

1. FOREWORD

ATLAS V-Series and ICON V-Series fluid ends are VULCAN'S next generation of direct replacement hydraulic fracturing pump fluid ends. These fluid ends have been engineered with various design features that allow for fast and easy field repairs. This service bulletin details installation and removal procedures for the packing bore wear sleeve, suction side access cover adapter flanges, discharge connections, discharge cover retainers and gauge port fitting retainers.

2. ATLAS/ICON V-SERIES DESIGN OVERVIEW

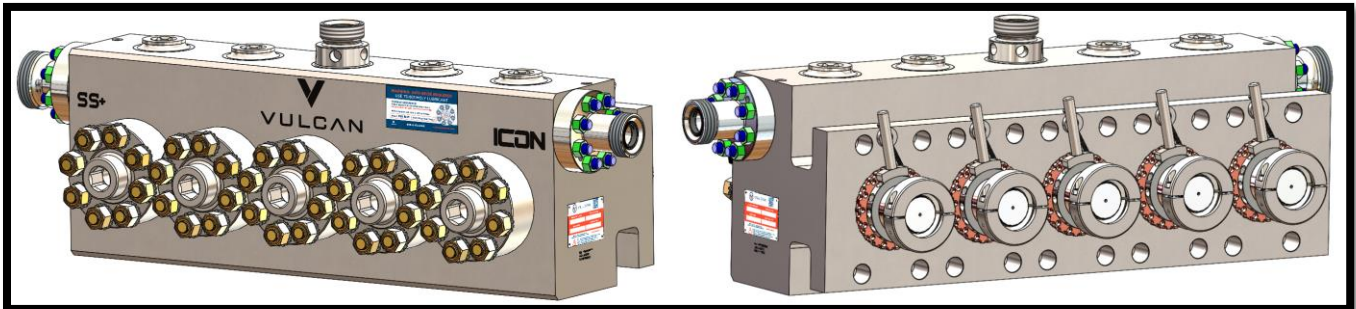


Figure 1- ATLAS/ICON V-Series Quintuplex Series fluid end front and back view

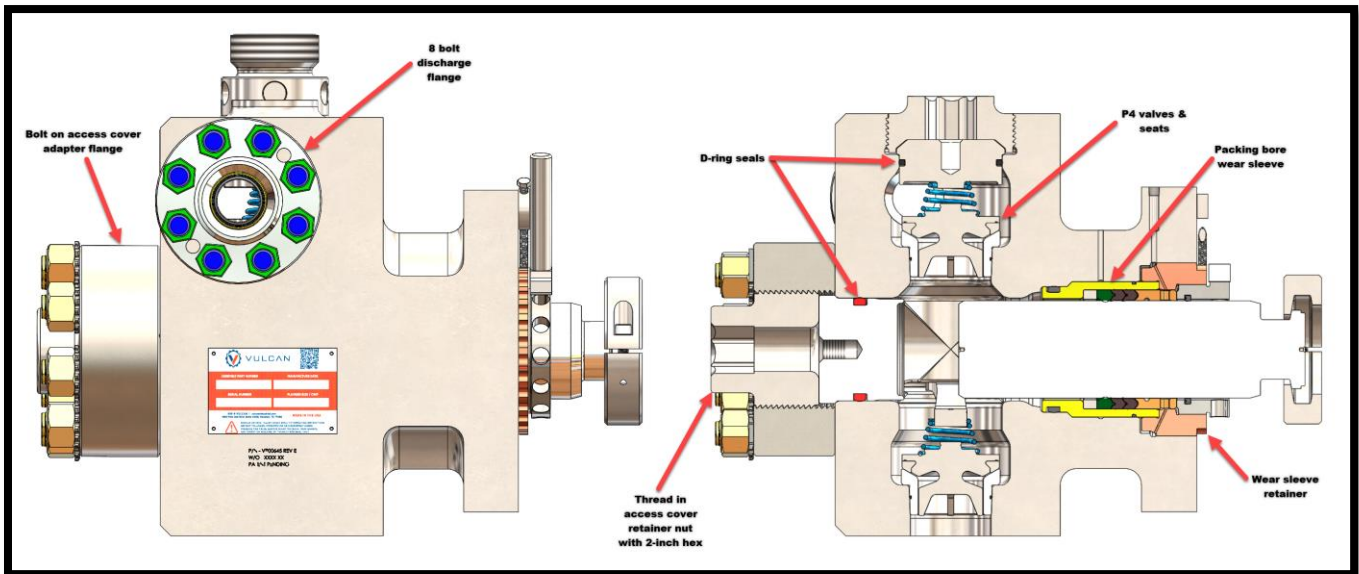


Figure 2- ATLAS/ICON V-Series cross section view

3. SUCTION SIDE ACCESS COVER ADAPTER FLANGE SYSTEM INSTALLATION PROCEDURE

INSTALLATION STEPS

1. Thoroughly clean the female threaded blind holes in the fluid end that will be receiving the studs by blowing them out with compressed air, brake clean etc.



NOTE

It is critical that the female threaded blind holes and the male threaded studs be thoroughly clean and free of all foreign material before threading the studs into the fluid end. Any studs that have damaged threads should be discarded and replaced with new. Failure to follow these guidelines may cause the studs to seize into the fluid end.

2. Apply TS-801 moly lubricant anti-seize or equivalent to the female threaded blind holes in the fluid end that will be receiving the studs along with the male threads of the studs.
3. Thread the studs into the fluid end by hand until they fully bottom out. Studs must be oriented as shown in Figure 3. All of the studs must all be fully threaded in until they bottom out with the hole before proceeding to the next step.

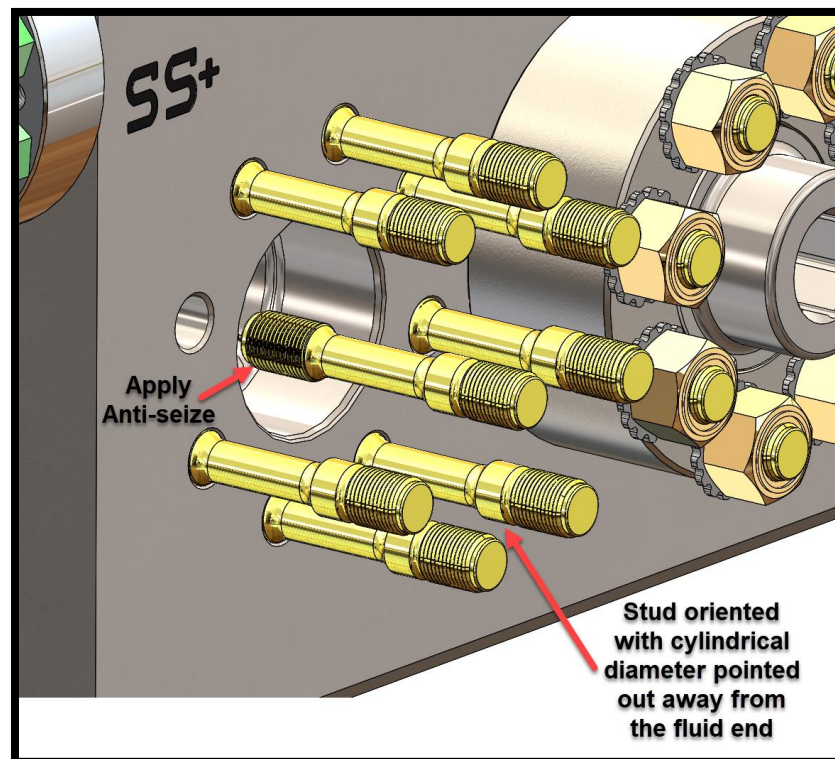


Figure 3- Access cover adapter flange stud installation

4. Place the access cover adapter flange onto the studs. One side of the adapter flange has four shallow linear grooves cut into the face. This side of the flange must be sitting against the fluid end. Slide the adapter flange down the studs until it sits flush with the face of the fluid end.
5. Place the reaction washer onto each of the studs. One side of the reaction washer has a knurled surface profile. This side of the washer must be in contact with the access cover adapter flange.

