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.

1. Read and understand all instructions and shaft design application limits before operation.
2. Never use this product for a purpose or in a machine that it was not specifically designed for. See Product Safety Data Sheet (PSDS).
3. Do not exceed the operation loads for this shaft as noted on its PSDS, Product Safety Data Sheet.
4. Follow all warnings and instructions marked on the product and on the PSDS.
5. Inspect the shaft for wear and/or other safety and functional deficiencies daily, before each use.
6. Wear safety glasses or proper eye protection when inflating or deflating or otherwise operating the air system.
7. Do not remove or otherwise alter any setscrews or fastening devices prior to using this product.
8. Do not operate this product if any setscrews or fastening devices are missing.
9. 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.
10. When lifting a shaft, use proper lifting techniques, keeping back straight and lifting with the legs.
11. Do not carry or lift this product over wet or slippery surfaces.
12. Use appropriate mechanical lifting devices, such as a hoist or shaft puller, for heavier shafts.
13. When performing maintenance or repair procedures, do not pressurize the shaft if journal setscrews are loose or missing.
14. When performing maintenance procedures, do not pressurize the shaft if the journal is missing.
15. All replacement parts used on this product should be made to original Tidland specifications.
16. All maintenance and repair procedures performed on this product should be done to Tidland specifications by qualified personnel.

CAUTION

Wear eye protection when using tools or compressed air.

- Fasten all clamps and hardware to recommended torque specifications.
- Loose hardware could be ejected from shaft during rotation.
- Could result in death or serious injury.
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TIDLAND CUSTOMER SERVICE

1-800-426-1000 www.tidland.com

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

RECOMMENDED TOOLS

- Clean, dry, non-lubricated air supply: 0-60 psi (0.0-4.1 bar) for proper operation.
  See Operation for recommended operating pressures for each air system.
- Tidland Inflation Tool (Part No. 128052)
- Tidland Air Release Tool (Part No. 111630)
- Tidland Hole Punch Tool (Part No. 560345)
- Hex drive wrenches: 1/8", 3/16" and 2, 2.5, 3, and 4 mm and socket drive: 12mm

For more accessories to help with your winding processes, visit www.tidland.com.
GENERAL SHAFT CARE

Maintenance Schedule

- During operation shifts, use compressed air to keep shaft free from dust and debris.
- As needed, remove sticky residue. Use a soft cloth damp (not soaked) with a mild solvent, such as rubbing alcohol.
- Complete maintenance procedures begin on page 11.

Shaft Care

- Clean shaft with a soft cloth.
- Mild solvents may be used sparingly; make sure shaft slot and all parts are wiped completely dry of solvents before beginning reassembly.
- Avoid lubricants as they cause dust to accumulate, preventing the shaft from functioning properly.

Polyurethane Bladders

- Do not use petroleum-based lubricants; they will damage polyurethane bladders.
- To help ensure leak free operation when replacing bladders:
  a) Measure the length carefully so that bladder will be secured under the element end clamps.
  b) Always cut the bladders square across the end; bladders cut at an angle are at risk for leaks.
  c) Ensure that the element end clamp screws are tightened to recommended torque specifications. Use LOCTITE 242 on screw threads when reinstalling.

Poron® Springs

- Do not use harsh solvents on or near the Poron springs; rubbing alcohol is acceptable.
- The Poron material attached to the tension segment strip is fragile – use care when handling the strip.
- A torn or broken strip can function, but such damage may result in the loss of tension segments when the strip is outside of the tray.
- Strips with missing tension segments will prevent proper shaft operation. Do not use.
- Poron material is installed on the core stop trays. Use care when installing and removing trays from the shaft.
- Excess water (when testing for leaks) can damage Poron springs. Let dry thoroughly before resuming operation.

Wear Bars

- Inspect the UHMW wear bars for gouges and deep wear depressions. If they are evenly worn, Tidland recommends replacing all wear bars at the same time.
- Single replacements can be made in the event of a damaged wear bar.

