Important Instructions

Seal Replacement for Turbine Pumps

All Models 10, 12, 13, 14, 16, 17, 18, and 19

Warning: (1) Periodic inspection and maintenance of Corken products is essential. (2) Inspection, maintenance and installation of Corken products must be made only by experienced, trained and qualified personnel. (3) Maintenance, use and installation of Corken products must comply with Corken instructions, applicable laws and safety standards. (4) Transfer of toxic, dangerous, flammable or explosive substances using Corken products is at user's risk and equipment should be operated only by qualified personnel according to applicable laws and safety standards.

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Solutions beyond products...

CORKEN®

Chapter 5—Seal Replacement Instructions

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1. Please note the following important **safety tips:**

   Periodic inspection and maintenance of the pump are essential.

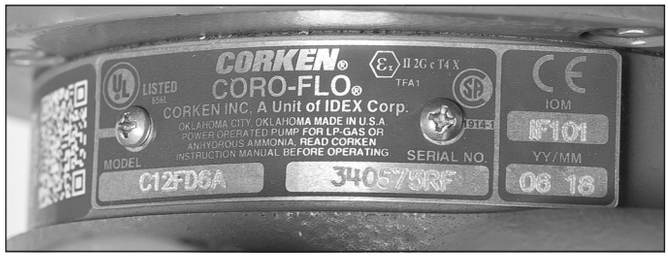
   Inspection, maintenance, and installation of the pump should be performed by trained personnel only.

   All procedures must comply with the Corken Installation, Operation & Maintenance manual, applicable local codes, and safety standards.

   The transfer of toxic, flammable, or explosive substances is always at the user's risk.

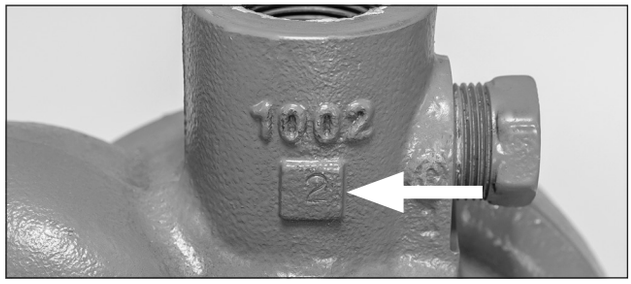
   In according to applicable codes and safety standards , only qualified personnel should operate the equipment.

   Listed below are some written instructions for replacing the seal assembly on all models 10, 12, 13, 14, 16, 17, 18, and 19 regenerative turbine pumps. A video presentation is available on Corken's YouTube channel.

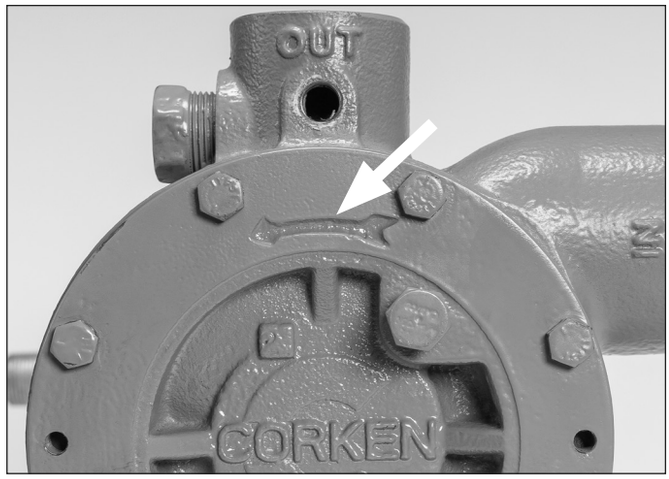


2. The model number of the pump is listed on the name plate on top of the pump casing.

   If the nameplate is missing, there is a stamped number on the pump cover and on the back of the pump casing indicating the model number.

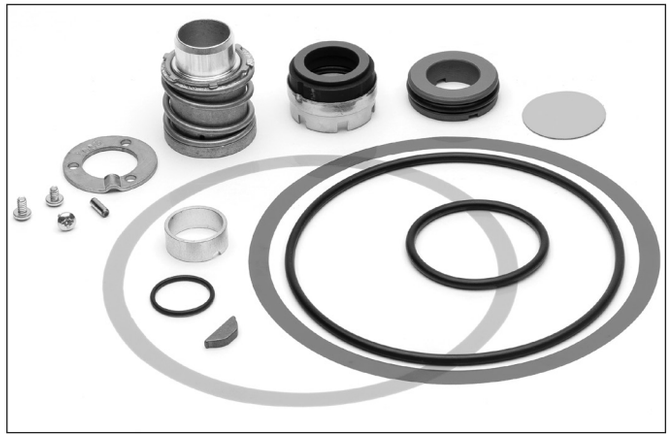


   The number 2 on the raised face indicates a model 12. Number 0 is a model 10, number 3 is a model 13, number 4 is a model 14 etc.



3. Note the arrow on the front of the pump cover showing the direction of rotation. This is important to know when installing a three phase motor such as the one used on all C-models 10, 12, 13, 14, and 16. An electric motor can be wired to turn in a clockwise or counterclockwise direction, so make sure it is wired to match the direction of the rotation arrow when installing a new motor. NOTE: This wiring instruction does not apply to the small C-model motors of 2 horsepower or less since they are wired to run one direction only.