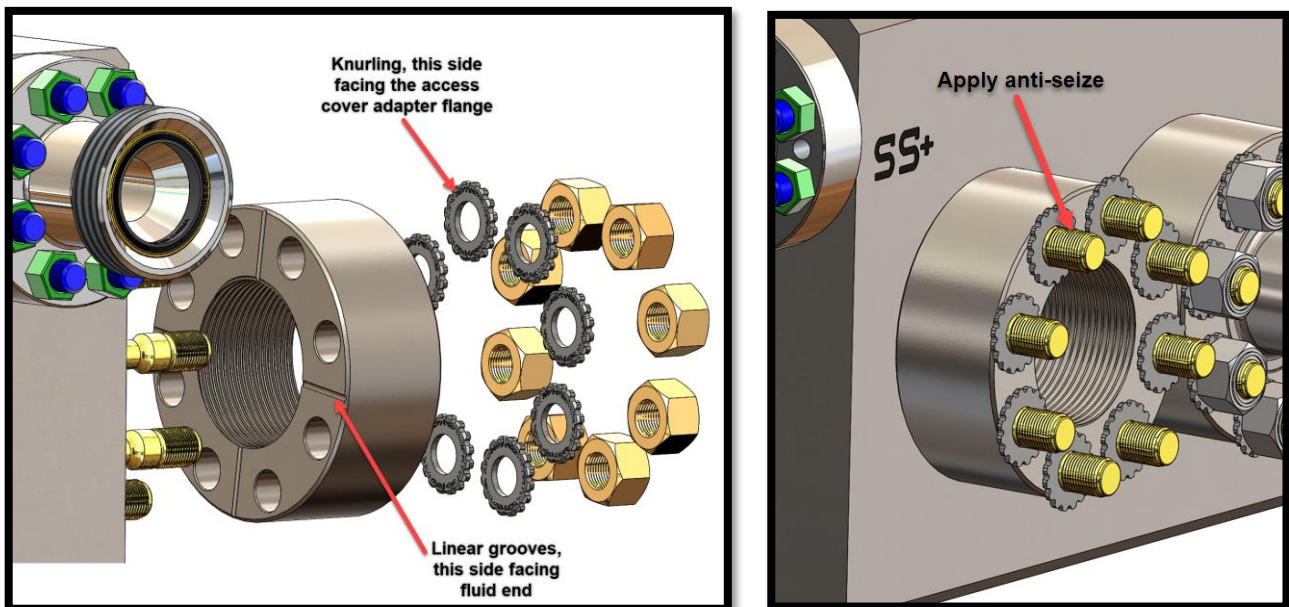


Figure 4- Access cover adapter flange and reaction washers

6. Apply TS-801 moly lubricant anti-seize or equivalent to the stud male threads that will be receiving the heavy hex nuts.
7. Install the heavy hex nuts onto each of the studs and start threading them on by hand.
8. Run down all heavy hex nuts using an electric or pneumatic impact gun under low power setting, working in a star pattern to bed all the components tightly together.
9. Begin final torque down procedure for the heavy hex nuts. Working in a star pattern, make two passes at incremental torque levels, see figure 5.



WARNING - THE FOLLOWING TORQUE DOWN PROCEDURE MUST BE FOLLOWED TO ENSURE MAXIMUM STRUCTURAL INTEGRITY OF THE BOLTED JOINT. FAILURE TO ADHERE TO THIS PROCEDURE MAY LEAD TO FATIGUE FAILURE OF THE ADAPTER FLANGE STUDS DURING OPERATION AND SUBSEQUENT DAMAGE TO THE FLUID END, AND POSSIBLE SERIOUS INJURY TO PERSONNEL OR DEATH



NOTE

VULCAN recommends that only the HYTORC cordless 36-volt lithium series torque gun (HYTORC Part #: LST-2000) with accompanying HYTORC washer drive assembly (HYTORC Part #: DZAL-104-200X) be used when torquing down the heavy hex nuts. This tool is designed to be used with the HYTORC reaction washers. Refer to the tool operation and maintenance manual for tool use instructions. Contact VULCAN for this tool and associated tool training

TORQUE SEQUENCE

Make 2 passes at incremental torque levels.

Follow pattern at right →

PASS 1: Approx 350 lb-ft | 50% of Torque

Pass 2: 700 lb-ft | 100% REQUIRED Torque

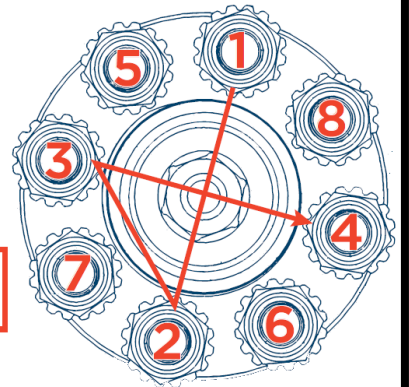


Figure 5: Torque down sequence for access cover adapter flange bolts

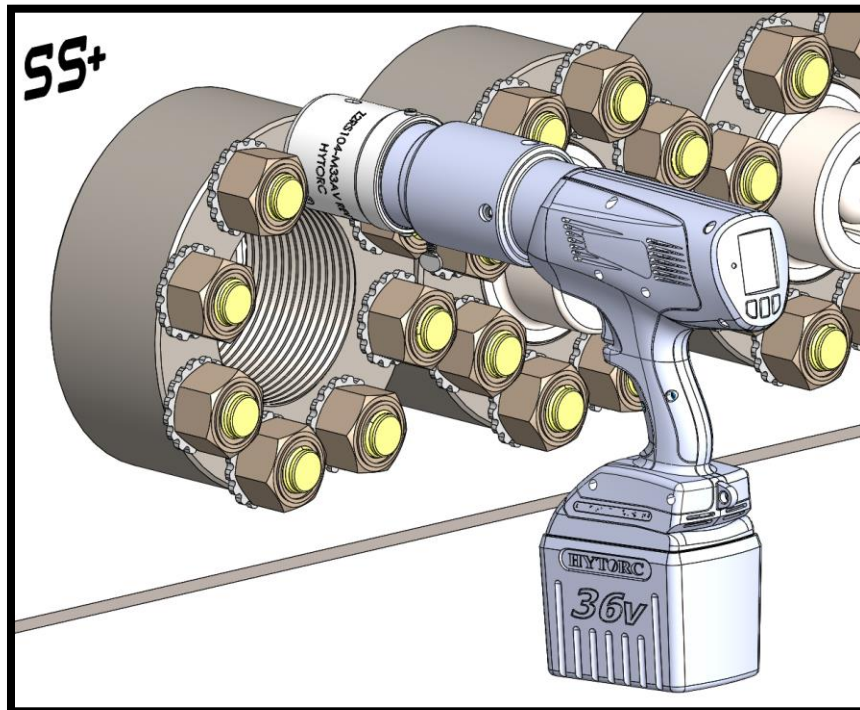


Figure 6: HYTORC 36-VOLT torque gun with HYTORC reaction washer drive assembly

10. After each heavy hex nut has been torqued, witness mark the top of the stud or nut with a paint pen to indicate that final torque value has been applied to the nut.
11. Grease the D-ring seals for the suction cover and install them onto the groove cut into the suction cover. Grease the mating bore of the fluid end.