AIR PRESSURE

Do not exceed the recommended maximum air pressures:
Core Stop Tray Inflation 60 psi (4.1 bar) page 7
Winding Operation 40 psi (2.8 bar) page 8
### Item | Description | Qty | Part No.
---|---|---|---
1 | Outboard Clamp | 1 | 681947
2 | Set Screw | 1 | 133201
3 | Poron Spring Clamp | 2 | 694585
4 | Flat Hd Cap Scr | 3 | 132270
5 | Hex Nut | 2 | Call
6 | Spring Steel | 1 | 695239
7 | Flat Hd Cap Scr | 2 | 535196
8 | End Clamp, Core Stop Tray | 1 | 525908
9 | Flat Hd Cap Scr | 3 | 612022
10 | End Cap or Journal | 1 | Custom
11 | Wear Strip | 3 | 652361

** Item Description Qty Part No. **

12 | Shaft Body | 1 | Custom
13 | Tension Segments ** | 2 | 651831
14 | Soc Hd Cap Scr | 10 | 542945
15 | End Clamp, Tension Segs | 4 | 525904
16 | Poly Bladder | 2 | 566462
17 | Air Fitting | 5 | 562024
18 | Valve | 1 | 126440
19 | Bleeder Valve *** | 2 | 639967
20 | Poly Bladder | 1 | 534666
21 | Lateral Adjustment Cam | 1 | 694119
22 | Core Stop Tray | 1 | Custom

---

* Recommended Spare Parts – please have your serial number ready when you call to order parts.
** Replacement tension segments are supplied as a complete strip assembled with Poron spring material.
*** One at each end of shaft (not shown)
Pressure Control Valve System

Successful operation of the Tidland Differential Shaft series depends upon proper internal air pressure. Each of the Differential Shaft models can be equipped with a pressure control system comprising two bleeder valves. Used with your applied air pressure, these valves allow the operator to adjust and maintain internal air pressure, which is critical in low-tension winding applications where the required internal pressure is very low and the pressure range is very small.

Variable pressure is required in order to increase the air pressure on the tension segments as the roll diameter increases. As the roll diameter grows, the required rate of pressure increase will diminish due to the weight of the roll and friction between the roll and shaft. These parameters will vary based on your application.

How It Works

As operating air pressure is applied to the shaft, the factory-set inlet valve causes a drop in pressure as air enters the bladder. The exhaust bleeder valve controls the amount of that pressure drop. The larger the exhaust opening, the greater the pressure drop, resulting in lower internal bladder pressure. Reducing the exhaust opening increases the internal air pressure.

If you are unable to achieve optimal tension control by adjusting your applied air pressure, use the exhaust bleeder valve to improve the resolution of your tension controller.
INSTALLATION

Install Shaft
1. Install shaft as required for your application.
2. Manually rotate the shaft so that the core stop tray is facing up.

Before Installing Cores
1. Position the web ends across the notches in the core stop tray.
2. Adjust the tray to align the notches with the web.
   a. Loosen the outboard clamp and the cam lock.
   b. Turn the concentric adjustment clockwise or counterclockwise to move the tray.
      • The cam will push the core stop tray toward the outboard clamp.
      • To move the tray away from the outboard clamp, you will need to push the tray toward the cam during the adjustment.
3. When web alignment is achieved, tighten the adjustment cam lock.
4. Position the outboard clamp with .010-.015" clearance* adjacent to the core stop tray and tighten the outboard clamp. Torque to 8-10 ft·lbs (10.6-13.6 Nm).
   *Note: If outboard clamp is too tight against the core stop tray, the tray will not lift when inflated.

Install the Cores
1. When the web is correctly aligned in the core stop tray, install the cores and attach the web.
2. Inflate the core stop tray bladder to ensure that the cores seat properly in the notches.
3. Begin the winding operation as described on page 8.

Fasten all clamps and hardware to recommended torque specifications. Loose hardware could be ejected from shaft during rotation. Could result in death or serious injury.
Inflation Procedure
Valve locations for the Tidland D5 shaft vary according to customer specifications.

