



SOUTHWEST
OILFIELD PRODUCTS, INC.

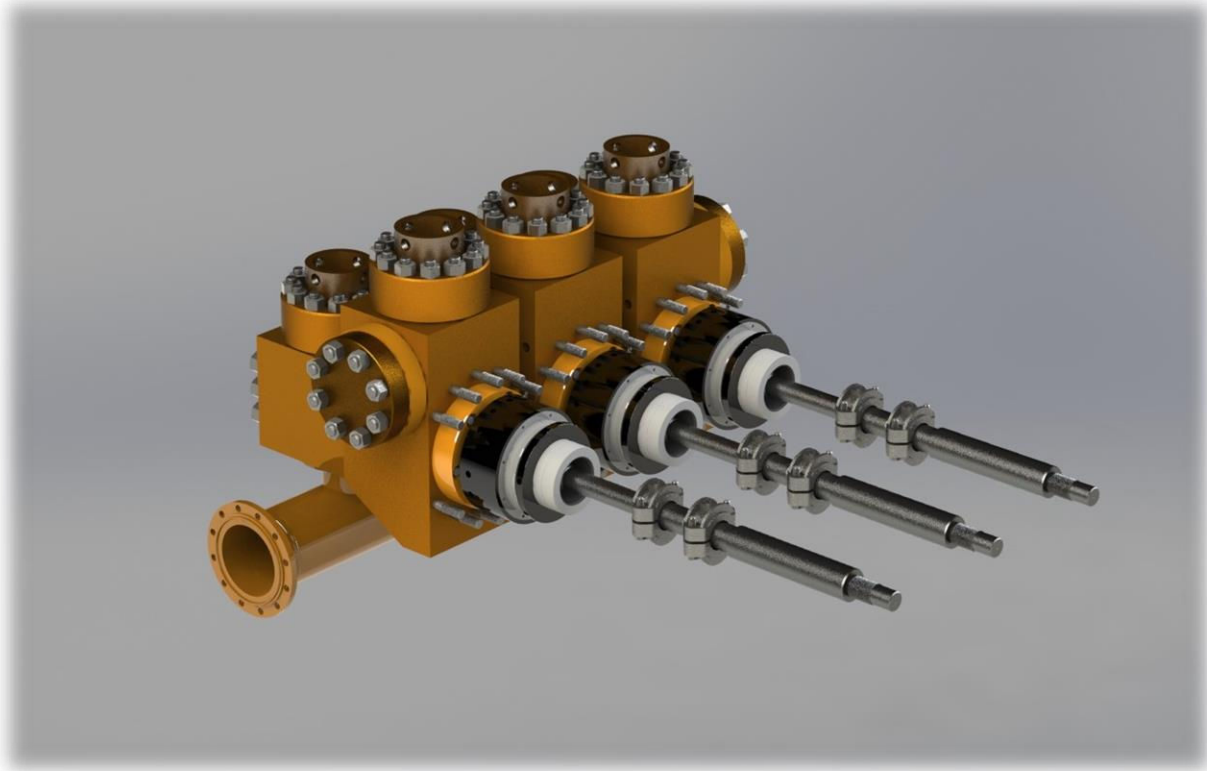
INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS
FOR THE SOUTHWEST 6576-22A NATIONAL 12-P-160
HYDRAULIC LINER RETAINER SYSTEM



online at www.swoil.com and www.swoparts.com

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***SOUTHWEST L-SHAPED 12-P-160 MUD PUMP
SHOWN WITH SOUTHWEST HYDRAULIC LINER RETAINERS INSTALLED***

OVERVIEW

The 6576-22A hydraulic liner retainer (HLR) is a patented device (Patent No. US 6,209,445) that replaces screw-type manual liner retainers and provides a safe and easy-to-use procedure for changing liners, liner seals, and wear plates in National 12-P-160 mud pumps.

This HLR was designed to fit OEM fluid ends as well as Southwest 8476-4A (5,000 PSI) fluid ends, 8476-9A (6,000 PSI) fluid ends, and 8476-25A (7,500 PSI) fluid ends and is engineered to use the Southwest 1376 liner equipped with Grayloy or Zirconia liner sleeves.

This unit operates using a pair of high-strength Bellville conical spring washers to retain the liner against the wear plate. When the liner must be removed, hydraulic pressure is supplied to the unit by a high-pressure air-over-oil pump. The hydraulic pressure drives the HLR's piston to compress the Bellville springs thus allowing the liner to be safely removed. When a new liner is installed, hydraulic pressure is released and the Bellville springs return to their natural state to retain the liner against the wear plate.

No hammer wrenches or cheater bars are required for the operation of the HLR system. The air-over-oil pump is set at the factory to provide the exact pressure needed for energizing the springs so that no risky guesswork is needed during the liner change-out process.



GENERAL SAFETY

- Pump repair work should be performed only by authorized and trained service personnel.
- Instructions contained in this manual should be thoroughly understood and respected. If questions arise, call Southwest Oilfield Product's service or engineering departments.
- Pumps should be completely safe before any repair work is allowed; this includes
 - Disengaging the pump's power source (**FAILURE TO DO THIS MAY RESULT IN SERIOUS DAMAGE TO PERSONNEL AND/OR EQUIPMENT!**)
 - making sure the pump and ALL ACCESSORY EQUIPMENT are non-operational
 - depressurizing the fluid end modules and hydraulic flow lines
- Sufficient cooling time of parts involved in maintenance/installation should be provided prior to servicing.
- ALWAYS use the rig hoist, lifting appliance or jib crane to lift items over 40 lbs.



****NOTE: the hydraulic liner retainer assembly weighs 378 lbs.****

- Hydraulic pumps to be used in installation/maintenance should be routinely calibrated.
- Work area should be adequately lit and ventilated to ensure optimum working conditions.
- Proper safety attire should be worn by all personnel in the vicinity of the work area; this includes
 - Eye protection against solid and liquid objects which may suddenly come loose
 - Foot protection against cuttings, hot/cold liquids, and dropped objects
 - Hand protection against sharp edges, mineral oils, and for handling cumbersome loads

INSTALLATION

To install the Southwest 6576-22A Hydraulic Liner Retainer (HLR) system, perform the following steps:

NOTE: *If installing HLR systems on an existing pump which uses conventional liner retainers, remove the old liner retainer systems and discard them. They will not be needed for this HLR system.*

1. Inspect the new parts for debris and clean if necessary.
2. Remove the old wearplate and wearplate seal from the discharge module and clean the area.
3. Mount the 6476-1 flange to the discharge module using the six 4021-20 ferry head cap screws provided with the kit.
 - Cap screws should be lubricated with an anti-seize type such as Southwest High-Pro 4000 or NeverSeez®.
 - **Torque to 966 foot-pounds.**
4. Grease and install a new wearplate and wearplate seal.