4. All standard Coro-Flo regenerative turbine pumps use the seal replacement kit 113-CXA6. The letter after the "X" at the end of the part number indicates the O-ring material. A is the standard configuration and indicates Buna-N. Optional O-ring material is available and indicated with a B for Neoprene, D for Viton, E for PTFE, G for Ethylene propylene, and K for Kalrez.



5. The boxed seal replacement kit includes:

   - Important Instructions
   - The stationary silicon carbide seat
   - The rotating carbon with the seal sleeve assembly and spring
   - The case cover O-ring

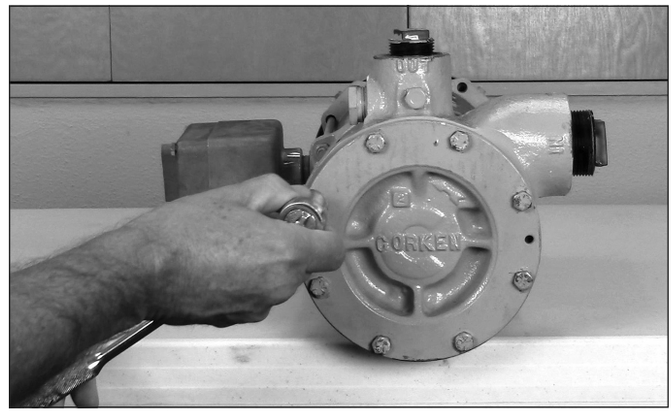
- The rear housing O-ring
- The follower and follower O-ring that seals to the shaft
- The impeller woodruff key
- The seal locking pin
- The seal clamp ring and 3 screws
- One .002 red and one .003 green cover shim for adjusting impeller clearance

6. The tools required for this procedure are:
   - #2 phillips screwdriver
   - #2 flat screwdriver
   - Diagonal or side cutting pliers
   - 3/4" PVC collar
   - 1/2" PVC pipe
   - 3/8" drive ratchet with 1/2" socket
   - 300 to 400 grit emery cloth and Scotch-Brite®[a]
   - Flat metal file
   - 12" adjustable wrench
   - 1/2" box wrench
   - O-ring pick
   - A can of spray lubricant or light oil and plenty of clean shop towels
7. CAUTION: Before servicing the pump, make sure the pump and system are depressurized!

   The seal replacement is an easy procedure so it's not necessary to remove the pump from the piping.

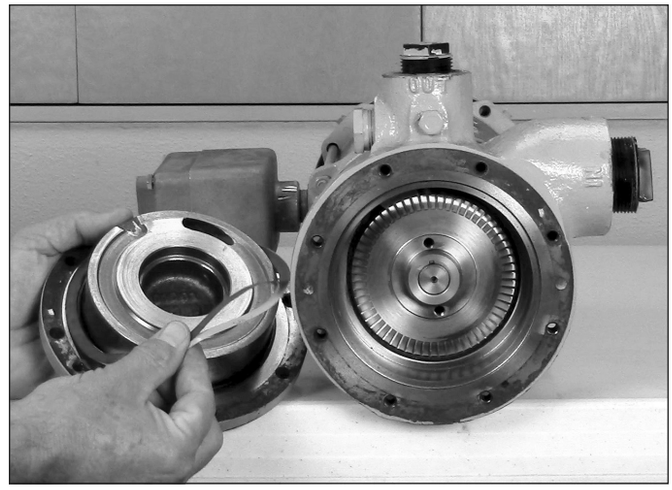
   Keep the work area, tools, and parts clean.

[a] *Registered trademark of 3M.*



8. Begin by removing the bolts from the pump cover with a ½" wrench or socket.

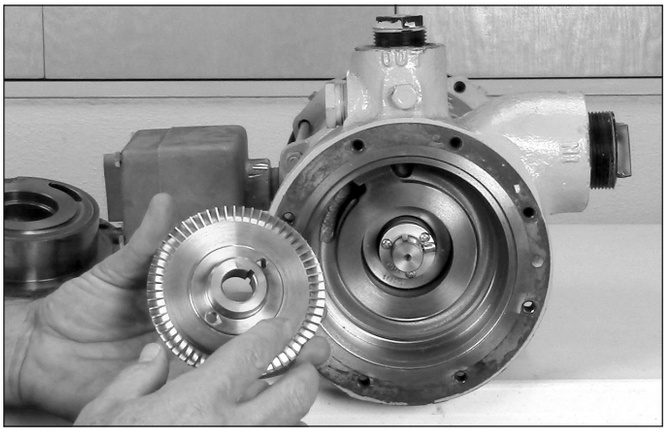
   If the pump cover cannot be removed by hand, use the cover bolts in the bolt holes located at the three and nine o'clock positions as pull or jacking bolts to remove the cover.