1. Ensure that cores are seated properly in the notches of the core stop tray and that the tray is fully inflated. **Do not exceed 60 psi.**
2. Slowly apply air pressure to tension segments as required for your application. **Do not exceed maximum operating air pressure as outline in the chart below.**

**NOTICE**
- Do not exceed recommended air pressures during the winding operation.
- Refer to the chart below for overspeed* limits.

Winding
1. Observe the web alignment as winding begins; if realignment is required, stop shaft rotation.
2. Cut the web from the cores.
3. Deflate the core stop tray and repeat the adjustment process as described on page 7 (**Before Installing Cores**).
4. Repeat the Inflation Procedure and resume the winding operation.
5. During winding, observe the tension controller readout and adjust the applied air pressure as needed. Adjusting the exhaust bleeder valve may improve the effectiveness of the tension controller. (See page 9.)

---

**D5 Pressure/Overspeed Limits**
(Maintaining Safe Temperature for Plastic Components)

Overheating will occur

Recommended operation

* Overspeed = speed of shaft relative to speed of core
Bleeder Valves

As operating air pressure is applied to the shaft, the factory-set inlet valve causes a drop in pressure as air enters the bladder. The exhaust bleeder valve controls the amount of that pressure drop. The larger the exhaust opening, the greater the pressure drop, resulting in lower internal bladder pressure. Reducing the exhaust opening increases the internal air pressure.

- Both valves are factory-set according to customer operating specifications: roll specs (width, diameter and weight), and web tension (PLI).
- If you are unable to achieve optimal tension control by adjusting your applied air pressure, use the exhaust bleeder valve to improve the resolution of your tension controller. For the majority of applications, no adjustment is required for the exhaust bleeder valve. For higher internal pressure, adjust to a smaller opening in the valve. For lower internal pressure, adjust to a larger opening. Adjustments are made with a 1/8” hex key.
- The restrictor valve at the inlet should not require adjustment.
- Do not operate shaft with missing valves.
- A muffler may be installed* on the exhaust bleeder valve outlet to reduce noise. A slight hiss may be audible: this indicates that the Pressure Control Valve System is functioning, allowing air to escape from the shaft as designed. The muffler must be removed (12 mm socket) before attempting to adjust or remove the bleeder valve. (See Bleeder Valves, page 13.)

*Not available on all Differential shaft designs.

Adjusting the Exhaust Bleeder Valve

1. Stop winding operation and shaft rotation.
2. To adjust the internal air pressure, turn the valve in 1/8 turn increments using a 1/8” hex drive wrench.
   - To increase the pressure, turn the valve clockwise.
   - To decrease the pressure, turn the valve counterclockwise.

   DO NOT adjust while shaft is spinning.

To Clean or Replace the valve, see page 13.

*The purpose of this graph is to illustrate the characteristics of bleeder valve function. The tension values displayed are arbitrary.
- Actual winding tension will differ by variables such as bladder length, shaft speed, roll specs (width, diameter and weight), and core material.
- This system affects only the bladder that controls the tension segment height.
OPERATION

Changing the Core Stop Tray

- Core stop trays for the Tidland D5 Differential shaft are identified on the bottom with core width size and the shaft serial number for which the tray was manufactured.
- There is also an arrow on the bottom that indicates the direction in which the tray should be installed in the shaft.

1. Stop shaft rotation.
2. Deflate both bladders (tension segments and core stop tray) and remove the cores from the shaft.
3. Loosen and remove the outboard clamp. (2.5 mm hex drive)
4. Slide the core stop tray out of the slot.
5. Remove dust, debris and residue from the tray slot. Use mild solvents sparingly, if necessary.
6. Insert the desired core stop tray, ensuring that it is the correct tray for your shaft serial number and that it is pointing in the right direction.
7. Reinstall the outboard clamp; do not tighten the set screw until after web alignment in Step 11.
8. Position the web ends across the notches in the core stop tray.
9. Adjust the tray to align the notches with the web.
   a. Loosen the outboard clamp and the cam lock.
   b. Turn the concentric adjustment clockwise or counterclockwise to move the tray.
      • The cam will push the core stop tray toward the outboard clamp.
      • To move the tray away from the outboard clamp, you will need to push the tray toward the cam during the adjustment.
10. When web alignment is achieved, tighten the adjustment cam lock.
11. Position the outboard clamp with .010-.015" clearance adjacent to the core stop tray and tighten the outboard clamp. Torque to 8-10 ft·lbs (10.6-13.6 Nm).
12. Inflate the core stop tray bladder to ensure that the cores seat properly in the notches.
13. Repeat Inflation Procedure as described on page 7.