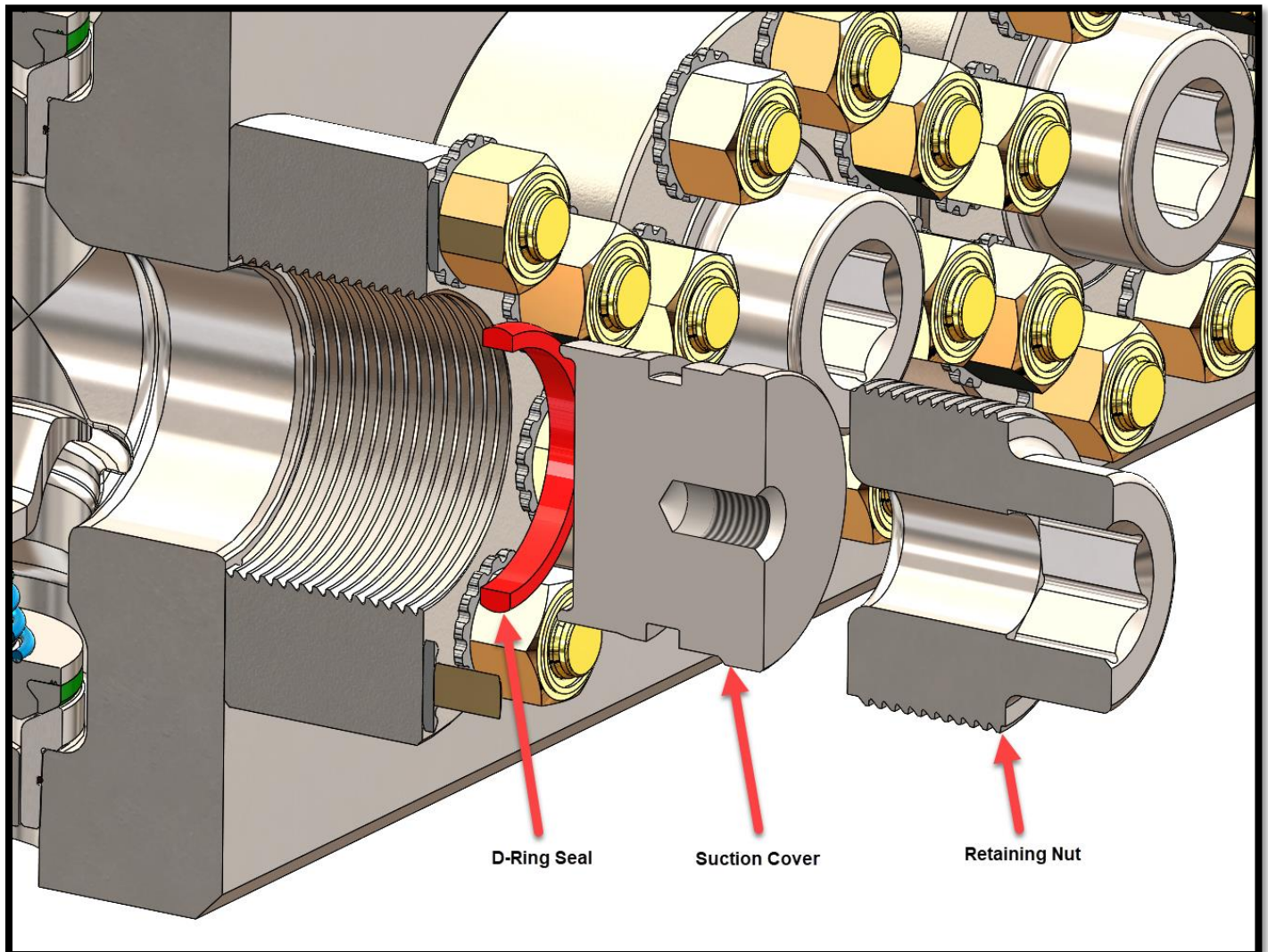


Figure 7: Exploded view suction cover side example

12. Apply grease to the outer diameter of the suction cover and apply Kopr-Kote or equivalent anti seize to the buttress treads of the retaining nut. Place the suction cover into the bore and thread in the retaining nut. Using a 2-inch hex hammer wrench tighten down the retaining nut until it bottoms out. Finish tightening the retaining nut with a few heavy blows to the hammer wrench using a sledgehammer.

4. GAUGE PORT AND DISCHARGE COVER INSTALLATION

INSTALLATION STEPS

1. Apply grease and install the D-ring seal into the groove on the gage port fitting discharge cover. Apply grease to the mating bore of the fluid end. Also install a 2" 1502 hammer union seal into the pocket on the topside of the gauge port fitting discharge cover and another on the topside of the gauge port fitting retaining nut.

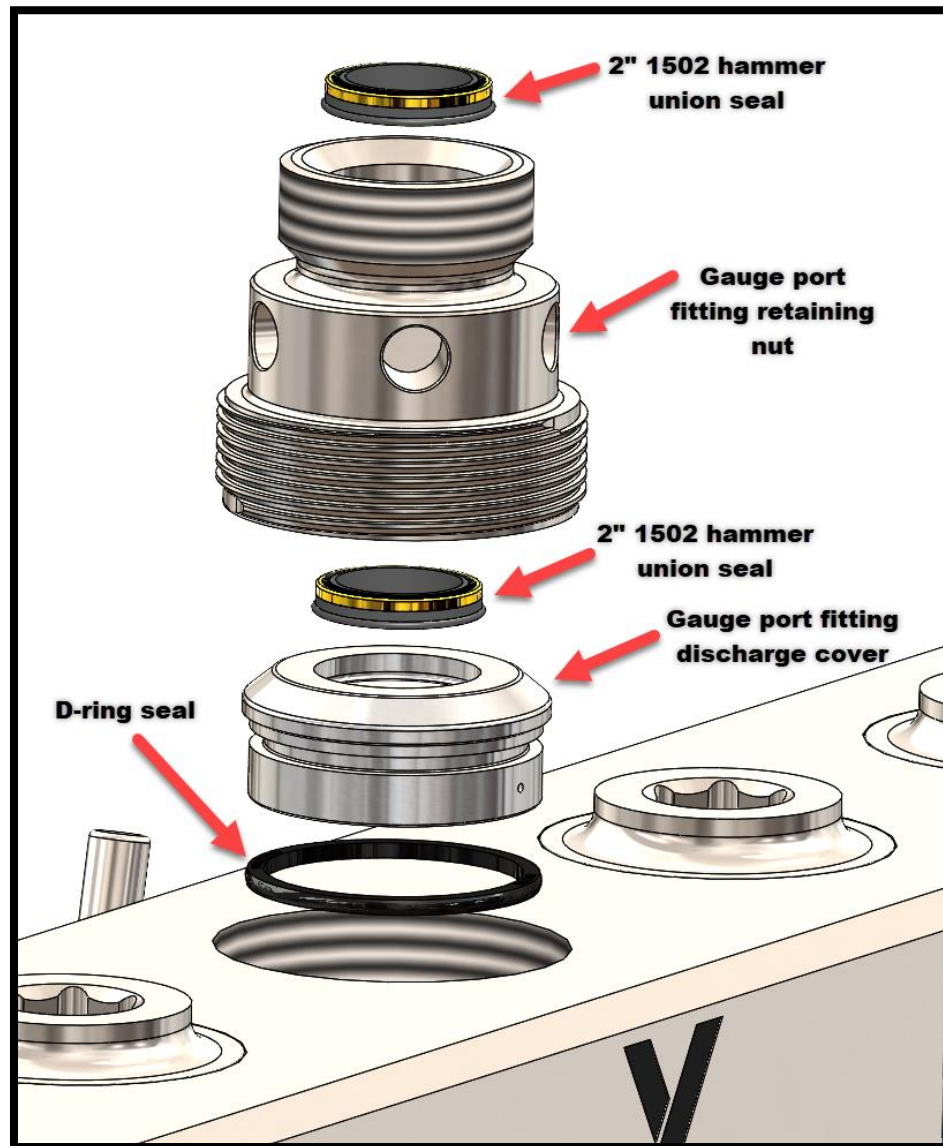


Figure 8: Gauge port fitting exploded view

2. Apply a heavy coating of grease to the topside surface for the gauge port fitting discharge cover & 2" 1502 hammer union seal. Also, apply kopr-kote anti-seize to the buttress threads.
3. Place the gauge port fitting discharge cover into the discharge bore of the fluid end. It will be partially installed within the bore and rest on top of the uncompressed valve spring.
*There is no need to strike the topside of the gauge port fitting discharge cover in order to seat it within the bore, it will be fully driven in by threading in the gauge port fitting retaining nut in the next step.
4. Take the gauge port fitting retaining nut and begin threading it into the fluid end. The gauge port fitting discharge cover will be driven completely into the fluid end during this process. Using a 1" bar tighten down the gauge port fitting discharge cover completely until it bottoms out. Tighten it down with a few heavy blows using a sledgehammer on the bar.

