



VSI-X PACKER

9-5/8" X 4-1/2"

Manual No:
DL-601-9625-518

Revision: **D**

Revision Date:
01/27/2020

Authored by: S. White

Approved by: B. Oligschlaeger

A) DESCRIPTION

The VSI-X Single String Double Grip Production Packer is one of the most versatile packers on the market today. The VSI-X is a modification of the popular ASI-X Packer with the added advantage of being able to set on electric line or hydraulically.

An On-Off Tool Stinger with a Wireline Plug installed can be attached to the top of the packer. The packer can then be lubricated in the hole and set under pressure. Once the packer is set, casing pressure can be bled off, and the tubing with the On-Off Tool Overshot is run and latched onto the packer. The wireline plug can then be retrieved.

This packer easily converts to a mechanically set ASI-X Packer – just remove the shear screws and install drag blocks and drag block springs. The ASI-X Packer sets with 1/4 right-hand rotation, and releases with 1/4 right-hand rotation. The ASI-X Packer can be left in tension, compression or neutral.

NOTE₁: Stinger and setting equipment sold separately.

NOTE₂: This packer requires at least a 30 second burn on the wireline setting tool to ensure a proper set. A burn time less than 30 seconds may shear the setting tool from the packer before fully setting the packer.

B) RELATED TOOLS (sold separately)

B-1) 8-5/8" – 10-3/4" Wireline Adapter Kit (WLAK) (PN 97196)—refer to technical manual *DL-971-8625-546*.

B-2) 4-1/2" DT-2 On/Off Tool and Stinger—refer to technical manual *DL-515-4500-1095*.

B-3) 4-1/2" Stinger—actual P/N varies depending on customer requirements.

C) SPECIFICATION GUIDE

CASING			TOOL		THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
SIZE (INCHES)	WEIGHT (LBS/FT)	RECOMMENDED HOLE SIZE (INCHES)	GAGE OD (INCHES)	NOMINAL ID (INCHES)		
9-5/8	32.3 – 43.5	8.755 – 9.001	8.500	4.00	4-1/2 EUE	60196S 60196SH ¹ 60196SV ²
	43.5 – 53.5	8.535 – 8.755	8.250	4.00	4-1/2 EUE	60195S 60195SH ¹ 60195SV ²

Elastomer Trim Options: ¹HSN, ²Viton

NOTE₃: Tools listed are right-hand set / right-hand release.

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
6,000 PSI	156,000 LBS

D & L OIL TOOLS
P.O. BOX 52220 TULSA, OK 74152
PHONE: (800) 441-3504 www.dlmfg.com



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D) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION1: D&L ships tool connections made-up **HAND TIGHT**—labeled with hand-tight tape on the tool (Fig. 1) — unless stated otherwise. Tighten/torque all connections properly before operating tool.

Fig. 1



GENERAL THREAD CONNECTION TORQUE RECOMMENDATIONS			
STUB ACME / ACME THREADS	INTERNAL TAPERED TUBING THREADS		PREMIUM THREADS
	UP TO 2-3/8"	GREATER THAN 2-3/8"	
600 – 800 FT-LBS	600 – 800 FT-LBS	800 – 1,200 FT-LBS	Consult thread manufacturer's recommendations.

GENERAL SCREW TORQUE RECOMMENDATIONS									
SCREW SIZE (INCHES)	#6	#8	#10	1/4	5/16	3/8	7/16	1/2	5/8 and larger
TORQUE RANGE (INCH-POUNDS)	5 – 8	10 – 15	18 – 25	25 – 40	50 – 80	90 – 135	160 – 210	250 – 330	450 – 650

Before first use, D&L recommends disassembly and inspection of the tool unless stated otherwise. Ensure parts have not been damaged during shipping. Replace damaged parts with D&L replacement parts. Contact D&L sales for replacement part information.

Re-assemble the tool after inspection. Install parts in the correct order and orientation. Properly tighten connections.

Before re-using the tool, D&L recommends disassembly and inspection of the tool. Clean parts and ensure parts are in good working condition. Replace worn or damaged parts with D&L replacement parts.

When redressing the tool, D&L recommends replacement of all seals, elements, o-rings, shear screws, etc. Contact D&L sales for redress kit and/or other replacement part information.