---

Fasten all clamps and hardware to recommended torque specifications. Loose hardware could be ejected from shaft during rotation. Could result in death or serious injury.
Replacing Bladders

- Bladder material supplied for replacement may be longer than the required finished length. Do not cut to length until instructed.
- Clean all dried threadlocker from screw threads. Use a small amount of Loctite 242 on the threads of all screws and tighten to torque specifications noted in brackets.

Under Tension Segments

1. Remove both end clamps from tension segment slot. (4 mm hex drive)
2. Push – and pull gently – on the tension segment strip to remove it from the slot. Poron spring material is fragile.
3. Lift the bladder out of the slot and remove the air fitting from the bladder.
4. Clean the shaft slot with rubbing alcohol and dry thoroughly.

5. Cut square across one end of the new bladder and install it in the tray, lined up near the edges of the screw holes.
6. On the bladder, mark the location of the center of the air fitting hole, as shown.
7. Using the Tidland Hole Punch Tool, punch a hole in one wall only of the bladder. Use a small piece of plastic in the bladder to prevent punching through both sides.
8. Insert the air fitting into the bladder.

9. Reinstall the bladder in the shaft slot and seat the air fitting in the hole.
10. Install the bladder end clamp with two socket head capscrews (4 mm hex drive), securing the bladder underneath. Tighten to 60 in·lbs (6.8 Nm).
11. Mark the other end of the bladder at a point that lines up near the edges of the screw holes, as in Step 5, and cut the end of the bladder square.
12. Repeat Steps 6-8.
13. Reinstall the tension segment strip in the slot, taking care not to tear the Poron spring.
14. Install the bladder end clamp with two socket head capscrews (4 mm hex drive), securing the bladder underneath. Tighten to 60 in·lbs (6.8 Nm).

**Note:** Test the bladder for air leaks at 60 psi (4.1 bar). Spray soapy water onto bladder end clamps and air fittings and watch for bubbles. When inflated, the bladder should raise the tension segments. Let dry before resuming operation. **Excess water can damage Poron springs.**
MAINTENANCE

Replacing Bladders

- Bladder material supplied for replacement may be longer than the required finished length. Do not cut to length until instructed.
- Clean all dried threadlocker from screw threads. Use a small amount of Loctite 242 on the threads of all screws and tighten to torque specifications noted in brackets.

Under the Core Stop Tray

1. Loosen the set screw to remove the outboard clamp from the core stop tray slot and slide the tray out of the shaft slot. Do not disassemble the core stop tray clamps unless replacing Poron spring material.
2. Remove the flat head screw and the spring steel strip from the slot. (2 mm hex drive)
3. Remove the internal element clamp (3 mm hex drive) and the lateral adjustment cam (4 mm hex drive) from the slot.
4. Lift the bladder out of the slot and remove the air fitting for reuse with the new bladder.
5. Clean the slot with rubbing alcohol and dry thoroughly.
6. Cut square across one end of the new bladder.
7. At the end where the lateral adjustment cam will be installed, align the square end of the bladder near the edges of the screw holes.
8. On the bladder, mark the location of the center of the air fitting (~.870" from end).
9. Using the Tidland Hole Punch Tool, punch a hole in one wall only of the bladder. (Insert a small piece of shim stock in the bladder to prevent punching through both sides.)
10. Install the air fitting in the bladder and reinstall the bladder in the shaft slot. Install the adjustment cam with two socket head cap screws (use small amount of Loctite 242 on the threads), securing the bladder underneath. Tighten to 60 in·lbs (6.8 Nm).
11. Mark the other end of the bladder at a point that lines up near the edges of the screw holes at the other end and cut the bladder square across the end. Do not stretch the bladder.
12. Install the remaining element end clamp with two flat head cap screws (use small amount of Loctite 242 on the threads), securing the bladder underneath. Tighten to 41 in·lbs (4.6 Nm).
13. Reinstall the spring steel strip into the shaft slot and secure with the flat head screw. Do not use Loctite.
14. Reinstall the outboard clamp with .010-.015" clearance adjacent to the core stop tray and tighten the clamp.