5. Lubricate the flange threads and install the pre-assembled 6576-22A HLR. Tighten the housing (6576-23-2) with the tightening bar (6576-22ATBAR) to ensure a snug fit against the wearplate.

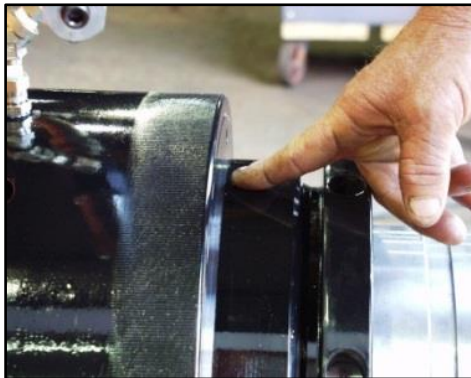


6. Remove the pipe plug nearest to the top of the retainer housing and install the hydraulic pressure hose and hose connector.



7. Pressure the system up to approximately 3200 psi. DO NOT EXCEED 3200 psi. Watch your gauges closely; when the pressure nears this mark, the pop-off valve will open and hydraulic fluid will release – this is the indication that the system has reached its pre-set limit.

- Notice that the hydraulic liner piston has moved outward by approximately 1/4"; this indicates that the spring washers have contracted and the nut (6576-23-4) can now be unscrewed.



8. Inspect and clean the new liner and liner seal before installing the seal into the liner.

9. Slide the liner seal-end first into the hydraulic liner retainer system until it touches the wearplate.

10. Screw the nut on and tighten with the bar provided in the tool kit.

11. Release system pressure.

12. Repeat Step #7.



13. Tighten the nut.

14. Depressurize.

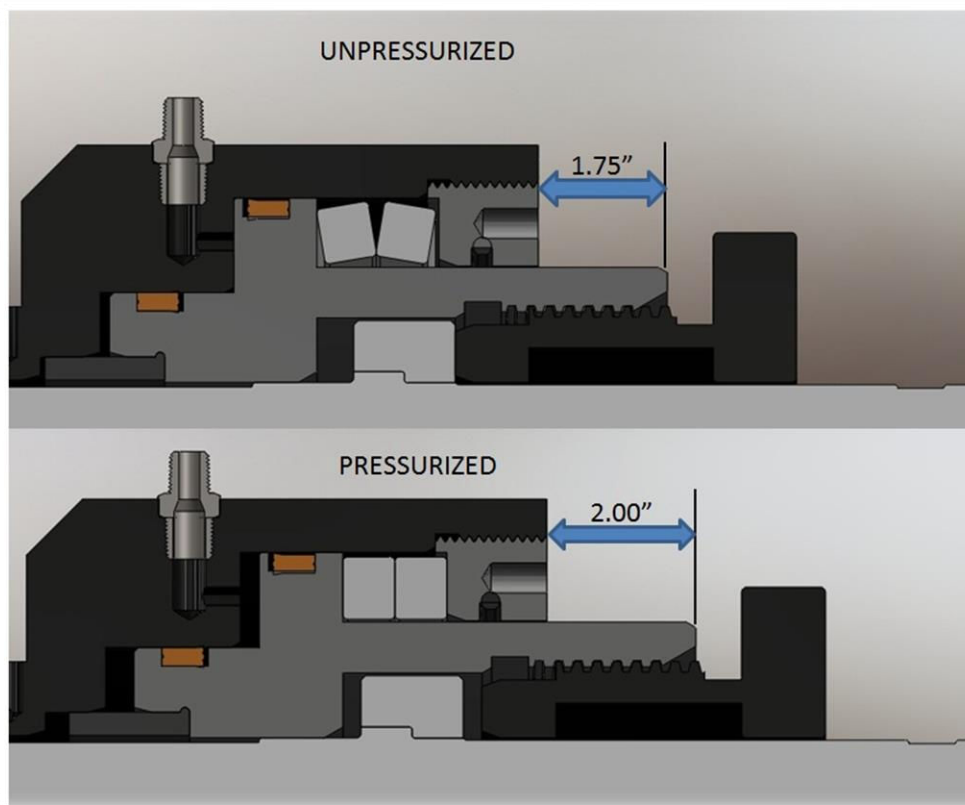
15. Leave the hose connector installed and the dust cap tightened.

The liner is now held securely in place and the system is ready for pumping.

CHANGING A LINER

To change the liner, perform the following steps:

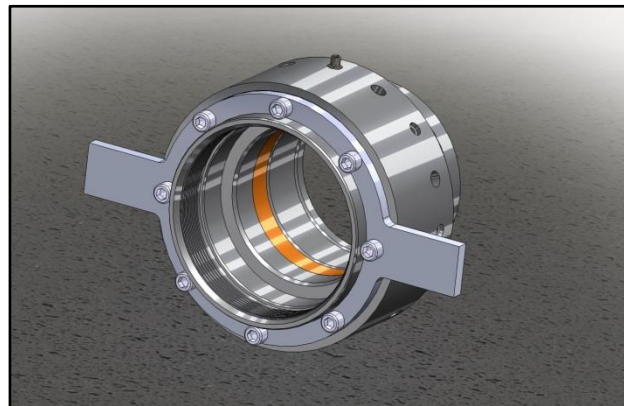
1. Shut down the mud pump and depressurize the hydraulic fluid lines.
2. If the hose connector has been removed from the HLR housing, remove the pipe plug in the port closest to the top and reinstall the hose connector.
3. Connect the hose to the connector and pressure the hydraulic liner retainer system up to approximately 3200 psi.
 - DO NOT EXCEED 3200 psi. Watch your gauge(s) closely: when the pressure nears this mark, the pop-off valve will open and hydraulic fluid will release indicating that the system has reached its pre-set limit.
4. Notice that the hydraulic liner piston has moved outward by approximately 1/4" – this indicates that the spring washers have been compressed and the nut can now be unscrewed.
 - The nut threads may need to be loosened with the tightening bar; after a few slight turns, the nut should easily turn by hand.