E) RELEASING PROCEDURES

Set down weight on the packer and rotate the work string 1/4 turn to the right at the packer and pick up while holding right-hand torque. The internal by-pass will open, allowing pressure to equalize. After pressure is equalized, continue to pick up to release the upper slips, relax the elements and release the lower slips.

CAUTION4: High differential pressure below the VSI-X may cause the upper slips to wedge in tighter, requiring an extra amount of tension to release the upper slips.

E-1) EMERGENCY RELEASE

In the event, the packer will not release in the normal manner, hard right-hand torque can be applied (800-1,000 ft-lbs) which will break the tack weld on the J-pin ring. Continued rotation of approximately 15 turns will release the J-pin ring and allow the packer to be pulled. When released in this manner, the packer will reset when moved down the hole.

F) STORAGE RECOMMENDATIONS

When preparing the tool for storage, follow the Pre-Installation Inspection Procedures. Re-assemble the tool with connections hand-tight only and in running position if applicable. Elements should be in a relaxed state—free from tension, compression, and other stresses that could cause deformation.

Store the tool, if possible, in an enclosed, temperature and humidity controlled environment. Avoid excessively high temperatures over long periods of time. Shield elastomeric parts from ultraviolet light sources. Keep tool dry and protected from condensation. Do not store in contact with or near volatile or corrosive chemicals. Do not store near ozone generating equipment or operations such as welding.



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G) PRESSURE AFFECTED AREA GUIDE

When set downhole, the packer mandrel is subjected to a force created by differential pressure above or below the packer that acts on the pressure affected area (i.e., the piston effect). Depending on the tubing size and weight and the seal area of the packer the force created by differential pressure acts upwards or downwards on the packer mandrel. An upward force, designated as a negative (-) value, acts to push the packer mandrel up hole and must be accounted for when releasing the packer. A downward force, designated as a positive value, acts to push the packer mandrel down hole and must be accounted for when releasing the packer. Other factors (e.g., tubing movement due to temperature change) must be considered separately to determine all the forces acting on the packer.

PACKER SIZE (INCHES)	TUBING SIZE (INCHES)	PRESSURE AFFECTED AREA (IN ²)	
		ABOVE	BELOW
9-5/8	2.875	11.11 (DOWN)	-13.59 (UP)
	3.500	7.98 (DOWN)	-11.66 (UP)
	4.500	1.70 (DOWN)	-7.20 (UP)

Example: Consider a 9-5/8" X 4-1/2" VSI-X Packer set on 4.500" tubing with a differential pressure of 3,000 psi in the annulus around the tubing above the packer. What is the force acting on the seal area of the mandrel?

To calculate the force (lbs) acting on the seal area of the mandrel, refer to the Pressure Affected Area Guide for a 9-5/8" X 4-1/2" VSI-X Packer run on 4.500". In this example, the differential pressure from above the packer acts on the seal area of the packer mandrel across a pressure affected area of 1.70 in². Multiplying the differential pressure (3,000 psi) by the pressure affected area (1.70 in²) results in a force of 5,100 lbs. The piston effect on the packer mandrel is a downward force of 5,100 lbs.

H) ELASTOMER TRIM TEMPERATURE GUIDE

NITRILE (STD)			
TEMPERATURE RANGE (F°)	DUROMETER		
	END	MIDDLE	END
40° - 125°	80	70	80
125° - 250°	90	70	90
150° - 250°	90	80	90
250° +	Contact D&L Sales		

RUBBER TYPE	TEMPERATURE RANGE
NITRILE	40° - 250°F
HSN (HNBR)	70° - 300°F
VITON	100° - 350°F

I) RECOMMENDED HAND TOOLS

- VISE
- GLOVES
- ALLEN WRENCHES
- TAPE MEASURE
- O-RING PICK
- BAR
 - 1/2-INCH
 - 3/4-INCH
- PAINT BRUSH, 2-INCH
- PIPE WRENCH, 3-FT (2 EA)
- "CHEATER" PIPE, 4-FT LONG
- ADJUSTABLE WRENCH, 12-INCH
- CORDLESS DRILL, 18V
- SNAP RING SPREADER PLIERS
- ALIGNING PUNCH
- SCREWDRIVER SET, FLAT-TIPPED
- SOCKET SETS
 - 3/8-INCH DRIVE
 - 1/2-INCH DRIVE
- HAMMERS
 - SLEDGE
 - BALL PEEN
 - DEAD BLOW



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J) DISASSEMBLY

J-1) Clamp spring cage (5) in vise.