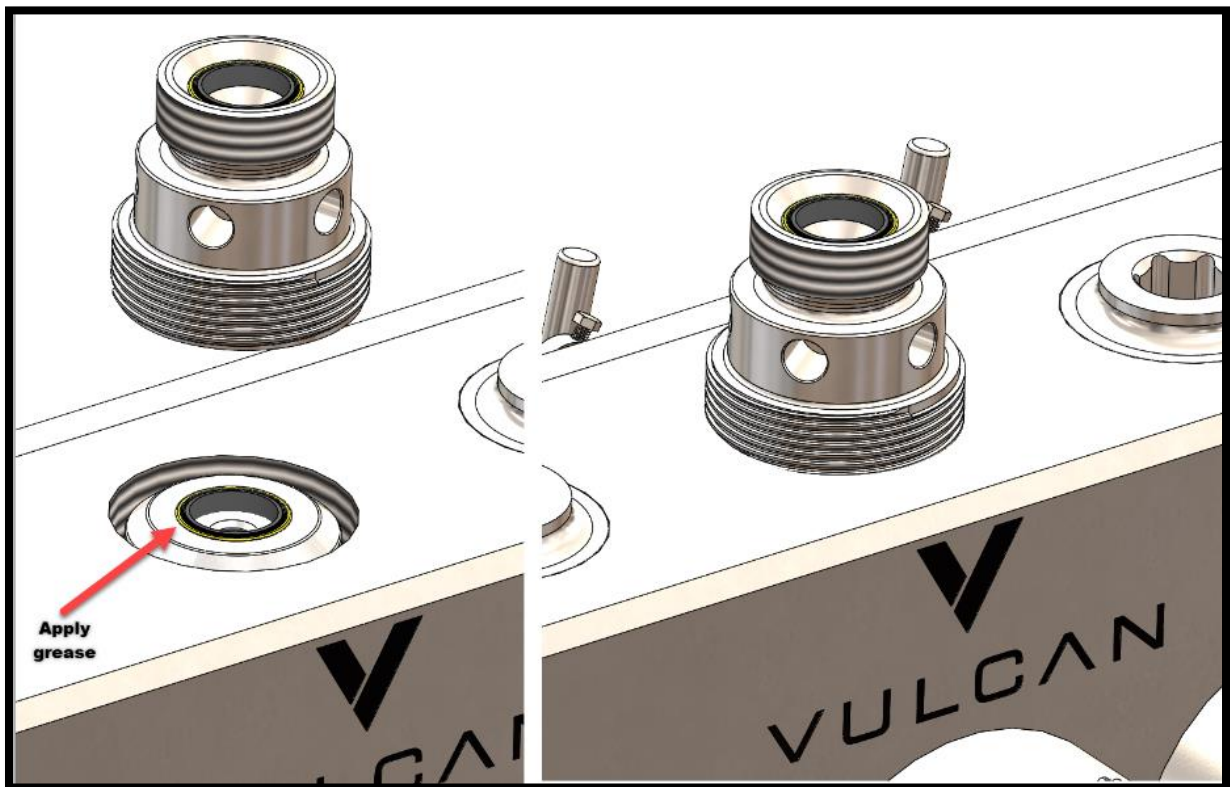


Figure 9: Gauge port discharge cover assembly steps

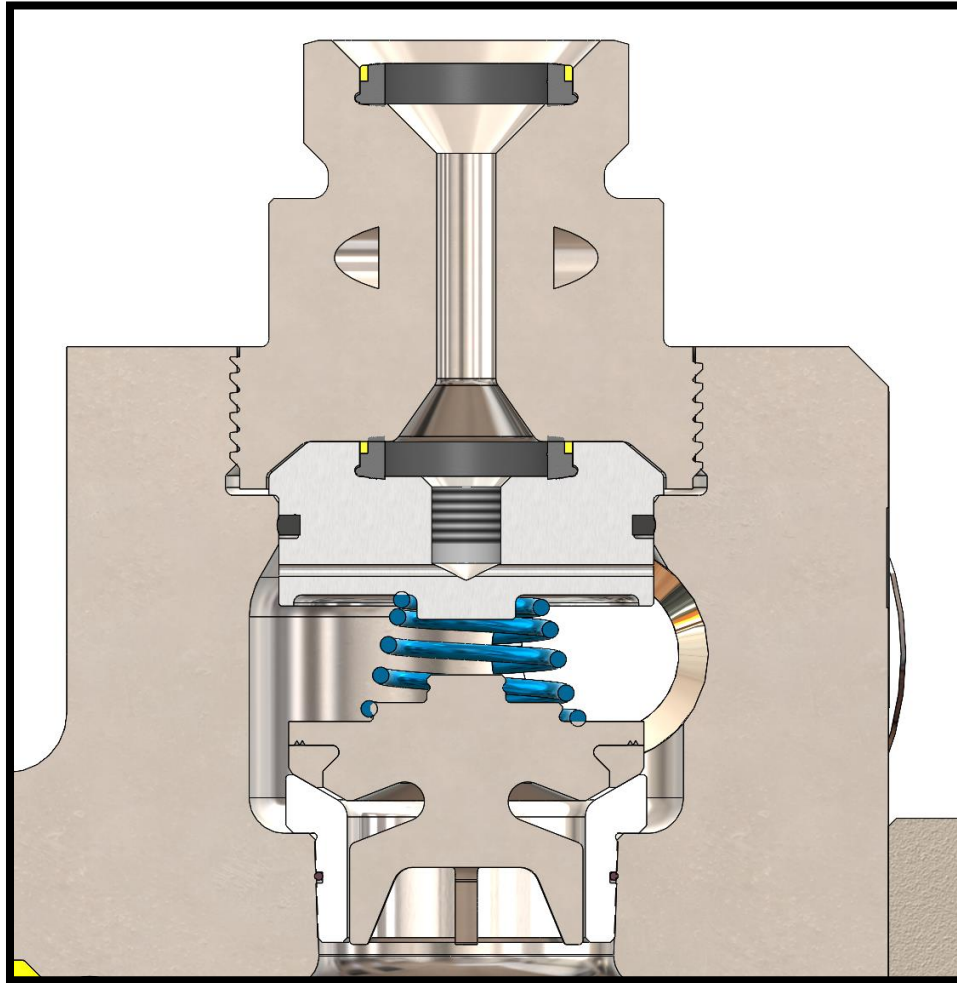


Figure 10: Gauge port fitting fully assembled section view

5. Apply grease and install the D-ring seal into the groove on the discharge cover. Apply grease to the mating bore of the fluid end. Also, apply kopr-kote to the buttress threads.
6. Place the discharge cover into the discharge bore of the fluid end. It will be partially installed within the bore and rest on top of the uncompressed valve spring. *There is no need to strike the topside of the discharge cover in order to seat it within the bore, it will be fully driven in by threading in the discharge cover retaining nut in the next step.
7. Take the discharge cover retaining nut and begin threading it into the fluid end. The discharge cover will be driven completely into the fluid end during this process. Using a 2" hex hammer wrench tighten down the discharge cover retaining nut completely until it bottoms out. Tighten it down with a few heavy blows using a sledgehammer on the hammer wrench.

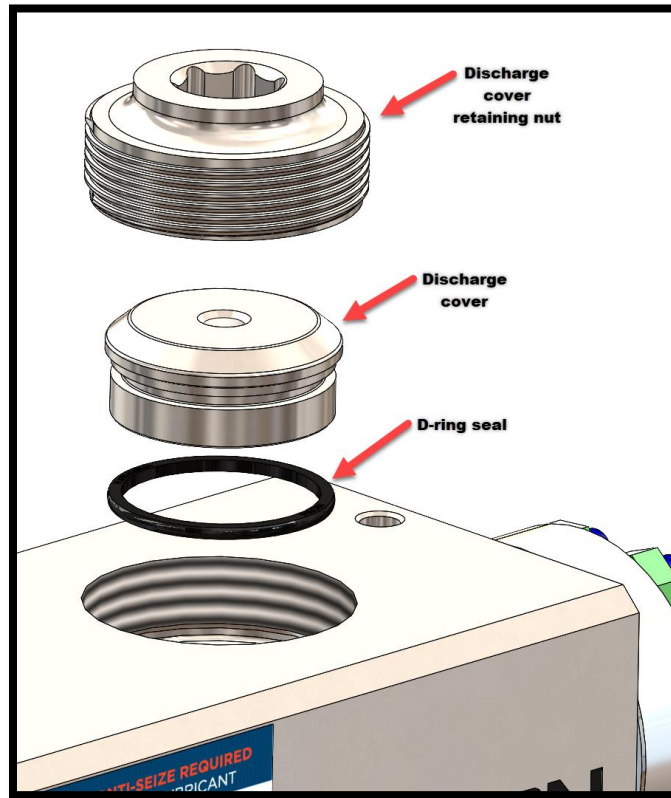


Figure 11: Discharge cover retaining nut exploded view

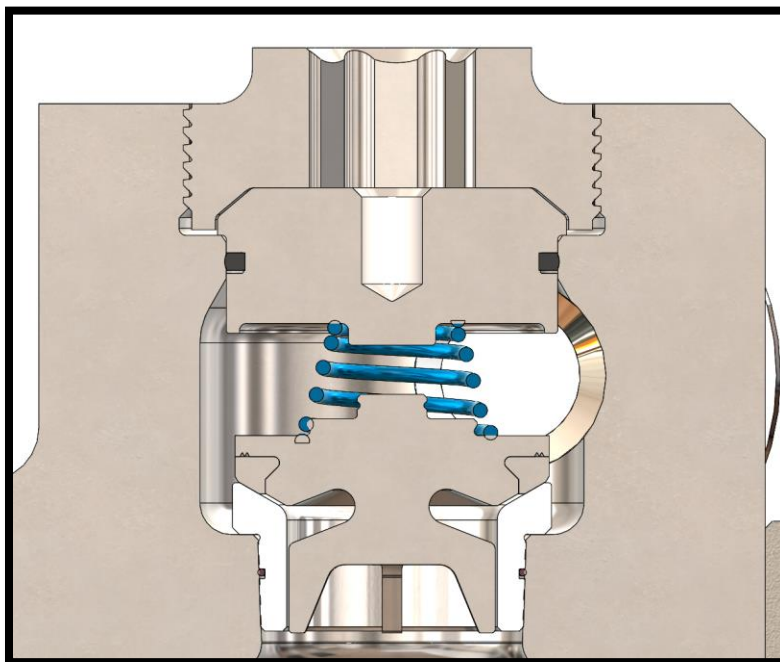


Figure 12: Discharge cover & retaining nut cross section view fully assembled into fluid end

5. DISCHARGE FLANGE INSTALLATION

INSTALLATION STEPS

1. Thoroughly clean the mating bore in the fluid end that the discharge flange boss will slide into. The bore must be clean and free from any sand or other debris before proceeding to the next step.
2. Apply grease and install the D-ring seal onto the discharge flange groove. Apply a coating of grease to the seal and mating bore of the fluid end before proceeding to the next step.