5. Remove the nut.
6. Clean the bore area of the hydraulic liner retainer and re-apply lubrication as necessary.
7. **MAKE SURE THE NEW LINER AND LINER SEAL ARE CLEAN.** Install the new liner seal, and slide the new liner in until it contacts the wearplate.
8. Screw the nut back in to the piston. Use the tightening bar if necessary to ensure a snug fit.
9. Release the system pressure. The liner is now held securely in place.

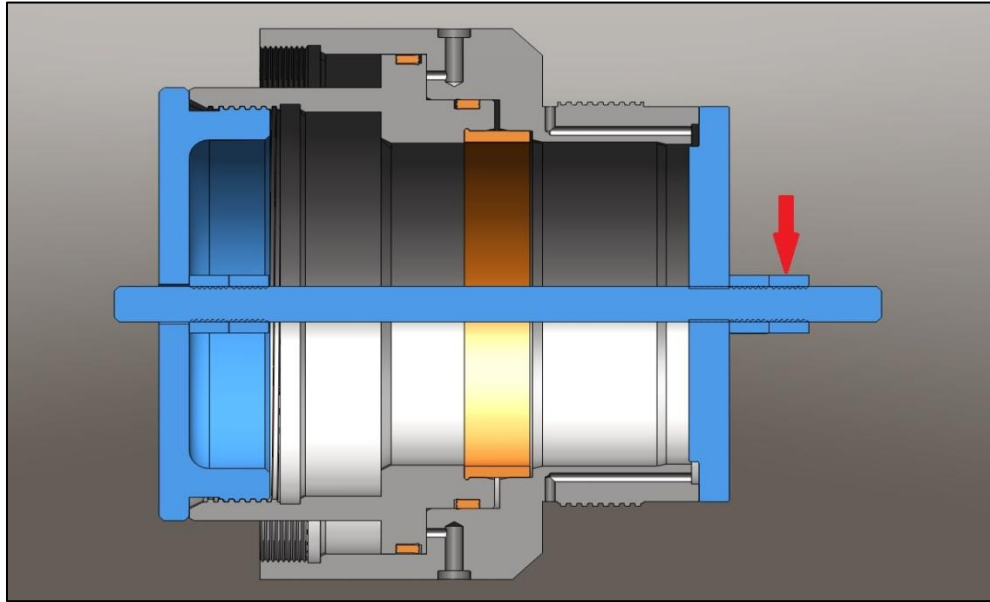
DISASSEMBLY

- Connect the hydraulic pump hose to the hose connector on the liner retainer housing; pressure the system up to no more than 3200 PSI.
- Remove the nut.
- Remove the liner.
- Depressurize the system.
- Remove the housing assembly from the pump and over to a CLEAN work area. Set the assembly down on its smaller end (piston facing UP).
- Insert the pins of the spring retaining ring removal tool (6576-22ASRRRTA) into the spring retaining ring (6576-22-5) and use a soft hammer to loosen and unscrew the ring from the housing.



- Remove the two spring washers from the assembly.
- Remove the piston from the assembly (see illustration below).
 - Tilt the assembly onto its side.
 - Thread the draw-in plate (6576-22ADP) into the piston.
 - Thread two (2) of the 1"-8 heavy hex nuts onto one end of the pulling screw; allow a few inches of space between the nut and the end of the screw.
 - Insert the pulling screw through the housing assembly so that the nuts are INSIDE the draw-in plate.

- Slide the bottom plate (6576-22ABP) over the other end of the pulling screw until it is flush with the housing; thread the remaining two (2) 1"-8 heavy hex nuts onto the pulling screw (note that these should be OUTSIDE of the bottom plate).
- Twist the outer screw (red arrow below) clockwise; this action forces the pulling screw to move in towards the assembly thereby pushing the draw-in plate outward.

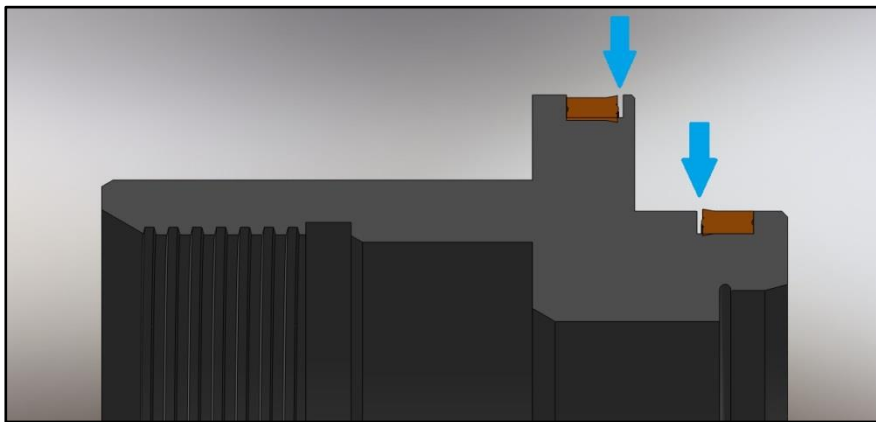


- Replace seals and spring washers as necessary.

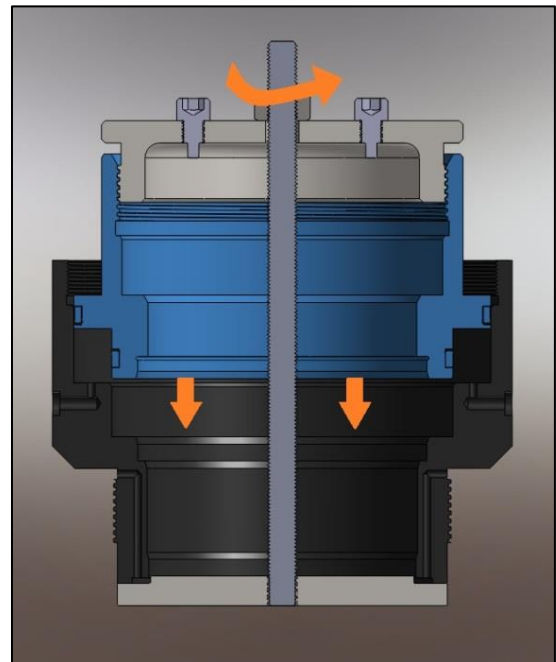
ASSEMBLY

MAKE SURE ALL PARTS ARE CLEAN AND FREE OF NICKS AND BURRS BEFORE RE-ASSEMBLING THE HYDRAULIC LINER RETAINER SYSTEM

1. Make sure the piston (6576-23-3) is clean and free of debris.
2. If the seals (6576-23-9 and 6576-22-10) are not already installed, install them now.
 - Greasing the seals will help them to slide on easier.
 - NOTE the position of the seals – lips should be facing each other (see illustration below).