J-1.1) Unscrew and remove shear screws (3) from J-body (20).

J-1.2) Unscrew and remove J-pin bottom sub (23) from inner mandrel (2).

NOTE₄: Drag block body assembly must be free to rotate.

J-1.2.1) Remove o-ring (36) from J-pin bottom sub (23).

J-1.3) Unscrew and remove set screws (22) from drag block body (18). Rotate drag block retainer (21) to access screws.

J-1.4) Unscrew and remove J-body (20) from drag block body (18) (**NOTE₅:** Left-hand threads).

J-1.4.1) Remove retaining ring (30) from J-body (20).

J-1.5) Remove drag block retainer (21) from drag block body (18).

J-1.6) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

NOTE₇: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

J-1.7) Remove drag block body assembly and disassemble:

J-1.7.1) Unscrew and remove socket cap screw (28) from drag block body (18).

J-1.7.2) Wedge lower slips (17) outwards (if needed). Remove lower slip support (32) from drag block body (18).

J-1.7.3) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from drag block body (18).

J-1.8) Unscrew and remove lower cone (16) from rubber retainer (15).

J-1.9) Unscrew rubber mandrel (11) from center coupling (10).

NOTE₈: For added leverage, insert a rod through upper cone (9) as needed.

J-1.10) Remove rubber mandrel assembly and disassemble:

J-1.10.1) Remove elements (13, 14), rubber spacers (12), and rubber retainer (15) from secondary rubber mandrel (31).

J-1.10.2) Remove secondary rubber mandrel (31) from rubber mandrel (11).

J-1.10.2.1) Remove o-ring (35) from rubber mandrel (11).

J-1.11) Unscrew and remove gage ring (29) from center coupling (10).

J-1.12) Unscrew and remove center coupling (10) from upper cone (9).

J-1.12.1) Remove bonded seal (24) and o-rings (34) from center coupling (10).

J-1.13) Remove upper cone (9) from inner mandrel (2).

J-1.14) Unscrew and remove inner mandrel (2) from top sub (1)

J-1.15) Unscrew and remove shear screws (3) from spring cage (5).

CAUTION₂: Compression spring (4) is compressed with spring tension against upper slip body assembly.

J-1.16) Unscrew and remove spring cage cap (27) from spring cage (5).

J-1.17) Remove top sub (1) and compression spring (4) from spring cage (5).

J-1.18) Unscrew and remove upper slip body assembly and disassemble:

J-1.18.1) Unscrew and remove upper slip support (33) from spring cage (5).

J-1.18.2) Wedge releasing slip (7) and upper slips (8) outward (if needed). Unscrew and remove upper slip support (33) from upper slip body (6).

J-1.18.3) Remove wedges (if needed). Remove upper slips (8), releasing slip (7) and upper slip springs (26) from upper slip body (6).

J-2) Unclamp and remove spring cage (5) from vise.



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K) ASSEMBLY

NOTE₆: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

CAUTION₅: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread reliefs (Fig. 2).

K-1) Clamp spring cage (5) in vise.

K-1.1) Assemble spring cage assembly:

K-1.1.1) Install upper slips (8), releasing slip (7) and upper slips springs (26) into upper slip body (6).

NOTE₁₀: Install two (2ea) springs per slip (Fig. 3).

K-1.1.2) Wedge releasing slip (7) and upper slips (8) outwards. Screw upper slip support (33) into upper slip body (6).

K-1.1.3) Remove wedges. Screw upper slip support (33) onto spring cage (5).

K-1.1.4) Install compression spring (4) and top sub (1) into spring cage (5).

K-1.1.5) Screw spring cage cap (27) onto spring cage (5).

CAUTION₂: Compression spring (4) will be compressed with spring tension against upper slip body assembly.

K-1.1.6) Align threaded holes in spring cage (5) with recessed holes in top sub (1). Screw shear screws (3) into spring cage (5). Tighten until shear screws (3) make contact with top sub (1). Back shear screws (3) out 1/4 turn.

