



ASI-X PACKER

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

Manual No:
DL-603-9625-005

Revision: **G**

Revision Date:
07/11/2023

Authored by: M. Kelley

Approved by: J.McArthur

A) DESCRIPTION

The ASI-X Single String Double-Grip Production Packer is the most versatile of the mechanically set retrievable packers and may be used in any production application. This packer is suited for treating, testing, or injection applications, in pumping or flowing wells, either deep or shallow. This packer can be left in tension or compression depending on well conditions and the required application.

A large internal by-pass reduces swabbing when running and retrieving. The by-pass closes when the packer is set and opens prior to releasing the upper slips when retrieving to allow pressure equalization. The J-slot design allows easy setting and releasing; 1/4 turn right-hand set, 1/4 turn right-hand release.

The standard ASI-X Packer is designed for differential pressures up to 7,000 PSI (unless noted otherwise). This packer is also available in an HT version which is designed for differential pressures up to 10,000 PSI (unless noted otherwise). The HT version allows this packer to be utilized in completions where high pressure treating operations are performed and it is desirable to leave the tool in the well for production.

B) RELATED TOOLS (sold separately)

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

B-2) 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	60396S 60396SH ¹ 60396SV ² 60396SC ³ 60396SHC ⁴ 60396SVC ⁵
	43.5 - 53.5	8.535 – 8.755	8.250	4.00	4-1/2 EUE	60395S 60395SH ¹ 60395SV ² 60395SC ³ 60395SHC ⁴ 60395SVC ⁵

Tool Options: ¹HSN, ²Viton, ³Nitrile, Carbide, ⁴HSN, Carbide, ⁵Viton, Carbide

NOTE1: Tools listed are right-hand set / right-hand release.

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)	TORQUE THRU TOOL (MAX)
6,000 PSI	156,000 LBS	2,000 FT-LBS

D & L OIL TOOLS
P.O. BOX 52220 TULSA, OK 74152
PHONE: (800) 441-3504 www.dloiltools.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 tools 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 part information.

E) SETTING PROCEDURES

CAUTION₂: Do not run the tool without properly tightening connections. Running the tool with loose connections may damage the tool and cause malfunction.

E-1) COMPRESSION SET

Run the packer to setting depth. Pick up the work string to allow for setting stroke (12-13") plus desired work string load. Rotate the work string 1/4 right-hand turn at the packer, and then lower the work string while releasing torque. Slack off on the work string sufficient weight to set the packer (25,000 lbs minimum). Pull tension to assure that the upper slips are set. The work string can then be left in tension, compression or neutral. If insufficient weight is available to set the packer with compression, tension can be applied after slack-off to pack off the elements.

E-2) TENSION SET

Run to setting depth, pick up on the work string and rotate 1/4 turn to the right at the packer then lower the work string slacking off available weight to set the packer lower slips. Pull tension to set upper slips and pack off elements (25,000 lbs minimum). After setting the packer, the work string can be left in compression, tension or neutral.



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F) RELEASING PROCEDURES

The releasing procedures are the same whether the packer has been tension or compression set. Set down weight on the packer to unseat the J-pin from the tension shoulder of the J-slot. Refer to the Pressure Affected Area Guide to determine necessary set down weight on the packer. Rotate the work string 1/4 right-hand turn at the packer and pick up while holding right-hand torque. Weight in addition to pipe weight may be required to pick up on packer - refer to Pressure Affected Area Guide. 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 thus allowing the packer to be re-set or removed from the well.

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

F-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.

G) 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.

H) 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 2.875" 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 2.875" tubing. 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 11.11 in². Multiplying the differential pressure (3,000 PSI) by the pressure affected area (11.11 in²) results in a force of 33,330 lbs. The piston effect on the packer mandrel is a downward force of 33,330 lbs.



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I) 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

J) RECOMMENDED TOOLS

J-1) 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

J-2) OPTIONAL SPECIAL TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT010110

K) DISASSEMBLY

NOTE₃: Ensure vise is capable of handling weight of tool.

NOTE₄: Support tool during disassembly and assembly with jack stands as necessary.

K-1) Clamp top sub (1) in vise.

K-1.1) Unscrew and remove J-pin bottom sub (23) from inner mandrel (2).

NOTE₅: Drag block body assembly must be free to rotate.

K-1.1.1) Remove o-ring (37) from J-pin bottom sub (23).

K-1.2) Compress drag blocks (22) with drag block assembly tool (T1).

K-1.3) Unscrew and remove set screws (28) from drag block body (18). Rotate drag block retainer (21) as needed to access screws.