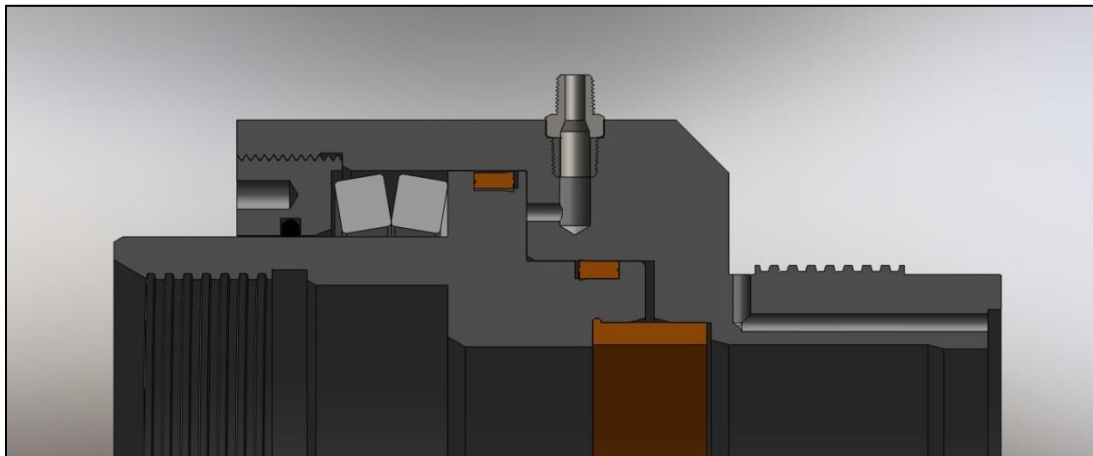


3. Install the two lifting eye bolts (6576-22AEB) in the draw-in plate (6576-22ADP), then insert the plate into the piston.
4. Set the bottom plate (6576-22ABP) on a work surface, smaller end up; place the smaller end of the housing (6576-23-2) onto the bottom plate.
5. Coat the inside of the housing with Enerpac® hydraulic fluid.
6. Remove one of the NPT pipe plugs from the housing – if this is not done, air will become trapped



between the piston and housing and the piston will not install correctly.

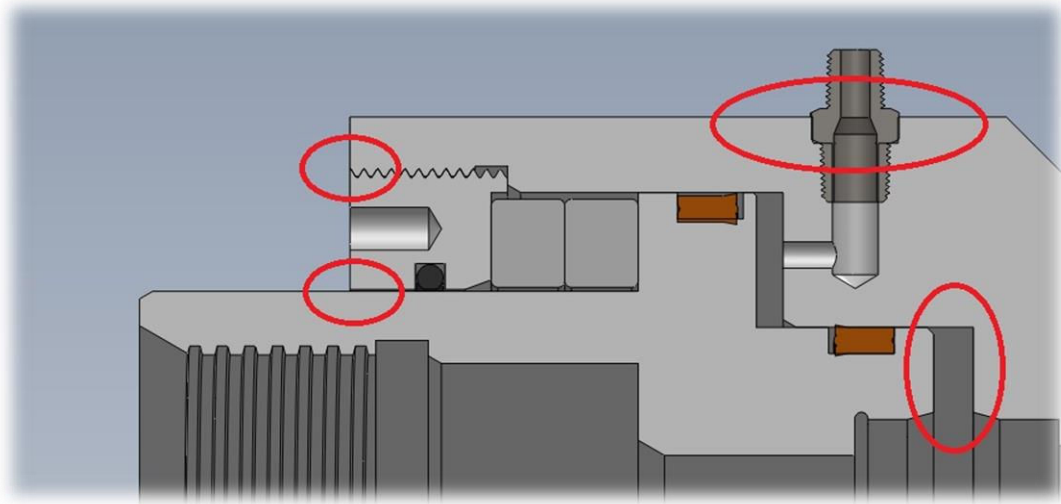
7. Slide the piston into the housing as far as it will naturally go.
8. Twist the draw-in plate into the piston.
9. Insert the pulling screw through the holes in the top and bottom plates.
10. Slide the round conveyor bearing (supplied with the kit) over the pulling screw and then twist the heavy hex nut to evenly install the piston into the housing. Continue twisting the nut until the piston comes into contact with the housing.
11. Remove the plates, nut, bearing, and threaded rod.
12. Install the Bellville springs EXACTLY AS SHOWN BELOW.
 - Positioning of the springs relative to each other is critical because this determines the amount of force they will generate when pressurized.
13. Insert the 568-454 O-ring into the spring washer retaining ring (6576-22-5) before installing the retaining ring.
14. Install the polyurethane seal protector last (see illustration below); this may be done either before or immediately after the hydraulic liner retainer assembly is mounted to the flange.



TESTING/TROUBLESHOOTING

To test the hydraulic liner retainer system:

1. Uninstall the housing assembly from the retainer flange and move it into a designated repair area.
2. Clean the area around the spring retaining ring, the pipe plugs, and the gap between the piston and housing (see areas in red in the illustration below).
3. Pressure the system up to – but DO NOT EXCEED – the rated PSI limit.
4. DO NOT remove the hose connector or pipe plugs during this time.
5. Set a timer for 15 minutes.
6. Check for leaks around the spring washer, in the bore of the housing, and around the pipe plugs (see areas in red in the illustration below).
 - a. If leaks are found at any point during the test, depressurize the assembly and replace the seal(s) which caused the leak(s).
 - b. Start the test over; observe the re-pressurized system for another 15 minutes.