K-1.2) Screw inner mandrel (2) into top sub (1).

K-1.3) Install upper cone (9) onto inner mandrel (2).

K-1.4) Install o-rings (34) in grooves in center coupling (10).

K-1.5) Install bonded seal (24) into center coupling (10).

CAUTION₃: Do not rip or tear o-rings during installation.

K-1.6) Screw center coupling (10) onto upper cone (9).

NOTE₈: For added leverage, insert a rod through upper cone (9) as needed.

K-1.7) Screw gage ring (29) on center coupling (10).

K-1.8) Assemble rubber mandrel assembly and install:

K-1.8.1) Install o-ring (35) in groove in rubber mandrel (11).

K-1.8.2) Install secondary rubber mandrel (31) onto rubber mandrel (11).

CAUTION₃: Do not rip or tear o-ring during installation.

K-1.8.3) Install rubber retainer (15), elements (13, 14) and rubber spacers (12) onto secondary rubber mandrel (31).

K-1.8.4) Install rubber mandrel assembly onto inner mandrel (2).

K-1.8.5) Screw rubber mandrel (11) into center coupling (10).

CAUTION₃: Do not rip or tear o-ring during installation.

K-1.9) Screw lower cone (16) into rubber retainer (15).

K-1.10) Assemble drag block body assembly and install:

K-1.10.1) Install lower slips (17) and lower slip springs (25) into drag block body (18).

NOTE₁₀: Install two (2ea) springs per slip (Fig. 4).

K-1.10.2) Wedge slips outward. Install lower slip support (32) into drag block body (18).

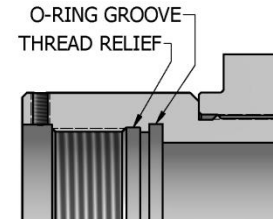


Fig. 2

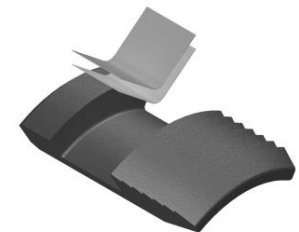


Fig. 3

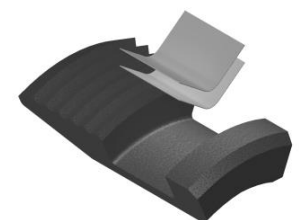


Fig. 4



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K) ASSEMBLY (cont'd)

K-1.10.3) Align hole in lower slip support (32) with threaded hole in drag block body (18). Screw socket cap screw (28) into drag block body (18).

K-1.10.4) Install drag block body assembly onto rubber mandrel (11).

K-1.11) Screw rubber mandrel cap (19) onto rubber mandrel (11).

NOTE7: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

K-1.12) Install drag block retainer (21) on drag block body (18).

K-1.13) Install retaining ring (30) onto J-body (20).

K-1.14) Screw J-body (20) into drag block body (18) (**NOTE5:** Left-hand threads).

K-1.15) Align threaded holes in drag block body (18) with groove in J-body (20). Screw set screws (22) into drag block body (18). Rotate drag block retainer (21) as needed to access threaded holes in drag block body (18).

K-1.16) Install o-ring (36) into groove in J-pin bottom sub (23).

K-1.17) Screw J-pin bottom sub (23) onto inner mandrel (2).

NOTE4: Drag block body assembly must be free to rotate.

CAUTION3: Do not rip or tear o-ring during installation.

K-1.18) Align threaded holes in J-body (20) with pocket holes in rubber mandrel cap (19). Screw shear screws (3) into J-body (20). Tighten until shear screws (3) make contact with rubber mandrel cap (19). Back shear screws (3) out 1/4 turn.

K-2) Unclamp spring cage (5) and remove assembled tool.

L) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	32.3 – 43.5# P/N 60196S	43.5 – 53.5# P/N 60195S
1	1	TOP SUB	DLMS60	60195610	
2	1	INNER MANDREL	DLMS80	60395210	
3	16	SHEAR SCREW (2375#)	DLM360BRS	60100990	
4	1	COMPRESSION SPRING	DLMCRSP	60395920	
5	1	SPRING CAGE	DLMS60	60195310	
6	1	UPPER SLIP BODY	DLMS110	60395320	
7	1	RELEASING SLIP	DLMS110	60095125	
8	2	UPPER SLIP	DLMS35	60095115	
9	1	UPPER CONE	DLMS80	60395410	
10	1	CENTER COUPLING	DLMS80	60095620	
11	1	RUBBER MANDREL	DLMS60	60313220	
12	2	RUBBER SPACER	DLMS35	60296840S	60295840S
13	1	ELEMENT	70 DURO NITRILE	60296511S	60295511S
14	2	ELEMENT	90 DURO NITRILE	60296513S	60295513S
15	1	RUBBER RETAINER	DLMS35	60296850S	60295850S
16	1	LOWER CONE	DLMS35	60395420S	
17	4	LOWER SLIP	DLMS35	60095135	



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L) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	32.3 – 43.5# P/N 60196S	43.5 – 53.5# P/N 60195S
18	1	DRAG BLOCK BODY	DLMS35	60395335	
19	1	RUBBER MANDREL CAP	DLMS60	60195230	
20	1	J-BODY	DLMS60	60195340	
21	1	DRAG BLOCK RETAINER	DLMS60	60395910	
22	3	SET SCREW 3/8-16 UNC X 5/8	STEEL	SSS037C062	
23	1	J-PIN BOTTOM SUB	DLMS80	60395650	
24	1	BONDED SEAL	90 DURO NITRILE	60095520	
25	8	LOWER SLIP SPRING	-	7170901	
26	6	UPPER SLIP SPRING	-	7170902	
27	1	SPRING CAGE CAP	DLMS35	60095810	
28	1	SOCKET CAP SCREW 1/2-13 UNC X 3/4	STEEL	SCS050C075	
29	1	GAGE RING	DLMS35	60296830	60295830
30	1	RETAINING RING	DLMS35	60095911	
31	1	SECONDARY RUBBER MANDREL	DLMS80	60095221	
32	1	LOWER SLIP SUPPORT	DLMS35	60395912	
33	1	UPPER SLIP SUPPORT	DLMS80	60395880	
34	2	160 O-RING	90 DURO NITRILE	90160	
35	1	254 O-RING	90 DURO NITRILE	90254	
36	1	348 O-RING	90 DURO NITRILE	90348	
37	8	SHEAR SCREW (5500#) 1/2-13 UNC X 7/16	DLM360BRS	BSSSLT050C043*	

*Refer to WLAK tech manual for placement.

REDRESS KIT (RDK)		60196050S	60195050S
ASSEMBLED WEIGHT		564 LBS	559 LBS



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L) PARTS LIST (cont'd)

L-1) ELASTOMER TRIM OPTIONS

NOTE: For temperature range, refer to Elastomer Trim Temperature Guide.

L-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	32.3 – 43.5# P/N 60196SH	43.5 – 53.5# P/N 60195SH
13	1	ELEMENT	70 DURO HSN	60296511SH	60295511SH
14	2	ELEMENT	90 DURO HSN	60296513SH	60295513SH
24	1	BONDED SEAL	90 DURO HSN	60095520H	
34	2	160 O-RING	90 DURO HSN	90160H	
35	1	254 O-RING	90 DURO HSN	90254H	
36	1	348 O-RING	90 DURO HSN	90348H	

REDRESS KIT (RDK)		60196050SH	60195050SH
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L-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	32.3 – 43.5# P/N 60196SV	43.5 – 53.5# P/N 60195SV
13	1	ELEMENT	70 DURO VITON	60296511SV	60295511SV
14	2	ELEMENT	90 DURO VITON	60296513SV	60295513SV
24	1	BONDED SEAL	90 DURO VITON	60095520V	
34	2	160 O-RING	90 DURO VITON	90160V	
35	1	254 O-RING	90 DURO VITON	90254V	
36	1	348 O-RING	90 DURO VITON	90348V	