Note: Test the bladder for air leaks at 60 psi (4.1 bar). Spray soapy water onto bladder end clamps and air fittings and watch for bubbles. When inflated, the bladder should raise the core stop tray. Let dry before resuming operation. Excess water can damage Poron springs.
MAINTENANCE

Wear Bars

Replacing
1. Remove shaft end cap or journal.
2. Slide damaged wear bar out of the shaft.
3. Install new wear bar.
4. Reinstall shaft end cap or journal.

Exhaust Bleeder Valve

If maintaining low tension during winding becomes difficult, the bleeder valve may require adjustment (page 6) or cleaning.

Note:
- The fine threads on the needle and the housing are easy to damage. Use care when working with these components.
- Do not attempt to remove the bleeder valve housing from the shaft. If repair is necessary, return the shaft to Tidland. (www.tidland.com/returns)
- Location of valve varies due to custom shaft configurations.

Do not operate the shaft if:
- the valve is missing.
- the orifice is otherwise plugged.

Cleaning the Exhaust Bleeder Valve
1. Stop the winding operation and shaft rotation.
2. Locate the bleeder valve at the end or on the side of the shaft.
3. Using a 12 mm socket, carefully remove muffler*, if installed.
4. Using a 1/8" hex drive, carefully back the needle valve all the way out of its housing (counterclockwise).
5. Using compressed air, blow dust and debris out of the valve.
6. Carefully reinstall the needle valve in the housing.
7. Close the valve down until it just bottoms out in the housing, and then adjust as required for your application.
8. Resume winding operation.
9. Adjust the bleeder valve incrementally to achieve required internal pressure.

*Not available on all Differential shaft designs.

Replacing the Exhaust Bleeder Valve
1. Stop the winding operation and shaft rotation.
2. Locate the bleeder valve at the end or on the side of the shaft.
3. Using a 12 mm socket, carefully remove muffler, if installed.
4. Using a 1/8" hex drive, carefully back the needle valve all the way out of its housing (counterclockwise).
5. Carefully reinstall the needle valve in the housing.
6. Close the valve down until it just bottoms out in the housing, and then adjust as required for your application.
7. Resume winding operation.
8. Adjust the bleeder valve incrementally to achieve required internal pressure.
## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Recommended Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tension segments do not activate</td>
<td>Exhaust Bleeder Valve missing or not adjusted correctly – too much air escaping from shaft.</td>
<td>Ensure bleeder valve is installed. Carefully tighten bleeder valve until it seats in its housing. Make incremental adjustments to achieve required internal pressure.</td>
</tr>
<tr>
<td>Air leak or obstruction in air system.</td>
<td></td>
<td>Make sure element end clamps are tightened to correct torque specifications. Inflate bladders and use soapy water at element end caps to locate leaks. Replace bladders or air lines as needed. Remove bleeder valve at air inlet and inspect for obstructions. Blow clean, dry air through the valve and reinstall.</td>
</tr>
<tr>
<td>Tension segments jammed with core dust or debris</td>
<td></td>
<td>Remove cores; use compressed air to remove dust and debris</td>
</tr>
<tr>
<td>Tensions segments do not retract</td>
<td>Bladder(s) not deflated properly</td>
<td>Ensure that tension segment bladder is completely exhausted.</td>
</tr>
<tr>
<td>Tension segments jammed with core dust or debris</td>
<td></td>
<td>Cut web and cores from shaft; use compressed air to remove dust and debris. Use care not to damage tension segment strip when cutting cores.</td>
</tr>
<tr>
<td>Overheated shaft has deformed the bladder(s).</td>
<td></td>
<td>Cut web and cores from shaft; replace bladder(s).</td>
</tr>
<tr>
<td>Overheated shaft</td>
<td>Shaft spinning inside cores after winding operation has stopped</td>
<td>Stop shaft rotation when not in winding operation.</td>
</tr>
<tr>
<td>Excessive friction caused by dust or residue buildup on shaft</td>
<td></td>
<td>Stop winding operation; remove cores and clean shaft. Use compressed air to remove dust. For residue, use a rag damp with small amount of mild solvent, such as rubbing alcohol. Let shaft dry completely before reloading cores.</td>
</tr>
<tr>
<td>Overspeed</td>
<td></td>
<td>Reduce winding speed: see chart on page 8.</td>
</tr>
<tr>
<td>Different tension from individual shafts (Duplex Winder)</td>
<td>Leak or obstruction in air system</td>
<td>Check all bladders for holes, deformation or debris around air fittings.</td>
</tr>
<tr>
<td>Exhaust Bleeder Valve not adjusted correctly.</td>
<td></td>
<td>Match tensions by adjusting Pressure Control System in each shaft (p. 6).</td>
</tr>
<tr>
<td>Cores not fully seated in the core tray slots</td>
<td></td>
<td>See page 7 for core installation and web alignment instructions.</td>
</tr>
</tbody>
</table>
## TROUBLESHOOTING