7. If no leaks are found during the 15-minute test interval, the unit may now be re-installed onto the pump.

****NOTE: if repairs are necessary, they may be performed in the field; however, it is recommended that the hydraulic liner retainer system be returned to Southwest Oilfield Products, Inc.****

PARTS LISTS

PARTS LIST FOR 6576-22A HYDRAULIC LINER RETAINER SYSTEM

ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	6576-23-2	HOUSING	1
2	6576-22-5	SPRING RETAINING RING	1
3	6576-22-6	SPRING	2
4	6576-23-3	PISTON	1
5	6476-1	LINER RETAINER FLANGE	1
6	6576-23-4	GLAND NUT	1
7	6576-23-9	PISTON SEAL (SMALLER)	1
8	6576-22-10	PISTON SEAL (LARGER)	1
9	568-454	O-RING	1
10*	1376	LINER	1
11	0.25-NPT	¼-18 NPT PIPE PLUGS	8
12	4021-20	LINER RETAINER STUD	6

**NOT INCLUDED IN 6576-22A, MUST BE ORDERED SEPARATELY*

PARTS LIST FOR 6576-22A TOOL KIT

ITEM NO.	PART NO.	DESCRIPTION	QTY.
13	6576-22ASRRRT	SPRING RETAINING RING REMOVAL TOOL ASSEMBLY	1
14	6576-22AEB	¾-10 EYE BOLT	2
15	HHN1000-8	1-8 HEAVY HEX NUT	1
16	6576-22ADP	PISTON DRAW-IN PLATE	1
17	6576-22APS	PULLING SCREW	1
18	6576-22ABP	BOTTOM PLATE	1
19	6576-22AS	SET SCREW FOR 6576-22ATK	8

APPENDIX: TOOLS, DRAWINGS, AND MISCELLANEOUS INFORMATION

VIEW OF EXPLODED ASSEMBLY

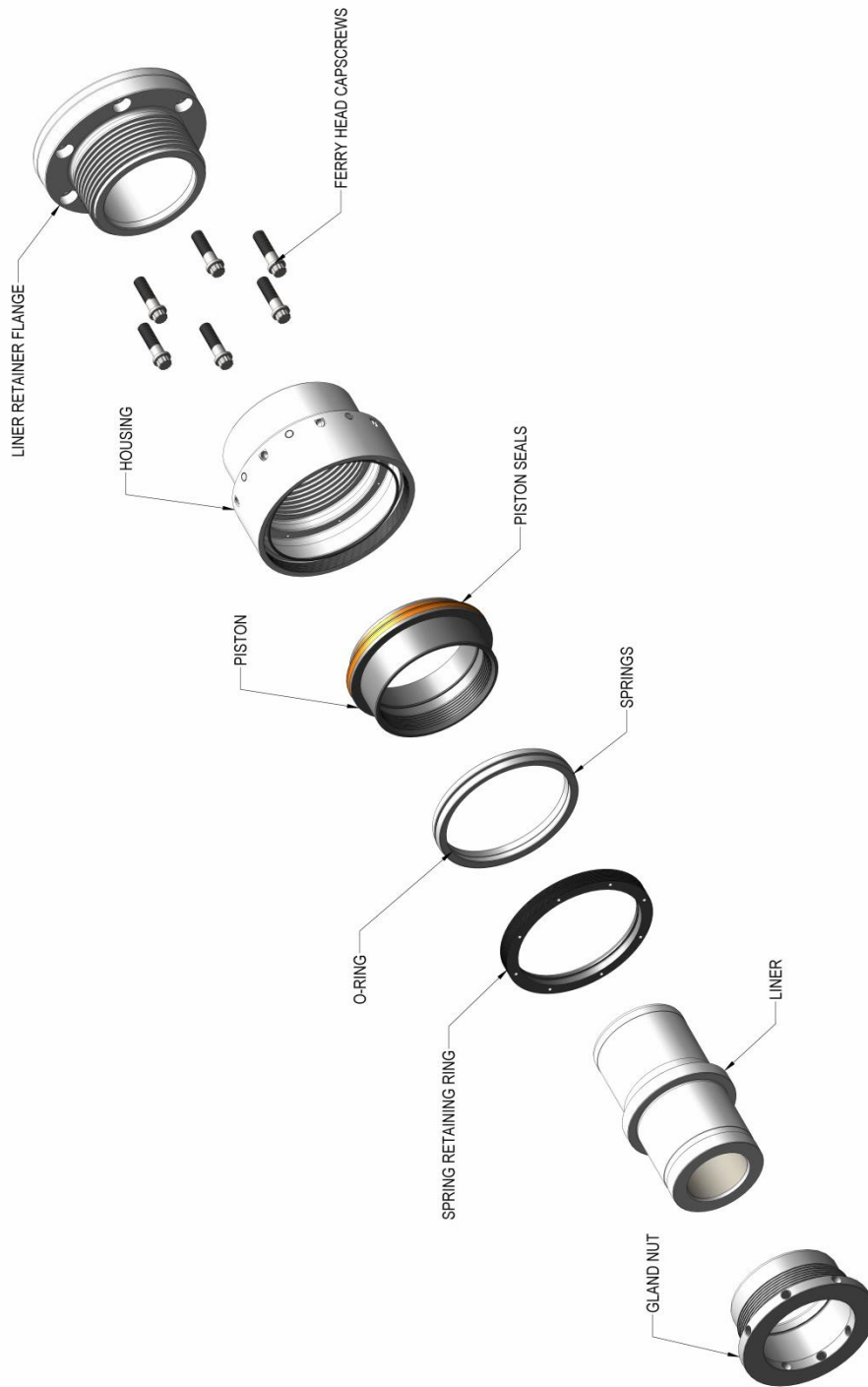
RECOMMENDED OIL AND SPARE PARTS

HYRAULIC LINER RETAINER ASSEMBLY BILL OF MATERIAL

TOOLS

PUMPING UNIT BILL OF MATERIAL





This shows the exploded view of all components in the hydraulic liner retainer assembly.
 (Note that seals were left in their installed positions for simplicity.)