K-1.4) Unscrew and remove J-body (20) from drag block body (18) (**NOTE₆:** Left-hand threads).

K-1.4.1) Remove retaining ring (31) from J-body (20).

K-1.5) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

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

K-1.6) Remove drag block body assembly from rubber mandrel (11) and disassemble:

K-1.6.1) Remove drag block retainer (21) from drag block body (18).

K-1.6.2) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).



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K) DISASSEMBLY (cont'd)

- K-1.6.3) Unscrew and remove cap screw (34) from drag block body (18).
- K-1.6.4) Wedge lower slips (17) outwards (if needed). Remove lower slip support (32) from drag block body (18).
- K-1.6.5) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from drag block body (18).
- K-1.7) Unscrew and remove lower cone (16) from rubber retainer (15).
- K-1.8) Unscrew and remove rubber mandrel (11) from center coupling (10).
- K-1.9) Remove rubber mandrel assembly from inner mandrel (2) and disassemble:
 - K-1.9.1) Remove elements (13, 14), rubber spacers (12), and rubber retainer (15) from secondary rubber mandrel (30).
 - K-1.9.2) Remove secondary rubber mandrel (30) from rubber mandrel (11).
 - K-1.9.3) Remove o-ring (36) from rubber mandrel (11).
- K-1.10) Unscrew and remove gage ring (29) from center coupling (10).
- K-1.11) Unscrew and remove center coupling (10) from upper cone (9).
 - K-1.11.1) Remove bonded seal (24) and o-rings (35) from center coupling (10).
- K-1.12) Remove upper cone (9) from inner mandrel (2).
- K-2) Unclamp and remove top sub (1) from vise. Clamp inner mandrel (2) in vise.

CAUTION: Do NOT wrench or clamp on seal surface.
- K-2.1) Unscrew and remove spring cage cap (27) from spring cage (5).

CAUTIONs: Compression spring (4) has spring tension against upper slip body assembly.
- K-2.2) Unscrew and remove top sub (1) from inner mandrel (2).
- K-2.3) Remove compression spring (4) from spring cage (5).
- K-2.4) Unscrew and remove spring cage (5) from upper slip support (33).
- K-2.5) Remove upper slip body assembly from inner mandrel (2) and disassemble:
 - K-2.5.1) Wedge slips outwards (if needed). Unscrew and remove upper slip support (33) from upper slip body (6).
 - K-2.5.2) Remove wedges (if needed). Remove releasing slip (7), upper slips (8), and upper slip springs (26) from upper slip body (6).
- K-3) Unclamp and remove inner mandrel (2) from vise.



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L) ASSEMBLY

NOTE₃: Ensure vise is capable of handling weight of tool.

NOTE₄: Support tool during disassembly and assembly with jack stands as necessary.

NOTE₈: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

CAUTION₆: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread reliefs (Fig. 2).

L-1) Clamp inner mandrel (2) in vise.

CAUTION₄: Do **NOT** wrench or clamp on seal surface.

L-1.1) Assemble upper slip body assembly and install:

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

NOTE₉: Install two (2ea) springs per slip (Fig. 3).

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

L-1.1.3) Install upper slip body assembly onto inner mandrel (2).

L-1.2) Screw spring cage (5) into upper slip support (33).

L-1.3) Install compression spring (4) onto inner mandrel (2) and into upper slip body assembly.

L-1.4) Screw top sub (1) onto inner mandrel (2).

L-1.5) Screw spring cage cap (27) onto spring cage (5).

CAUTION₅: Compression spring (4) will be compressed with spring tension against spring cage assembly.

L-2) Unclamp and remove inner mandrel (2) from vise. Clamp top sub (1) in vise.

L-2.1) Install upper cone (9) onto inner mandrel (2).

L-2.2) Install o-rings (35) in o-ring grooves in center coupling (10).

L-2.3) Install bonded seal (24) into center coupling (10).

CAUTION₇: Do not rip or tear o-ring during installation.

L-2.4) Screw center coupling (10) onto upper cone (9).

L-2.5) Screw gage ring (29) onto center coupling (10).

L-2.6) Assemble and install rubber mandrel assembly:

L-2.6.1) Install o-ring (36) in o-ring groove in rubber mandrel (11).

L-2.6.2) Install secondary rubber mandrel (30) onto rubber mandrel (11).

CAUTION₇: Do not rip or tear o-ring during installation.

L-2.6.3) Install rubber retainer (15), elements (13, 14), and rubber spacers (12) onto secondary rubber mandrel (30).

L-2.6.4) Install rubber mandrel assembly onto inner mandrel (2). Screw rubber mandrel (11) into center coupling (10).