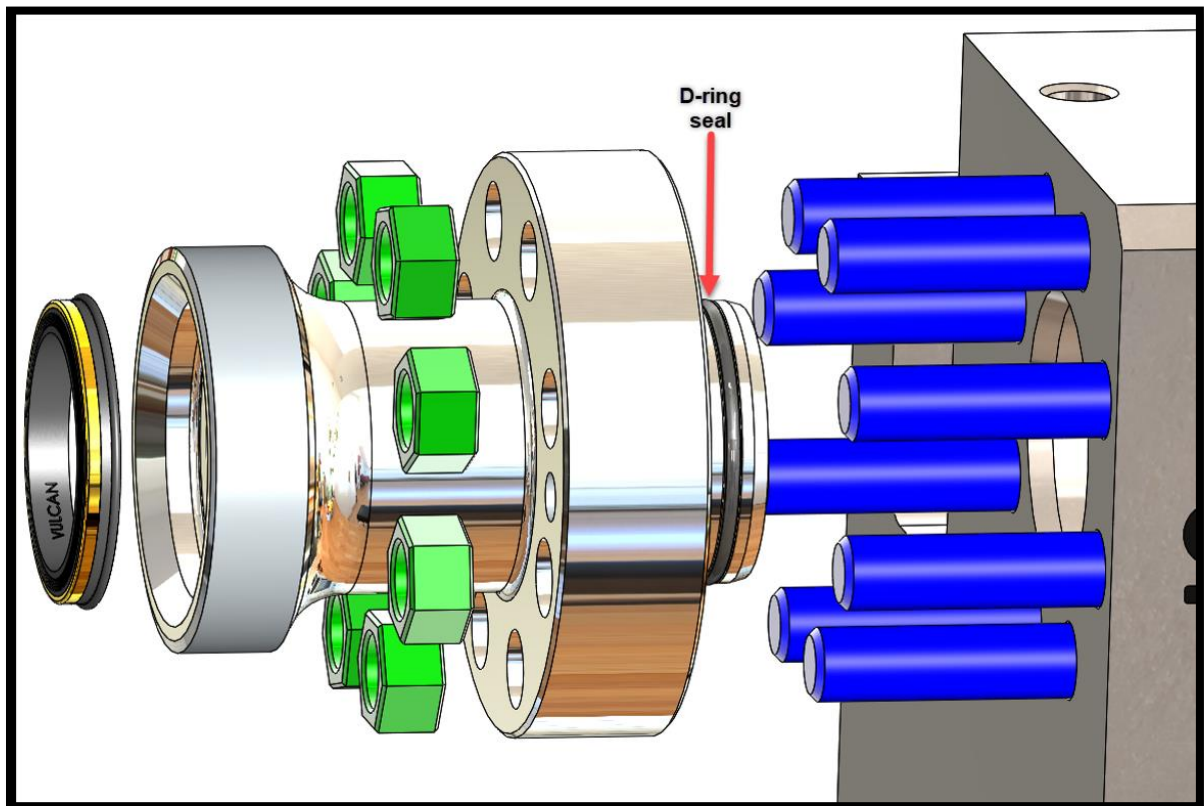


Figure 13: Discharge flange exploded view

3. Slide the discharge flange onto the studs and push the flange in until it is fully seated against the fluid end.
4. Thread on all hex nuts by hand; studs and nuts are Xylan coated, no anti-seize is required.

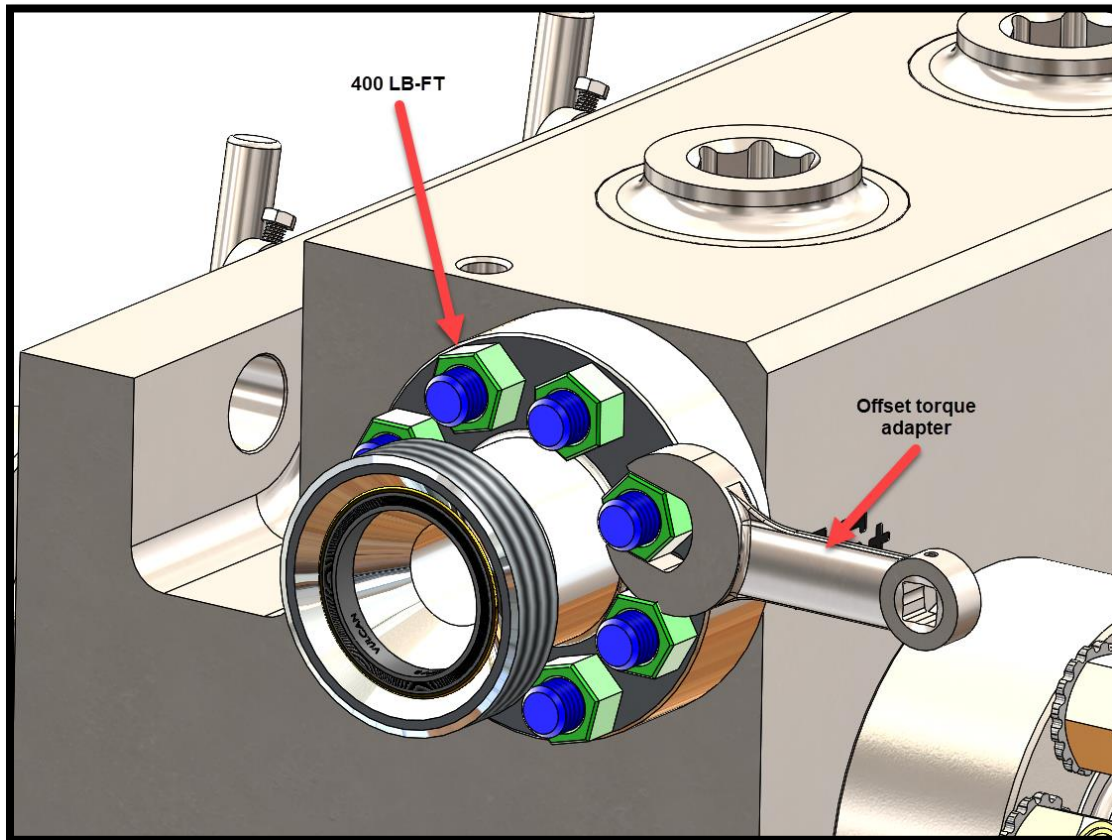


Figure 14: Discharge flange assembled onto fluid end

5. Torque down all the hex nuts working in a star pattern to **400 lb-ft**. Due to the small diameter of the bolt circle pattern and limited clearance, the use of a special offset torque adapter may be required. Contact VULCAN for this tool. Witness mark the nut with a paint pen to indicate that final torque value has been applied to the nut.

6. PACKING BORE WEAR SLEEVE INSTALLATION

INSTALLATION STEPS

1. Thoroughly clean the mating bore in the fluid end that the wear sleeve will slide into and the threaded portion of the fluid end. The bore and threads must be clean and free from any sand or other debris before proceeding to the next step.
2. Apply a light coating of grease to the mating bore. VULCAN recommends using red or blue high-pressure automotive grade grease or equivalent.