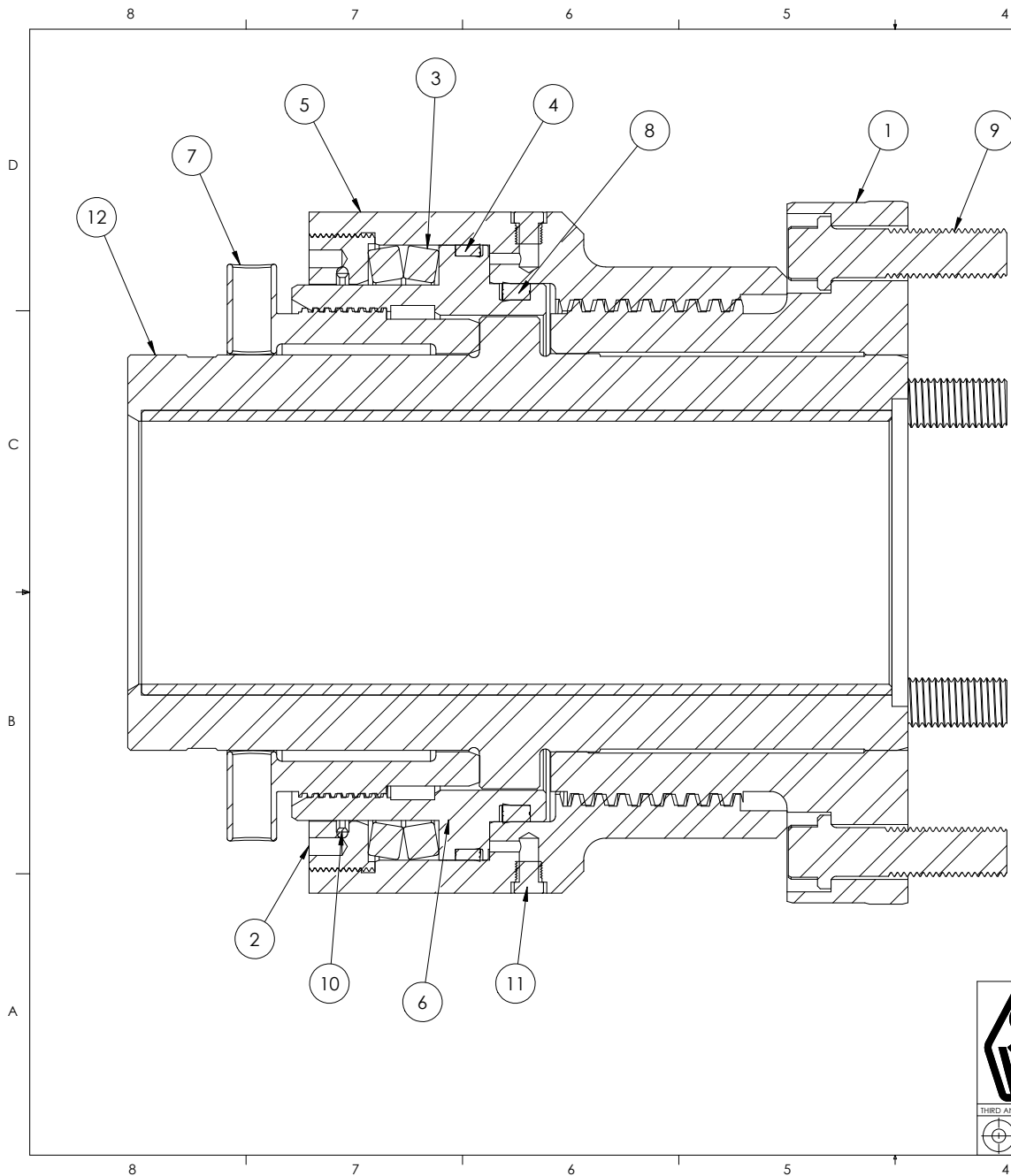
RECOMMENDED HYDRAULIC OIL

ENERPAC® OIL SPECIFICATION CHART	
Viscosity Index	100 min
Viscosity at 210 °F	42/45 S.U.S.
Viscosity at 100 °F	150/165 S.U.S.
Viscosity at 0 °F	<12,000 S.U.S.
API Gravity	31.0/33.0
Flash, C.O.C. °F	400
Pour Point, °F	-25
Aniline Point, °F	210/220
Paraffinic Base Color	Blue

RECOMMENDED SPARE PARTS

PART NO.	DESCRIPTION	QTY.
6576-22-6	BELLVILLE SPRING	2
6576-23-9	PISTON SEAL (SMALLER)	1
6576-22-10	PISTON SEAL (LARGER)	1
568-454	O-RING	1

REV.	DESCRIPTION	DATE
A	INITIAL RELEASE	02/17/2015
B	DELETED 568-447 & 2981-8-13 FROM SPARE PARTS LIST	09/09/2016
C	CORRECTED PISTON SEAL (LARGER) & PISTON SEAL (SMALLER) PART NUMBERS ON PAGE 17	10/31/2017



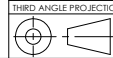
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	6476-1	LINER RETAINER FLANGE	1
2	6576-22-5	BELLVILLE SPRING RETAINING RING	1
3	6576-22-6	BELLVILLE SPRING	2
4	6576-22-10	LARGE PISTON SEAL	1
5	6576-23-2	HOUSING	1
6	6576-23-3	PISTON	1
7	6576-23-4	GLAND NUT	1
8	6576-23-9	SMALL PISTON SEAL	1
9	4021-20	LINER RETAINER STUD	6
10	568-454	O-RING	1
11	0.25-NPT	1/4-18 NPT PLUG	8
12	1376ZIR	LINER	1

NOTE:

LINER IS SHOWN (WITHOUT THE SEAL) IN THIS DRAWING FOR CLARITY. IT IS NOT PROVIDED WITH THE HYDRAULIC LINER RETAINER SYSTEM AND WILL NEED TO BE ORDERED SEPARATELY. REDRAWN FROM REV. B PRINT DATED 02/22/2000.



UNLESS OTHERWISE SPECIFIED:
 DIMENSIONS ARE IN INCHES
 TOLERANCES:
 FRACTIONAL $\pm 1/64$
 ANGULAR: $\pm 0.5^\circ$
 DECIMAL $+0.005 / -0.000$
 ALL FILLETS & RADII - $1/16$ MAX
 CHAMFERS $1/16 \times 45^\circ$ MAX
 SURFACE FINISH 125 RMS MAX
 CONCENTRICITY NOT TO EXCEED .005 T.I.R.
 BREAK SHARP CORNERS $1/32 \times 45^\circ$ MAX



THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SOUTHWEST OILFIELD PRODUCTS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SOUTHWEST OILFIELD PRODUCTS IS PROHIBITED.