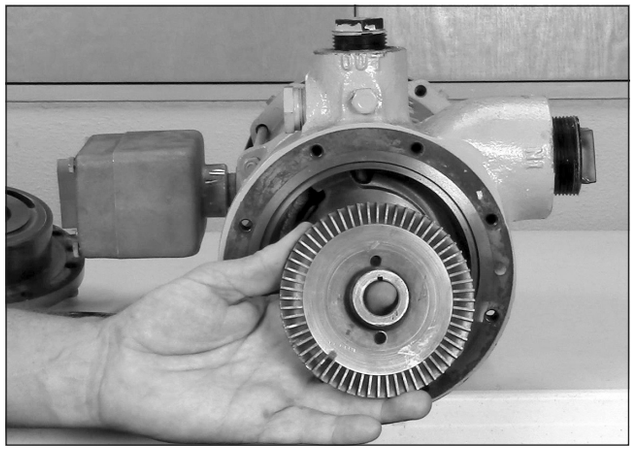
9. With the cover removed, note the quantity and color of shims used for shimming the impeller. The significance of this is discussed later during re-assembly.

This O-ring seals the cover to the casing.

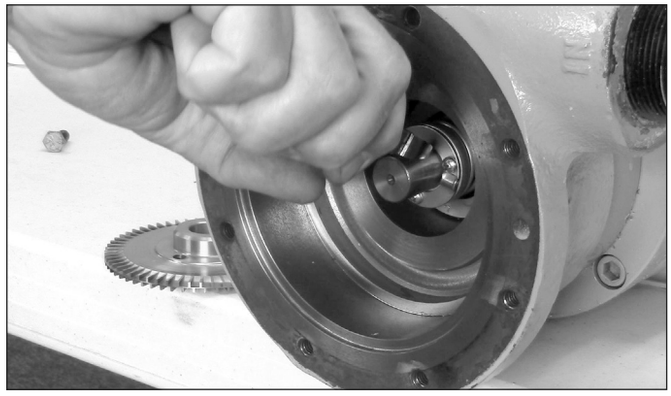
10. Next, remove the impeller by pulling it off the shaft. If it does not slide off, insert one of the bolts used with the pump cover into one of the threaded pulling holes located on the impeller. Remove the impeller by pulling on the bolt.



11. Light scoring or scratches on the face of the impeller is acceptable. As long as it can be shimmed for proper clearance, the impeller can be re-used. However, if any fins are damaged or broken, it should be replaced. The matching model number is stamped on the back of the impeller as well.



This is an example of an impeller that has discolored as a result of over heating due to dry-running. This usually causes seal failure and excessive wear on the impeller. Since this impeller is not damaged and can be shimmed for proper clearance, it may be re-used.



12. Next remove the woodruff key. With a pair of diagonal cutting pliers, grab the key firmly and slowly roll up. DO NOT drive the key out from the top with a screwdriver. Doing so may bend the shaft and cause seal failure.

13. Before removing the seal clamp ring, prevent the pump shaft from rotating by inserting a screwdriver between the fan blades at the rear of the motor. Remove the sleeve screws and clamp ring using the Phillips screwdriver. A magnetic screwdriver can make this a bit easier.

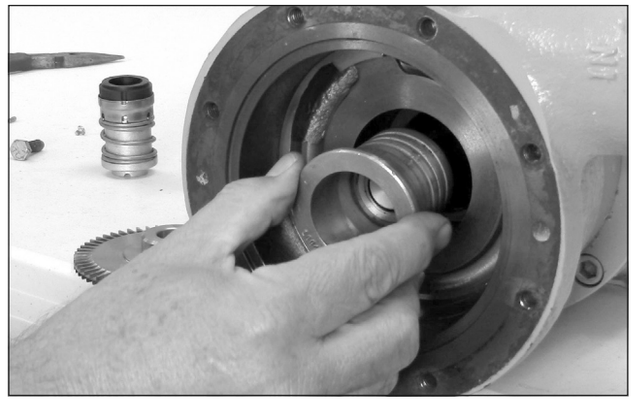
14. Remove the screwdriver from the fan guard at the rear of the motor. To remove the locking pin, rotate the

shaft until the locking pin is at the 6 o'clock position. Compress the seal assembly inwards until the pin should drops out. A light press with a screwdriver may help if the seal assembly does not move back.

15. Remove the sleeve, follower, and follower O-ring. If there are any nicks or burrs on the shaft, removal may be difficult. Push the assembly back in and use emery cloth to smooth out and polish the shaft. Repeat until the sleeve assembly slides off easily.

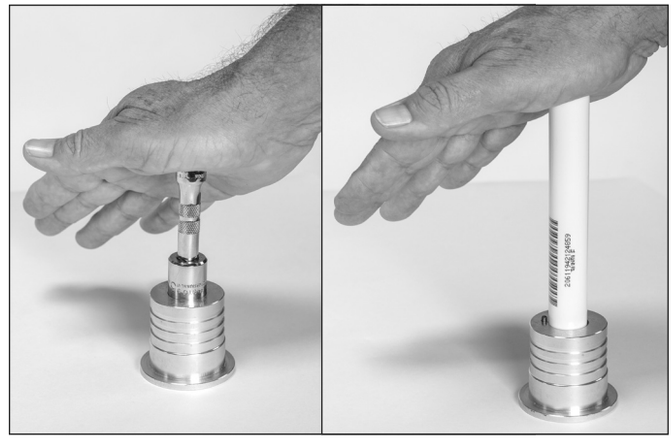
16. After removing the assembly, note the follower and follower O-ring. The O-ring is compressed by the follower when the three screws on the seal clamp ring are tightened. It is critical for the shaft to be smooth and clean for a positive seal.