REDRESS KIT (RDK)		60196050SV	60195050SV
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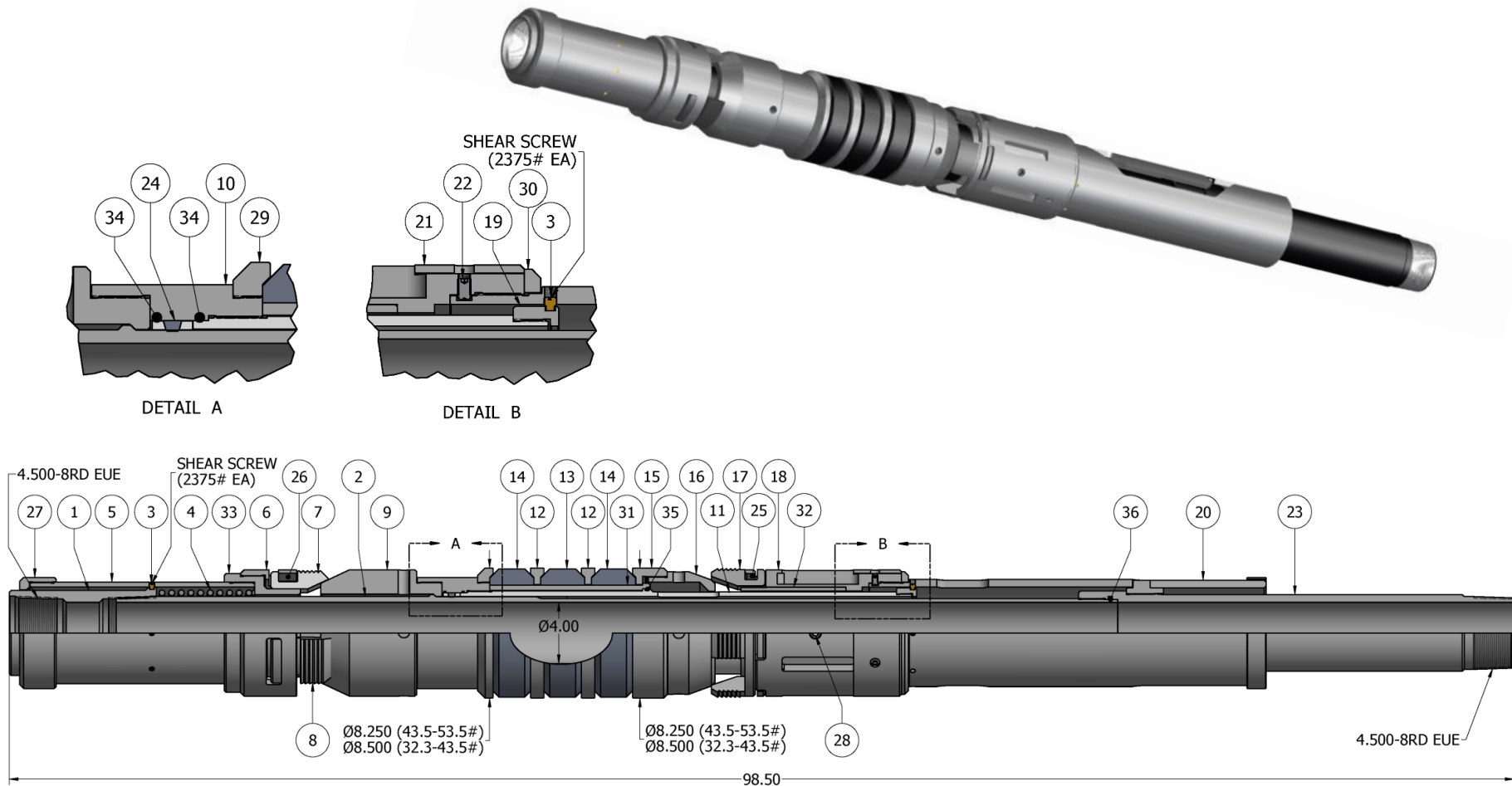
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M) TECHNICAL ILLUSTRATION



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N) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
01/27/2020	D	Revised max. differential pressure was 8,000	J.Anderson	E.Visaez
10/31/2019	C	Added Related Tools, Elastomer Trim Options, Pre-Installation Inspection Procedures, Storage Recommendations; Revised Pressure Affected Area Guide, Elastomer Trim Temperature Guide; P/N 60195610 was 60195610HT	J.Anderson	E.Visaez
06/04/13	B	Revised P/N 60195340 was 60195340A, Added reference to WLAK tech manual, maximum tool torque and tensile load thru tool, P/N 60195S and 60196S redress kits, revision history	J.Anderson	B.Oligschlaeger