DRAWN BY	DATE	SOUTHWEST OILFIELD PRODUCTS	
JM	08/11/2017	10340 WALLISVILLE ROAD, HOUSTON, TX 77013	
CHECKED BY	DATE	TITLE:	
EF	08/11/2017	HYDRAULIC LINER RETAINER FOR NATIONAL 12-P-160	
MATERIAL		SIZE	DWG. NO.
N/A		B	6576-22A
HEAT TREAT		REV.	A
N/A		SHEET 1 OF 1	

8 7 6 5 4 3 2 1

D

C

B

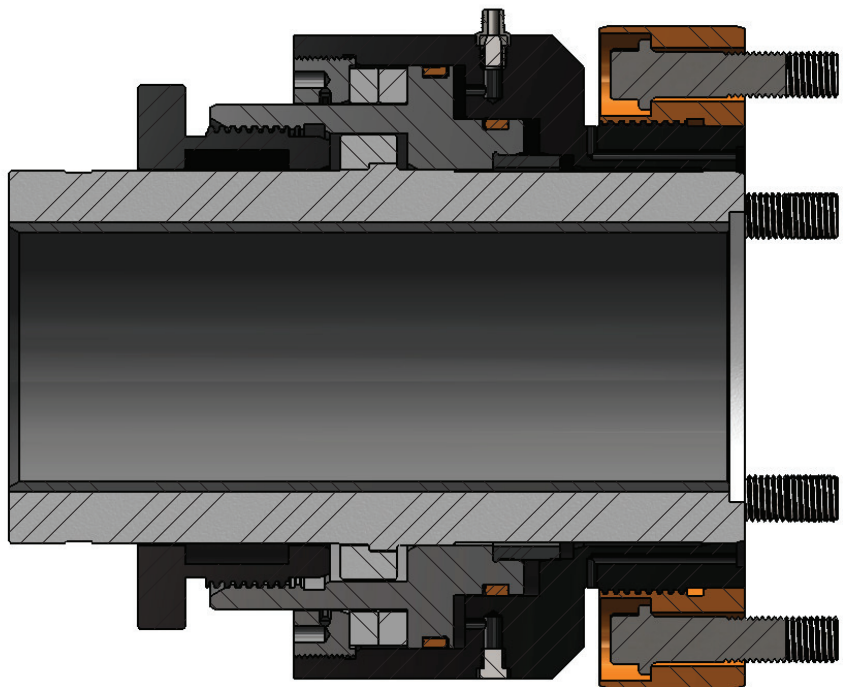
A

D

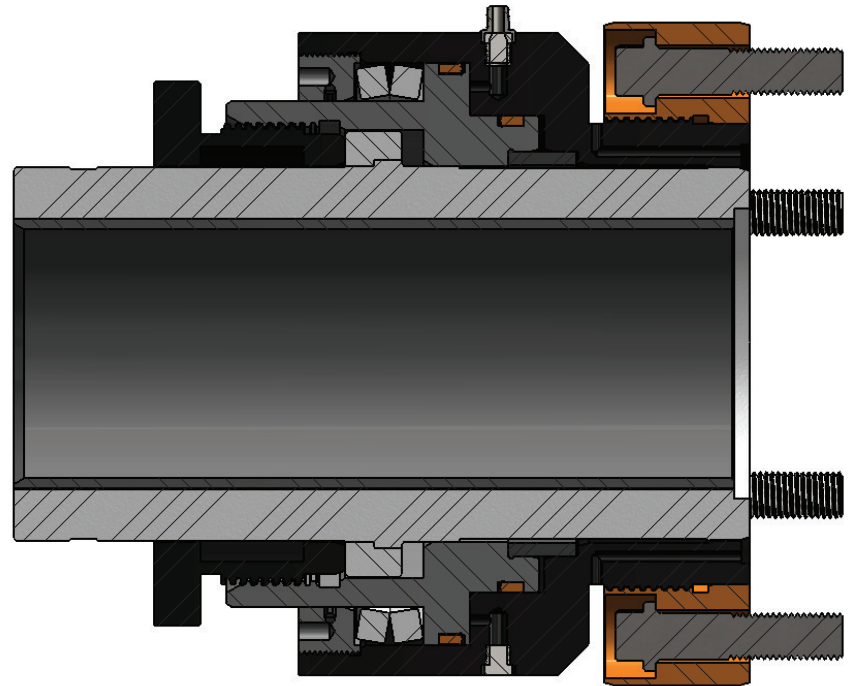
C

B

A



SPRINGS COMPRESSED



SPRINGS UNCOMPRESSED



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL $\pm 1/64$ ANGULAR: $\pm 0.5^\circ$ DECIMAL: $+0.005/-0.00$ ALL FILLETS & RADI: $1/16$ MAX CHAMFERS $1/16 \times 45^\circ$ MAX SURFACE FINISH 125 RMS MAX CONCENTRICITY NOT TO EXCEED 0.005 T.I.R. BREAK SHARP CORNERS $1/32 \times 45^\circ$ MAX	DRAWN	DATE	SOUTHWEST OILFIELD PRODUCTS 10340 WALLISVILLE ROAD, HOUSTON, TX 77013		
	BH	01/14/2013			
MATERIAL N/A HEAT TREAT N/A	CHECKED	DATE	TITLE: HYDRAULIC LINER RETAINER FOR NATIONAL 12-P-160		
	EF	01/29/2013			
THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SOUTHWEST OILFIELD PRODUCTS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SOUTHWEST OILFIELD PRODUCTS IS PROHIBITED.			SIZE	DWG. NO.	REV
			B	6576-22A	
			SHEET 2 OF 2		

8 7 6 5 4 3 2 1

8 7 6 5 4 3 2 1

15
HHN1000-8 HEAVY HEX NUT (QTY 1)

16
6576-22ADP PISTON DRAW-IN PLATE (QTY 1)


14
6576-22AEB 3/4-10 EYE BOLT (QTY 2)

17
6576-22APS PULLING SCREW (QTY 1)

19
6576-22AS SET SCREW (QTY 8)

13
6576-22ASRRRT SPRING RETAINING RING REMOVAL TOOL ASSEMBLY (QTY 1)

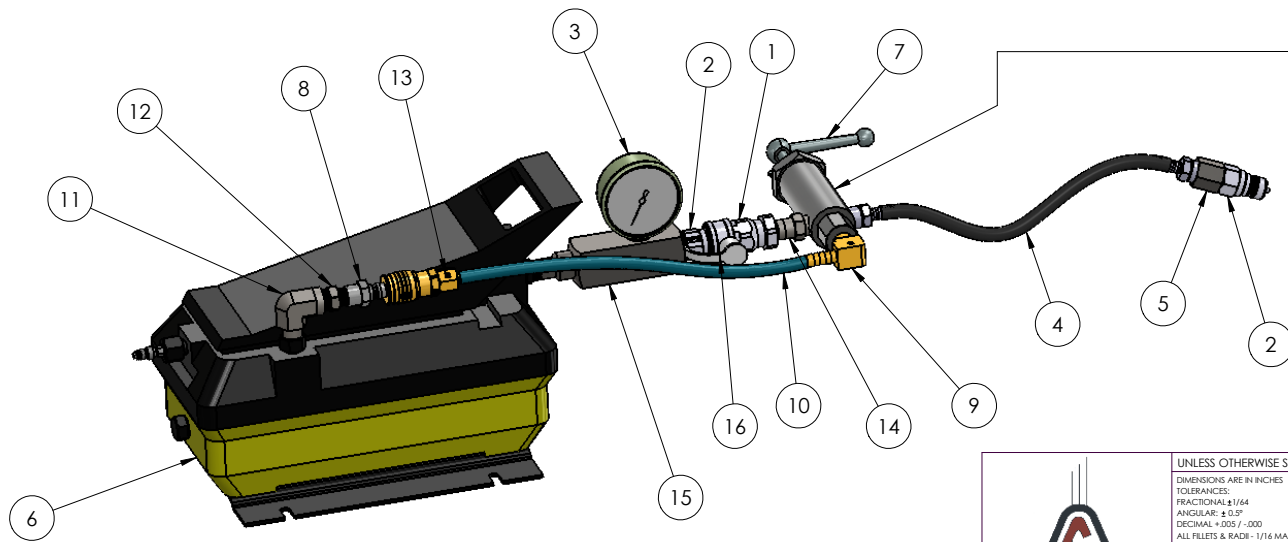
18
6576-22ABP BOTTOM PLATE (QTY 1)