17. To access the seal housing, remove the nameplate located at the top of the pump casing and insert a flat blade screwdriver in the opening.

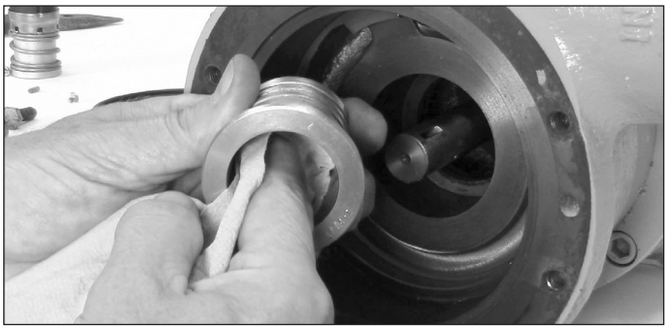


Pry the seal housing forward with the screwdriver and remove the housing from the pump.

18. After the seal housing is removed, locate and remove the shims behind the flange of the seal housing. Make sure none of the shims are left inside the pump casing. Note the quantity of shims and set aside. Using the correct number of shims is critical to proper seal compression.



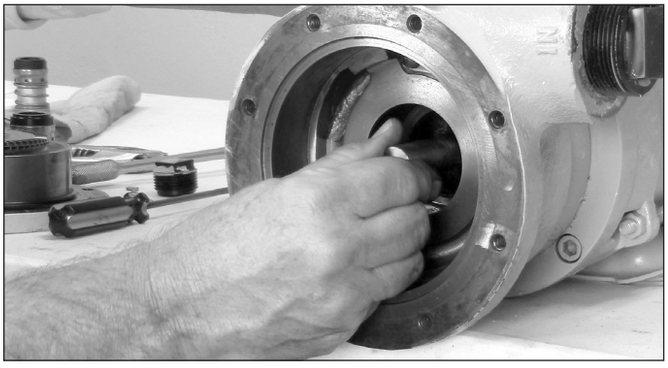
19. Remove the silicon carbide seal seat inside the seal housing by placing the seal housing face down on a flat work surface. Insert a ½" PVC pipe or 3/8" drive socket through the opening on the back side of the seal housing and press until the seal seat presses out.



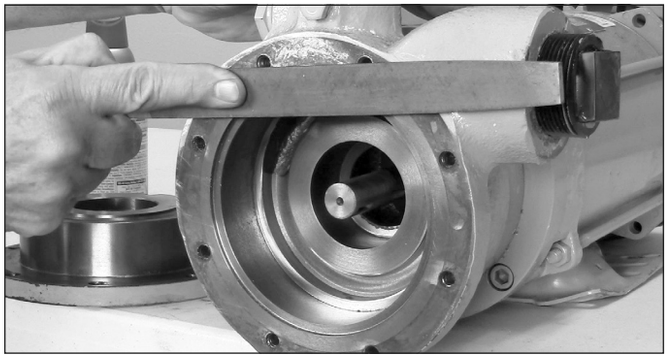
20. Clean the inside and outside of the seal housing with a spray lubricant or light oil and set aside. Polish with emery paper if needed.

21. Next remove the rear casing O-ring with an O-ring pick.

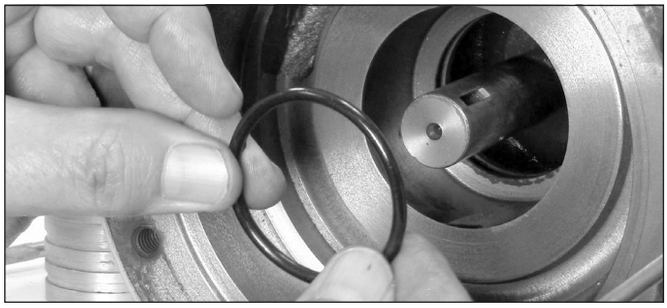
22. Clean the groove in the casing by rinsing with a spray lubricant and wipe dry with a clean cloth.



23. Rotate the shaft and examine for any roughness in the bearings as it turns. If the shaft slides in and out, the motor or frame bearings may need to be replaced.



24. Before reassembling the pump, clean the mating surfaces on the front of the casing and the back of the cover. Gently file or use emery cloth to remove paint, rust, and dirt from the surfaces. Next, clean all parts and surfaces with a spray lubricant or light oil.



25. The first step of reassembly is installing the new O-ring in the back of the pump casing. Begin by feeding the O-ring into the groove and work it around using fingers or a flat head screwdriver until it is fully seated. Spray with a light lubricant and wipe clean. Lubricating the O-ring helps with installation of the seal housing.