CAUTION₇: Do not rip or tear o-ring during installation.

L-2.7) Screw lower cone (16) into rubber retainer (15).

L-2.8) Assemble drag block body assembly:

L-2.8.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge slips outward.

NOTE₉: Install two (2ea) springs per slip (Fig. 4).

L-2.8.2) Install lower slip support (32) into drag block body (18). Align threaded hole in drag block body (18) with lower slip support (32).

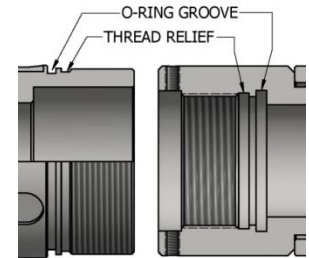


Fig. 2

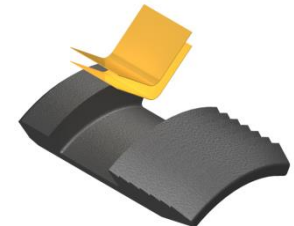


Fig. 3

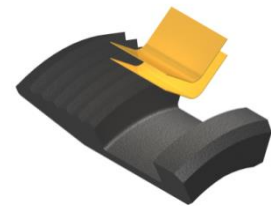


Fig. 4



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L) ASSEMBLY (cont'd)

L-2.8.3) Screw cap screw (34) into drag block body (18). Remove wedges.

L-2.8.4) Install drag blocks (22) and drag block springs (3) in drag block body (18).

NOTE₁₀: Install six (6ea) springs per drag block (Fig. 5).

L-2.8.5) Compress drag blocks (22) with drag block assembly tool (T1).

L-2.8.6) Install drag block retainer (21) capturing ends of drag blocks (22). Align holes in drag block retainer (21) with threaded holes in drag block body (18).

L-2.8.7) Install drag block body assembly onto rubber mandrel (11).

L-2.9) Screw rubber mandrel cap (19) onto rubber mandrel (11).

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

L-2.10) Install retaining ring (31) onto J-body (20).

L-2.11) Screw J-body (20) into drag block body (18) (**NOTE₆:** Left-hand threads).

L-2.12) Screw set screws (28) into drag block body (18).

L-2.13) Install o-ring (37) in o-ring groove in J-pin bottom sub (23).

L-2.14) Screw J-pin bottom sub (23) onto inner mandrel (2).

CAUTION₇: Do not rip or tear o-ring during installation.

NOTE₅: Drag block body assembly must be free to rotate.

L-2.15) Position J-pin of J-pin bottom sub (23) in running position in J-slot of J-body (20) (Fig. 6).

L-3) Unclamp top sub (1) from vise and remove assembled tool.

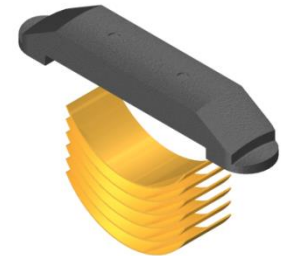


Fig. 5

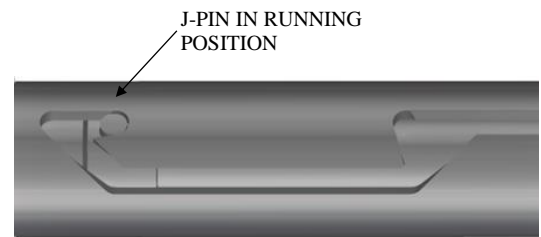


Fig. 6

M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60395S	P/N 60396S
1	1	TOP SUB	DLMS60	60195610	
2	1	INNER MANDREL	DLMS80	60395210	
3	36	DRAW BLOCK SPRING	INCONEL	9101900	
4	1	COMPRESSION SPRING	DLMCSP	60395920	
5	1	SPRING CAGE	DLMS60	60195310	
6	1	UPPER SLIP BODY	DLMS110 / DLMS80	60395320	
7	1	RELEASING SLIP	DLMS110	60095125	
8	2	UPPER SLIP	DLMS35	60095115	
9	1	UPPER CONE	DLMS35	60395410	
10	1	CENTER COUPLING	DLMS80	60095620	
11	1	RUBBER MANDREL	DLMS60	60313220	
12	2	RUBBER SPACER	DLMS35	60295840S	60296840S
13	1	ELEMENT	70 DURO NITRILE	60295511S	60296511S
14	2	ELEMENT	90 DURO NITRILE	60295513S	60296513S
15	1	RUBBER RETAINER	DLMS35	60295850S	60296850S