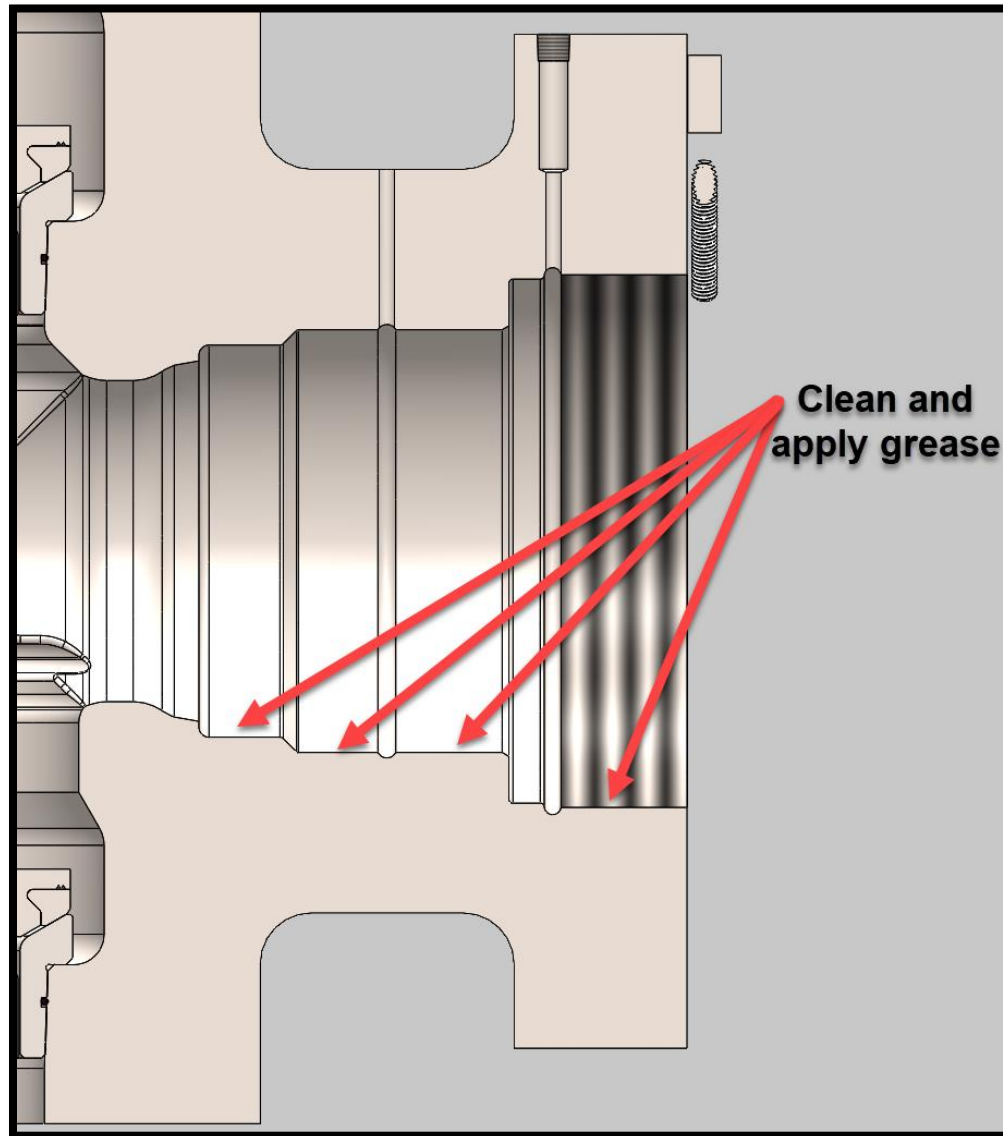


Figure 15- Fluid end wear sleeve bore

3. Lightly grease the wear sleeve seal and install the seal onto the pocket cut into the nose of the wear sleeve. Lightly grease the entire outer surface of the wear sleeve and install the wear sleeve O-ring onto the end of the wear sleeve. Slide the wear sleeve into the bore of the fluid end and push it forward as far as possible by hand. A dead blow hammer or rubber mallet may be used to aid in knocking the wear sleeve into the bore. Hit the wear sleeve in a circular pattern to work it into the bore. The wear sleeve will stop progressing forward into the bore when the seal at the nose of wear sleeve reaches the mating bore of the fluid end. Proceed to the next step when this occurs.

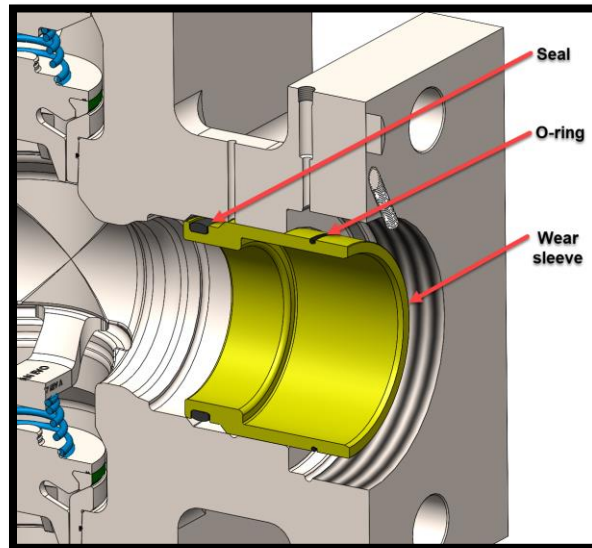


Figure 16: Wear sleeve partially inserted into fluid cylinder bore

4. Apply TS-801 moly lubricant anti-seize or equivalent to the male external threads of the wear sleeve retainer. Begin threading the wear sleeve retainer in by hand.

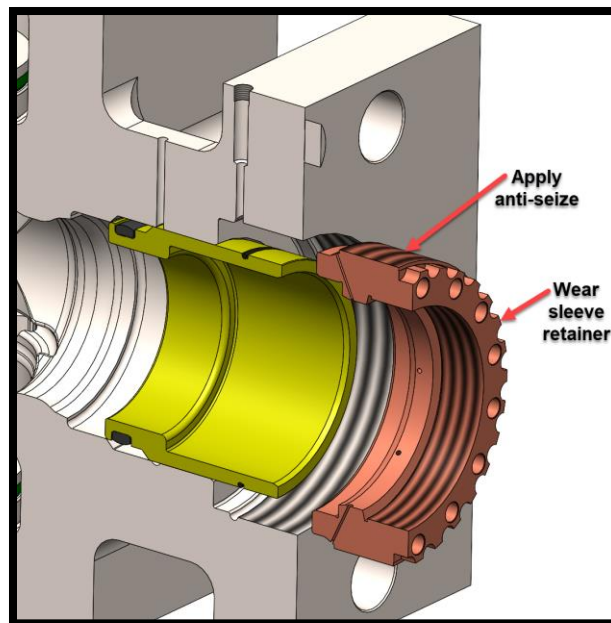


Figure 17: Wear sleeve retainer

5. Using the wear sleeve retainer spanner wrench tool in conjunction with a 1-Inch square drive ratchet wrench, thread the wear sleeve retainer into the bore. The wear sleeve will be fully seated into the fluid end bore during this step. Stop tightening the wear sleeve retainer in when it bottoms out. There is no need to overtighten the wear sleeve

retainer. Install the anti-rotation lock onto the fluid end. Tighten down the anti-rotation locking bolt, placing the end of the bolt into a groove located between the 12 and 1 o'clock position.

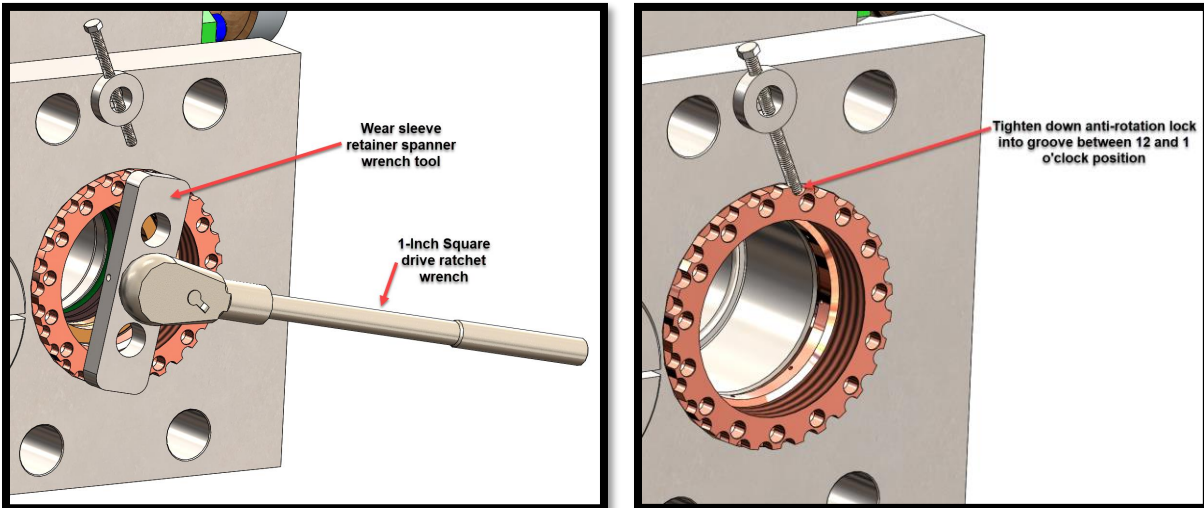


Figure 18: Wear sleeve retainer installation & anti-rotation lock

6. Apply grease to the inside of the wear sleeve bore and install the junk ring, packing and brass into the wear sleeve bore.