26. Next, install the new seal seat inside the seal housing.

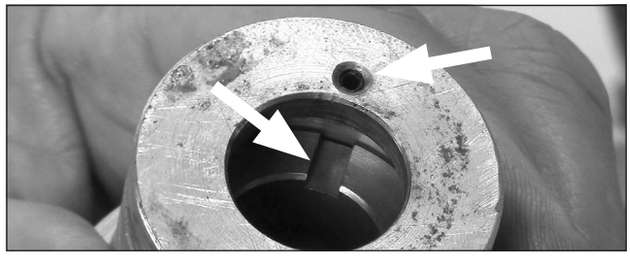
CAUTION: Mechanical seals are precision devices. To prevent chipping or cracking the silicon carbide seal seat, use extreme care during installation.

NOTE: There are two methods for installing a new seal seat.

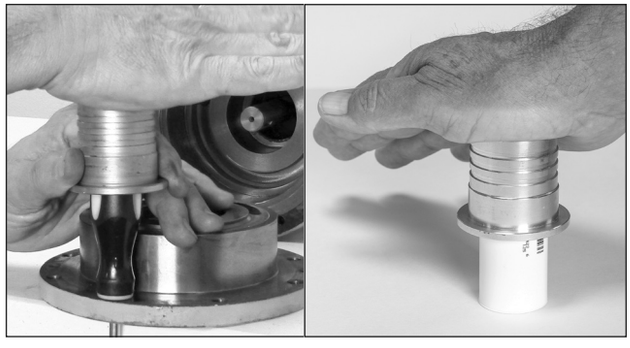
Method 1 (For PTFE and Kalrez® O-rings): This method uses a seal locating pin. When equipped with PTFE or Kalrez® O-rings, the locating pin in the back of the seal housing must be used. Due to the textures of these materials, the pin prevents the seal seat from rotating in the seal housing. Please follow steps 26a, 26b, and 26c shown below.

Method 2 (For Buna-N, Neoprene®, and Viton® O-rings): This method does not require a seal locating pin. When equipped with Buna-N, Neoprene®, and Viton® O-rings, the locating pin can be removed or pressed flush with the back of the seal housing. Please refer to step 26b only and skip steps 26a and 26c.

To keep from damaging the silicon carbide seal seat, use a plastic handle screwdriver or ¾" PVC collar to install the new seal seat. Lubricate the seal seat with a light oil or spray lubricant and place it on top of the plastic handle screwdriver or ¾" PVC collar with the notched side up as shown.

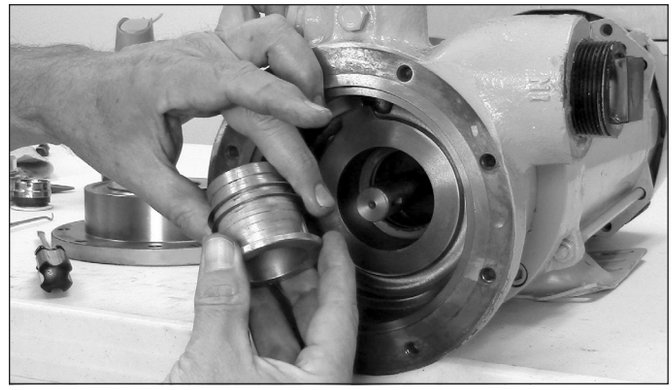


26a. Slide the seal housing over the seal seat and visually align the locating pin with the notch on the back of the seal seat. NOTE: This step applies to method 1 only.



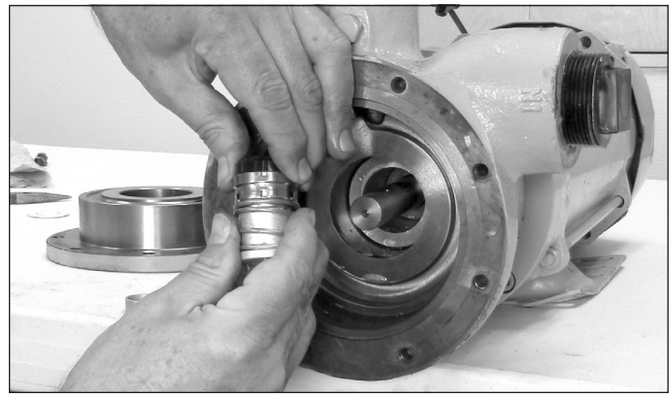
26b. PRESS the seal housing down with the palm of the hand to secure the seal seat inside the housing. The seal seat should gently slide into place.

26c. If the pin is misaligned during the process, remove the seat seal with the ½" PVC pipe or 3/8" socket as shown in step 19 and reinstall using a plastic handle screw driver or a ¾" PVC collar as shown. NOTE: This step applies to method 1 only.



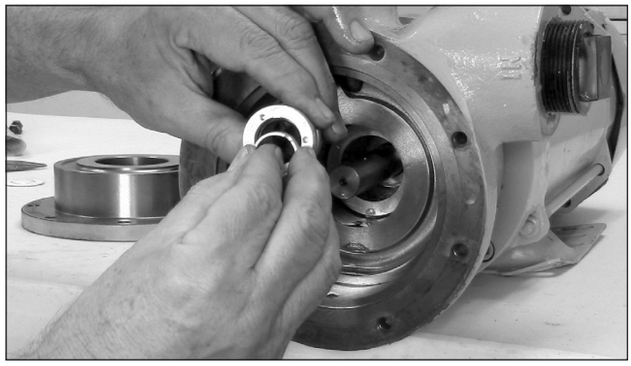
27. Reinstall all of the existing metal shims behind the flange of the seal housing as shown.