	DRAWN BY	DATE	SOUTHWEST OILFIELD PRODUCTS 10340 WALLISVILLE ROAD, HOUSTON, TX 77013		
	EF	01/15/2013	TITLE: SPRING RETAINING RING REMOVAL TOOL ASSEMBLY		
	CHECKED BY	DATE	SIZE	DWG. NO.	REV.
MG	06/16/2014	B	6576-22ATK	B	
<small>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SOUTHWEST OILFIELD PRODUCTS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SOUTHWEST OILFIELD PRODUCTS IS PROHIBITED.</small>			SHEET 1 OF 1		

8 7 6 5 4 3 2 1

HYDRAULIC POWER SYSTEM - PLUMBING FOR INSTALLATION AND REMOVAL OF LINER RETAINERS (BILL OF MATERIAL #6600-20-3-BM)

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.	VENDER P/N (FOR REFERENCE ONLY)
1	6600-20-1-1	QUICK DISCONNECT, 10000 PSI, FEMALE HALF, 3/8 FNPT	2	ENERPAC CR-400
2	6600-20-1-2	QUICK DISCONNECT, 10000 PSI, MALE HALF, 3/8 MNPT	2	ENERPAC CH-604
3	6600-20-1-4	GAUGE 2 1/2" DIA., 0-10000 PSI, 1/4 MNPT	1	ENERPAC G2535L / GRAINGER 3KD57
4	6600-20-1-5	HOSE, 10000 PSI, 15 FT (3/8 MNPT BOTH ENDS)	1	ENERPAC H9210 / GRAINGER 3KD68
5	6600-20-1-6	PIPE ADAPTER, 1/4 MNPT TO 3/8 FNPT, 10000 PSI	1	ENERPAC FZ-1055
6	6600-20-1-8	TURBO AIR-POWERED PUMP, 10000 PSI	1	ENERPAC PATG-1102N
7	6600-20-1-10	HYDRAULIC PRESSURE RELIEF VALVE, 3/8 FNPT (PSI SET FOR PUMP)	1	ENERPAC V-152
8	6600-20-1-11	QUICK DISCONNECT WITH SHUT-OFF, 1/4 MNPT & 1/4 FNPT	1	GRAINGER 3KD28
9	6600-20-1-13	3/8 MALE BARB TO 3/8 MNPT FITTING ELBOW	1	MCMaster-CARR 53525K18
10	6600-20-1-14	POLYETHYLENE TUBING, 100 FT. ROLL, 3/8 ID X 1/2 OD	1	GRAINGER 4HL98
11	6600-20-1-19	3/8 X 3/8 STREET ELBOW	1	ENERPAC FZ-1616
12	6600-20-1-20	3/8 X 1/4 REDUCING PIPE NIPPLE	1	MCMaster-CARR 51205K133
13	6600-20-1-22	3/8 BARB X 1/4 FNPT	1	MCMaster-CARR 5346K35
14	6600-20-1-7	3/8 HEX NIPPLES (RATED FOR 10000 PSI)	1	ENERPAC FZ-1617
15	6600-20-1-3	GAGE ADAPTER, GAGE PORT 1/4 FNPT, 3/8 FNPT TO 3/8 MNPT	1	ENERPAC GA-3 / GRAINGER 3KD39
16	6600-20-1-18	DUST CAP	2	GRAINGER 3PCV2



RELIEF VALVE PRESSURE SET AT _____ PSI.

VALVES ARE PRE-SET AT FACTORY, **DO NOT TAMPER WITH SETTINGS.**

NOTES: CONNECT HOSE WITH RELIEF VALVE AND PLASTIC HOSE TO HYDRAULIC PUMP. CONNECT OTHER END TO HYDRAULIC LINER RETAINER CONNECTION.

INSTALL DUST CAPS ON ALL CONNECTIONS WHEN NOT IN USE.

AIR LINE TO PUMP SHOULD HAVE A REGULATOR, FILTER, AND LUBRICATOR. USE ONLY GENUINE ENERPAC HYDRAULIC OIL.

6600-20-1-15 ALTERNATE HYDRAULIC HAND PUMP AVAILABLE (ENERPAC P-39 / GRAINGER 4Z480)

6600-20-1-16 HYDRAULIC LINER RETAINER HOSE ASSEMBLY CONSISTS OF ITEMS 2 (2), 5, 7, 10, 11, 13, 14, 22



UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/64 ANGULAR: ± 0.5° DECIMAL: ±0.015 / -0.00 ALL FILLETS & RADII - 1/16 MAX CHAMFERS 1/16 X 45° MAX SURFACE FINISH 125 RMS MAX CONCENTRICITY NOT TO EXCEED 0.005 T.I.R. BREAK SHARP CORNERS 1/32 X 45° MAX	DRAWN	DATE	SOUTHWEST OILFIELD PRODUCTS 10340 WALLISVILLE ROAD, HOUSTON, TX 77013		
	BH	07/24/2013			
MATERIAL N/A	CHECKED	DATE	TITLE: HYDRAULIC LINER RETAINER FOOT PUMP ASSEMBLY		
	EF	02/07/2014			
HEAT TREAT N/A	THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF SOUTHWEST OILFIELD PRODUCTS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF SOUTHWEST OILFIELD PRODUCTS IS PROHIBITED.		SIZE B	DWG. NO. 6600-20-1-A	REV A
SHEET 1 OF 1					