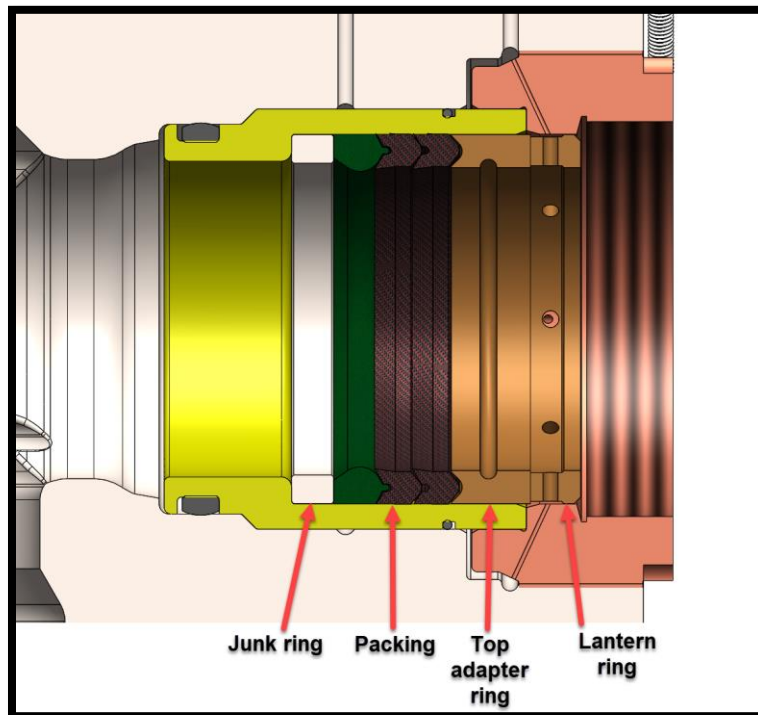


Figure 19: Packing bore cross section showing wear sleeve and packing set installed

7. Apply anti-seize to the packing nut threads and thread in the packing nut hand tight. Apply grease to the back tapered end of the plunger and slide it into the packing bore from the front side of the fluid end, knocking it through the packing bore with a brass bar. Using the packing nut bar, tighten the packing nut 1/4 turn past snug tight. Install the packing nut locking bar into the hole closest to the 12 o'clock position on the packing nut.

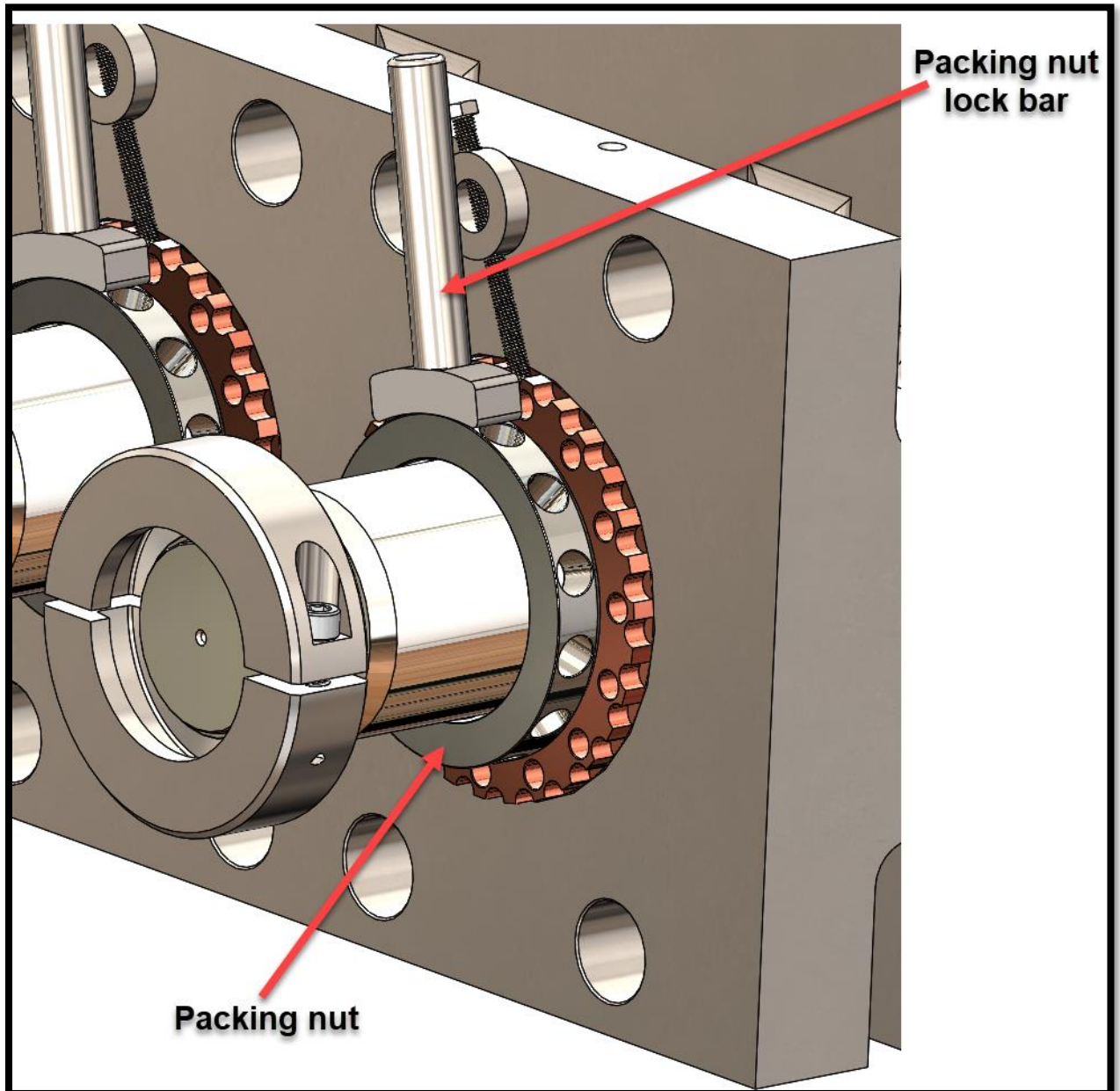


Figure 20: Packing Bore in fully assembled state

7. PACKING BORE WEAR SLEEVE REMOVAL PROCEDURE

REMOVAL STEPS

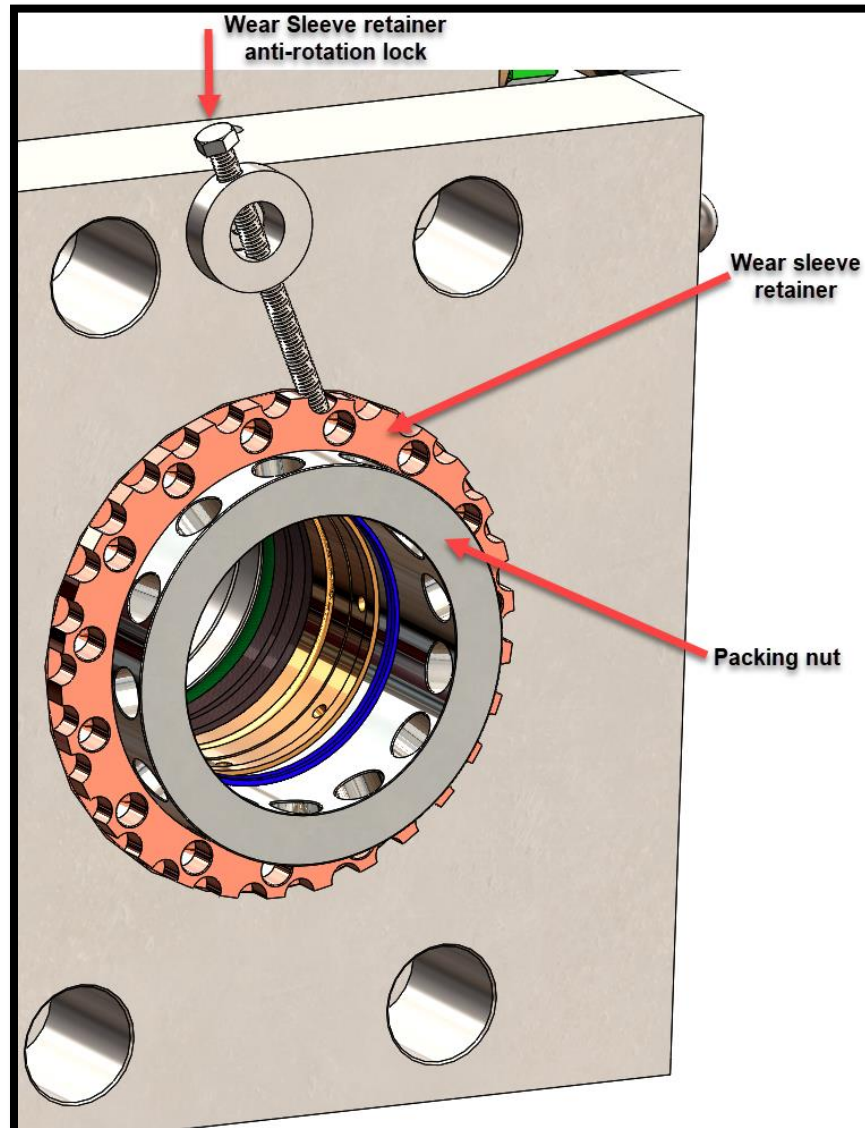


Figure 21: Backside view of fluid End - Wear sleeve retainer

1. Remove the packing nut locking bar and plunger from the fluid end and unthread the packing nut from the wear sleeve retainer. It is unnecessary to remove the packing and brass from the wear sleeve bore. It may remain installed during this removal procedure.
2. Loosen the wear sleeve retainer anti-rotation lock by backing out the threaded bolt halfway so it disengages the slots on the outer diameter of the wear sleeve retainer.