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor quality cores with rough edges</td>
<td>Replace cores.</td>
<td></td>
</tr>
<tr>
<td>Cores not fully seated in the core tray slots</td>
<td>See page 7 for core installation and web alignment instructions.</td>
<td></td>
</tr>
<tr>
<td>Excessive core dust</td>
<td>Cores not fully seated in the core tray slots</td>
<td>See page 7 for core installation and web alignment instructions.</td>
</tr>
<tr>
<td>Excessive tension crushing core</td>
<td>Reduce winding speed: see chart on p. <strong>Error! Bookmark not defined.</strong> Lower the range tension pressure or adjust taper tension. Check Bleeder Valve adjustment.</td>
<td></td>
</tr>
<tr>
<td>Core crushed by web shrinkage (e.g., stretchable materials)</td>
<td>Cut web and core from shaft</td>
<td></td>
</tr>
<tr>
<td>Core residue binding core to shaft</td>
<td>Cut web and core from shaft. Use a rag damp with small amount of mild solvent, such as rubbing alcohol, to clean the shaft. Let shaft dry completely before reloading cores.</td>
<td></td>
</tr>
<tr>
<td>Damaged tension segments are not retracting</td>
<td>Cut web and core from shaft; replace tension segment strip.</td>
<td></td>
</tr>
<tr>
<td>Leaky or obstruction in air system</td>
<td>Remove core stop tray from shaft. Check bladder for holes, deformation or debris around air fittings.</td>
<td></td>
</tr>
<tr>
<td>Air tubing not connected under core stop tray cover.</td>
<td>Remove cover from core stop tray and reconnect the air tubing to the air fittings. Check the tubing for holes or obstructions.</td>
<td></td>
</tr>
<tr>
<td>Outboard clamp is too tight.</td>
<td>Loosen clamp and provide .010-.015&quot; clearance. (See page 7.)</td>
<td></td>
</tr>
<tr>
<td>Tray is jammed with dust and debris</td>
<td>Remove tray from shaft; clean the tray and the tray slot in the shaft. Use mild solvent, such as rubbing alcohol, and dry thoroughly before reinstalling the tray.</td>
<td></td>
</tr>
<tr>
<td>Radical drop in air pressure during operation</td>
<td>Bladder leaking</td>
<td>Stop operation and test the bladder for air leaks at 60 psi (4.1 bar). Spray soapy water onto bladder end clamps and air fittings and watch for bubbles.</td>
</tr>
</tbody>
</table>