Slide the seal housing over the shaft and press into the pump casing. Make sure the seal housing slides through the O-ring and is seated to the back of the pump case. To confirm the seal housing is seated completely, lightly tap the outer flange surface on the front of the seal housing with a screwdriver. **DO NOT TAP ON THE SEAL SEAT LOCATED INSIDE THE HOUSING**.

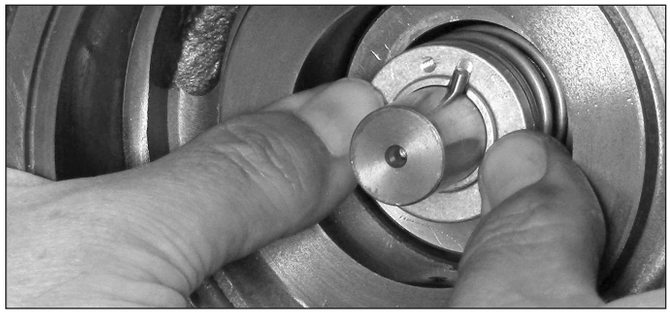


28. Reassemble the seal assembly before inserting inside the seal housing. Remove the rotating carbon from the retainer and apply some lubricant to the inner O-ring. Place the rotating carbon back on the retainer. Align notches on the retainer with locators on the spring seal assembly and press into place.

Next, insert the O-ring and follower into the seal sleeve.

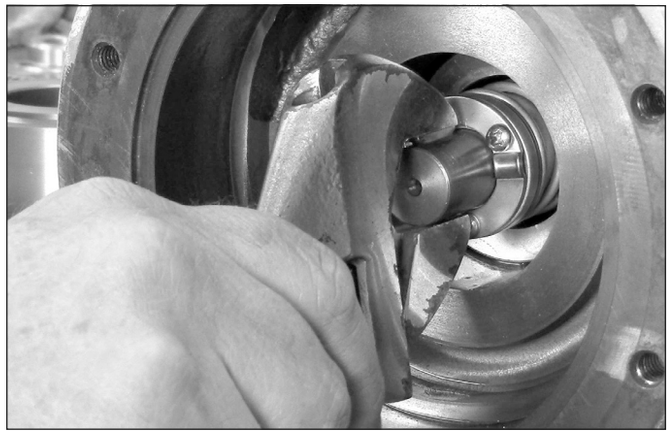


Make sure the notch on the follower aligns with the notch on the seal assembly. Clean and lubricate the shaft and surfaces again before installing.

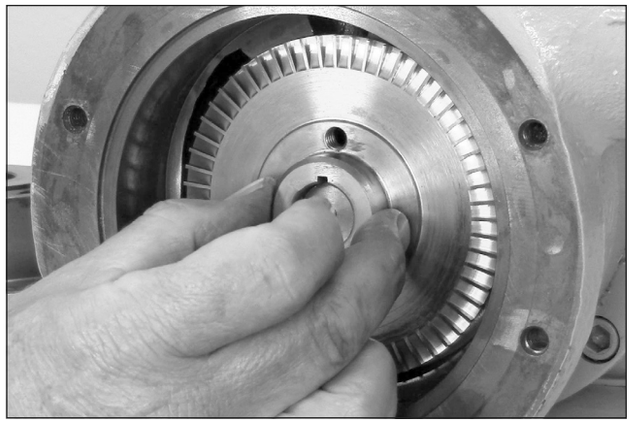


29. Rotate the pump shaft until the locking pin location is in the 12 o'clock position. Insert a screwdriver into the fan guard to lock the shaft in place. Slide the seal assembly over the shaft and align the locking pin notch with the pin location on the shaft. Compress the seal assembly spring with both thumbs and expose the hole on the shaft and install the locking pin. Make sure it is seated in the locking pin notch on the seal assembly. There should be some clearance behind the pin when the seal assembly is compressed but retain enough spring pressure to hold the pin in the notch on the seal assembly.

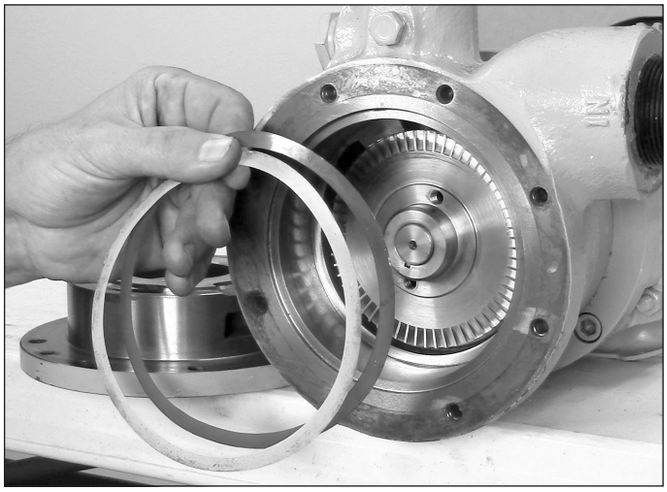
30. Next, install the seal clamp ring with three screws using the Phillips screwdriver. A magnetic screwdriver is helpful with this step. Install all three screws before tightening. Then tighten the screws evenly. DO NOT over tighten or break the screws.