- Using the wear sleeve retainer spanner wrench tool in conjunction with a 1-Inch square drive ratchet wrench, unthread the wear sleeve retainer from the bore.

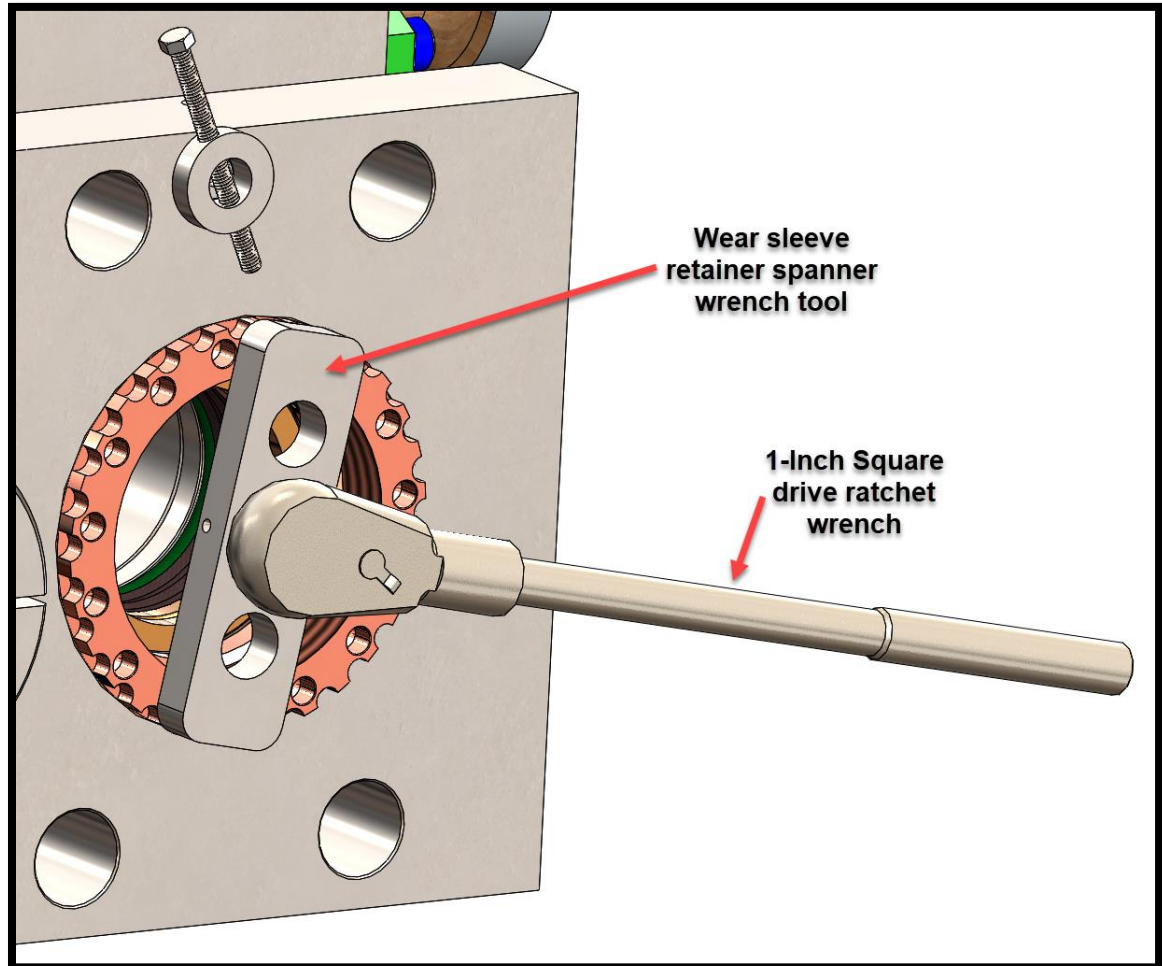


Figure 22:Wear sleeve retainer removal

- The wear sleeve may be removed from knocking it free from the bore from the front side of the fluid end using a brass bar or similar. Using a brass bar or other non-marring tool and working from the front side of the fluid end position the brass bar so it catches the front edge of the wear sleeve. Strike the front edge of the wear sleeve and working in a circular pattern, knock the wear sleeve free from the fluid end bore.

Alternatively, a pusher type tool may be used for removing the wear sleeves from the bore as shown in figures 23 & 24. The tool has a power screw drive that can be driven with an impact gun to push the sleeve free from the packing bore. Contact VULCAN for this tool.



Figure 23: Wear Sleeve Removal Tool

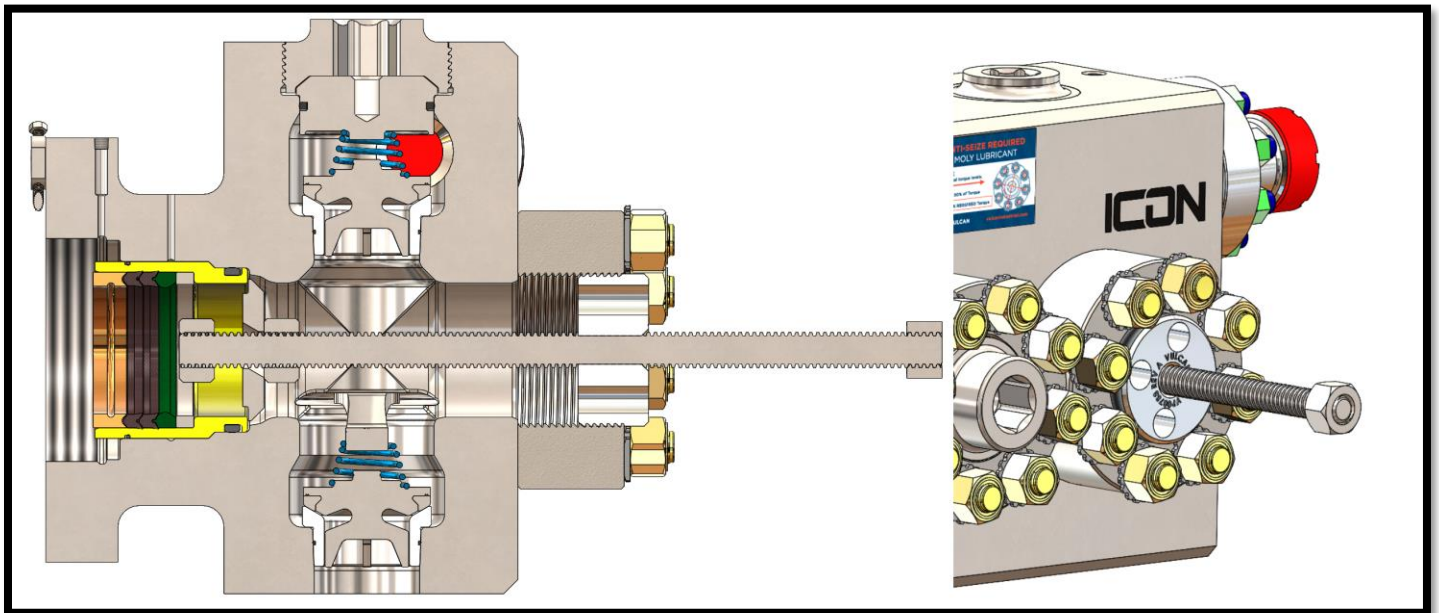


Figure 24: Wear Sleeve Removal Tool Installed in Fluid end

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	VTSB00008 REV D	10/6/20

8. MAINTAIN FLUID END RELIABILITY AND MAXIMIZE FLUID END LONGEVITY WITH GENUINE VULCAN REPLACEMENT PARTS

Instructions for Ordering Parts:

VULCAN replacement parts are available directly through our manufacturing facility or regional service centers. When ordering parts, specify the fluid end part number stamped on the right-hand side of the fluid end, serial number or preferably the part number of the component needing to be replaced.



For additional information contact:

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