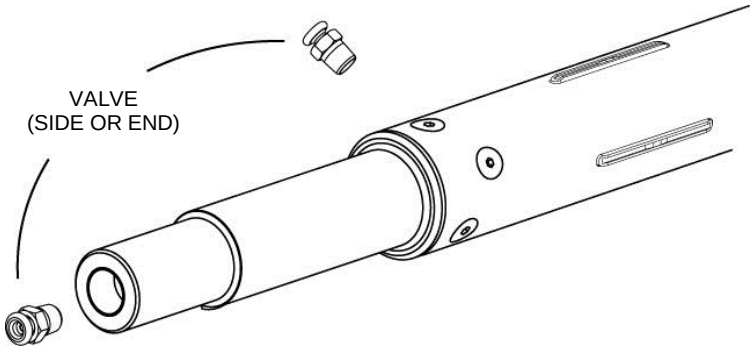
To Replace All Lugs: Tidland recommends returning the shaft for factory service.



Replacing a Valve

Shaft configurations vary. Valve may be installed in the end of the shaft or along its face.

1. Deflate the shaft. Remove all air.
2. Locate and remove the valve.
3. Apply thread sealant (according to manufacturer's directions) to the threads of the valve (unless the sealant is pre-applied) and reinstall.
   NOTE: Valves with pre-applied thread sealant are good for multiple uses. Always inspect the valve threads for sufficient sealant; do not reuse more than six times.
4. Screw the valve into the shaft and torque to 8.8-10 ft·lbs (12-13 Nm).



Troubleshooting

Problem	Possible Cause	Recommended Solution
Shaft will not inflate or hold air	Leaking rubber tube assembly	Disassemble shaft and replace rubber tube assembly
	Valve leaking	Remove valve and apply a thread sealant* according to manufacturer's directions. Reinstall valve and torque to 8.8-10 ft·lbs (12-13 Nm). Replace valve if necessary.
	Rubber tube fitting slips off o-ring connector	O-ring connector configurations vary. Make sure there is an o-ring in each groove of the connector. Use o-ring grease. **Always use a thread sealant when replacing or reinstalling o-ring connectors.** For shafts manufactured after Nov 2011, ensure that there are three set screws installed in the journal. See page 13.
	Hose clamps not secure	Make sure the load retaining hook is locked (p. 9).
Lugs fall through slots	No tube stiffener	Call Maxcess for recommendation.
	Rubber tube lies flat when not inflated.	
Cracked sleeves	Material fatigue	≤1.0" : Drill stop crack. Call Tidland for procedure (1-360-834-2345) >1.0" : Return sleeve for replacement.
Cores slipping	Low air pressure	Operate shaft at 80 psi minimum (5.5 bar) for optimal performance.
	Air leak	Check rubber tube assembly for leaks and replace or repair as needed. Remove valve and apply a thread sealant* according to manufacturer's directions. Reinstall valve and torque to 8.8-10 ft·lbs (12-13 Nm). Replace valve if necessary.
Journals wear prematurely	High loads or speeds	Check PSDS specifications for your shaft application. Verify that journals are hardened.
Excessive shaft vibration	Shaft imbalance	Return shaft to Maxcess for dynamic balancing.

* Valves with pre-applied thread sealant (from manufacturer) can be re-used up to six times.

AMERICAS
Tel +1.360.834.2345
Fax +1.360.834.5865
sales@maxcessintl.com
www.maxcessintl.com

EUROPE, MIDDLE EAST AND AFRICA
Tel +49.6195.7002.0
Fax +49.6195.7002.933
sales@maxcess.eu
www.maxcess.eu

CHINA
Tel +86.756.881.9398
Fax +86.756.881.9393
info@maxcessintl.com.cn
www.maxcessintl.com.cn

INDIA
Tel +91.22.27602633
Fax +91.22.27602634
india@maxcessintl.com
www.maxcess.in

JAPAN
Tel +81.43.421.1622
Fax +81.43.421.2895
japan@maxcessintl.com
www.maxcess.jp

KOREA, TAIWAN, AND SE ASIA
asia@maxcessintl.com
www.maxcess.asia