31. Remove the screwdriver from the fan guard and rotate the shaft until the shaft key-way is in the 12 o'clock position. Reinsert the screwdriver into the fan guard to secure the shaft. Align the woodruff or impeller key into the center of the shaft key-way. Using an adjustable wrench, apply pressure to the key by gently rocking the wrench up and down on the shaft while tightening the wrench. Continue until the key is firmly seated and flat in the key-way. Be careful and do not damage or score the shaft with the adjustable wrench.



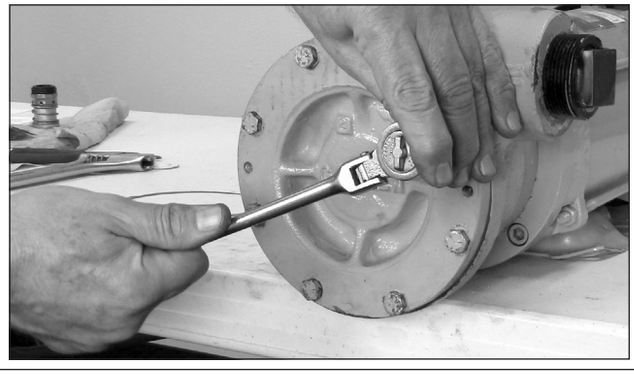
Reinstall the impeller. If properly installed the impeller should slide over the shaft freely and back to the pump casing.



32. Impeller side clearance or float is set with the red (.002) and green (.003) cover shims.

    TIP: For maximum performance, use a minimum number of shims to achieve impeller clearance.

    As the impeller wears (thins out), it may be necessary to remove one of the shims to maintain the proper clearance. If the pump has been in the field for a while, start the shimming process by installing the cover O-ring with the green shim only. Make sure the mating surfaces of the pump casing and the cover are clean and smooth. Adding a little lubricant to the shim will help hold it in place.



Attach the pump cover and make sure the Corken name is level. Start with just four cover bolts and cross-tighten. Rotate the shaft by inserting a screwdriver in the fan guard and rotating the fan blade. If the shaft does not spin freely with one green shim, remove the cover and add the red shim for additional clearance.

After proper clearance is achieved, install all of the pump cover bolts and tighten in a crisscross pattern.

Rotate the pump several times to ensure there is no rubbing or binding and to help seat the seal assembly.

33. Close and secure the name plate on top of the pump casing.

This completes the seal replacement procedure for all models 10, 12, 13, 14, 16, ,17, 18, and 19.

Back Into Service: If the pump is placed back into service, slowly pressurize with vapor. On most systems this is accomplished by slowly opening the bypass return line.

Short or Long Term Storage: If the pump is placed into short or long term storage, close all openings and partially fill the pump with some light oil to protect against rust and corrosion.

Intermittent Duty Applications: Lubricate once every three months.

Continuous Duty Applications: Lubricate monthly.

NOTE: For DL- and F-Model pumps, a low temperature ball bearing grease with a minimum rating of at least -25°F to 250°F is recommended. The lubricant used by the factory is Mystik JT-6 Low Temperature Extreme Grease. This instruction does not apply to C-Model pumps.

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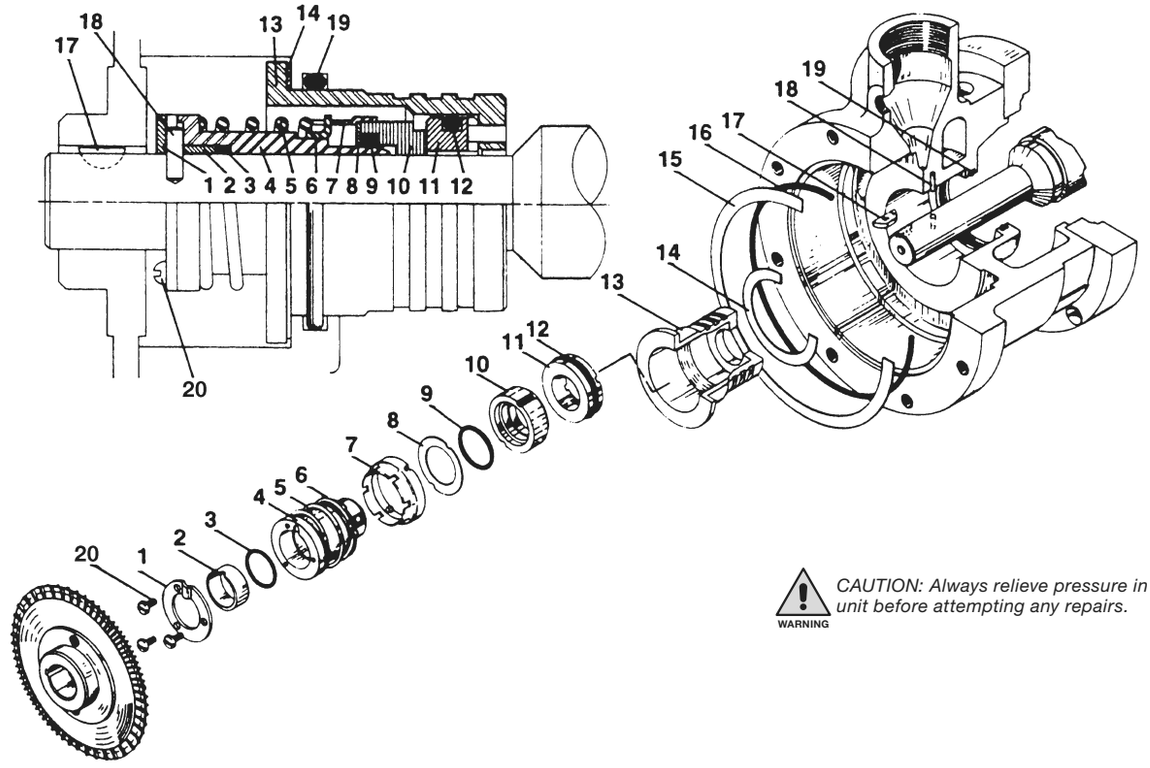
Appendix E—Parts Details for the Balanced Seal Assembly (113-CX_)

All Models 10, 12, 13, 14, 16, 17, 18, and 19



CAUTION: Always relieve pressure in the unit before attempting any repairs.

WARNING

Ref No.	Part No.	Description	Qty.
1.	1008	Seal clamp ring	1
2.	1080	Follower (aluminum)	1
	1080-1	Follower (stainless steel)	1
3.	2-018_ [a]	Follower O-ring	1
4.	1007 [c]	Seal sleeve (aluminum)	1
	1007-2	Seal sleeve (stainless steel)	1
5.	2734 [c]	Spring	1
6.	2735 [c]	Drive band	1
7.	2736 [c]	Retainer	1
8.	2737 [c]	Disc	1
9.	2-118_ [a, f]	Rotor O-ring	1
	2343-X [d, g]	Coro-seal (not shown)	1
10.	2738 [c, f]	Rotor	1
	2738-1 [d, g]	Rotor for Coro-Seal	1
11.	2739	Seat (silicon carbide)	1
12.	2-123_ [a]	Seat O-ring	1
13.	1004-1 [h]	Seal housing without pin (steel)	1
	1004-11 [h]	Seal housing without pin (stainless steel)	1
	1004-1X [e, f, i]	Seal housing with pin (steel, applies to Kalrez®b O-rings)	1
	1004-11X [e, f, i]	Seal housing with pin (stainless steel, applies to Kalrez®b O-rings)	1
	1004-2X [e, g, i]	Seal housing with pin (steel, applies to PTFE O-rings)	1
	1004-21X [e, g, i]	Seal housing with pin (stainless steel, applies to PTFE O-rings)	1
14.	1013 [e]	Housing adjustment shim (.010)	As req.
	1013-1 [e]	Housing adjustment shim (.020)	As req.

Ref No.	Part No.	Description	Qty.
15.	1014	Case clearance shim (.002)	As req.
	1014-1	Case clearance shim (.003)	As req.
16.	2-246_ [a]	Case O-ring (non-PTFE)	1
	2-247E	Case O-ring, PTFE	1
17.	2497	#5 Woodruff key (steel)	1
	2497-1	#5 Woodruff key (stainless steel)	1
18.	1009	Seal drive pin	1
19.	2-224_ [a]	Seal housing O-ring	1
20.	7012-006NC025B	Screw, 6-32 x 1/4" phillip pan head	3

Assembly No.	Assembly Name
113-CX_6 [a, d]	Seal assembly with 1007-X, 1008, 1009, 1014, 1014-1, 1080, 2497, 2736, 2737, 2739-X, 2-018, 2-224, 2-246
113-CX_6A [a, d]	Seal assembly with 1007-2X, 1008, 1009, 1014, 1014-1, 1080, 2497, 2736, 2737, 2739-X, 2-018, 2-224, 2-246
1007-X	Seal sleeve assembly with 1007, 2734,2735
1007-2X	Seal sleeve assembly, stainless steel, with 1007-2, 2734, 2735

[a] *_ denotes material code. See material code chart for details.*
[b] *Registered trademark of the DuPont company.*
[c] *These parts are not available separately.*
[d] *For PTFE fitted seals, O-ring 2-118 is replaced by Coro-Seal 2343-X and rotor 2738 is replaced by 2738-1.*
[e] *Not included in 113-CX.*
[f] *Except PTFE O-rings.*
[g] *Not used with PTFE O-rings.*
[h] *Pin is not required for Buna-N, Neoprene®, and Viton® O-rings.*
[i] *Pin is required for PTFE and Kalrez® O-rings.*

Material Code	
A	Buna-N
B	Neoprene®b
D	Viton®b
E	PTFE
G	Ethylene Propylene
K	Kalrez®b

Solutions beyond products...

CORKEN®

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