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ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60395S	P/N 60396S
16	1	LOWER CONE	DLMS35	60395420S	
17	4	LOWER SLIP	DLMS35	60095135	
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	6	DRAG BLOCK	DLMSDB8	9080900	
23	1	J-PIN BOTTOM SUB	DLMS80	60395650	
24	1	SEAL	90 DURO NITRILE	60095520	
25	8	LOWER SLIP SPRING	ELGILOY	7170901	
26	6	UPPER SLIP SPRING	ELGILOY	7170902	
27	1	SPRING CAGE CAP	DLMS35	60095810	
28	3	SET SCREW 3/8-16 UNC X 5/8	STEEL	SSS037C062	
29	1	GAGE RING	DLMS35	60295830	60296830
30	1	SECONDARY RUBBER MANDREL	DLMS60	60095221	
31	1	RETAINING RING	DLMS35	60095911	
32	1	LOWER SLIP SUPPORT	DLMS35	60395912	
33	1	UPPER SLIP SUPPORT	DLMS80	60395880	
34	1	CAP SCREW 1/2-13 UNC X 3/4	STEEL	SCS050C075	
35	2	160 O-RING	90 DURO NITRILE	90160	
36	1	254 O-RING	90 DURO NITRILE	90254	
37	1	348 O-RING	90 DURO NITRILE	90348	

REDRESS KIT (RDK)		60395050S	60396050S
ASSEMBLED WEIGHT		559 LBS	564 LBS



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M) PARTS LIST (cont'd)

M-1) ELASTOMER TRIM OPTIONS

NOTE2: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60395SH	P/N 60396SH
13	1	ELEMENT	70 DURO HSN	60295511SH	60296511SH
14	2	ELEMENT	90 DURO HSN	60295513SH	60296513SH
24	1	SEAL	90 DURO HSN	60095520H	
35	2	160 O-RING	90 DURO HSN	90160H	
36	1	254 O-RING	90 DURO HSN	90254H	
37	1	348 O-RING	90 DURO HSN	90348H	

REDRESS KIT (RDK)		60395050SH	60396050SH
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M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60395SV	P/N 60396SV
13	1	ELEMENT	70 DURO VITON	60295511SV	60296511SV
14	2	ELEMENT	90 DURO VITON	60295513SV	60296513SV
24	1	SEAL	90 DURO VITON	60095520V	
35	2	160 O-RING	90 DURO VITON	90160V	
36	1	254 O-RING	90 DURO VITON	90254V	
37	1	348 O-RING	90 DURO VITON	90348V	

REDRESS KIT (RDK)		60395050SV	60396050SV
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M-2) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60395SC	P/N 60396SC
8	2	CARBIDE UPPER SLIP	DLMS110	60095115C	
17	4	CARBIDE LOWER SLIP	DLMS110	60095135C	
22	6	CARBIDE DRAG BLOCK	DLMSDB4	9080900C	



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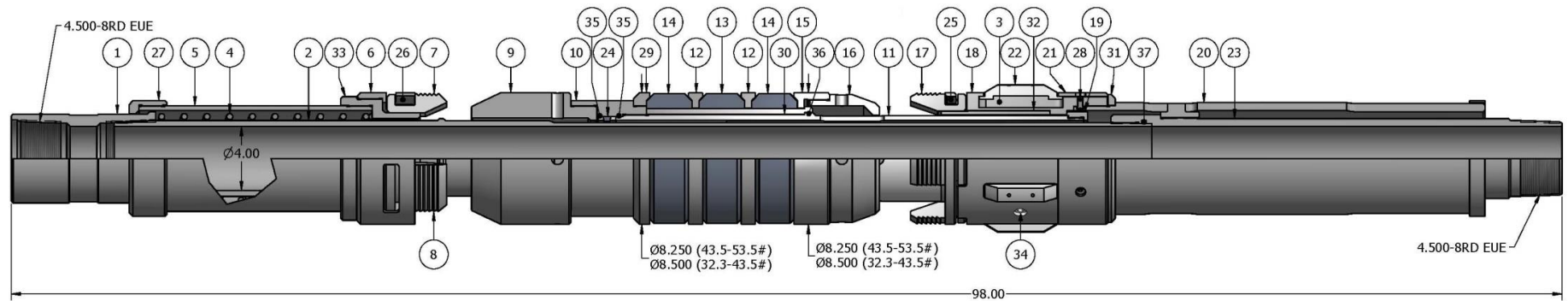
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Approved by: *J. McArthur*

N) TECHNICAL ILLUSTRATION



	<h1 style="text-align: center;">ASI-X PACKER</h1> <h2 style="text-align: center;">9-5/8" X 4-1/2"</h2>		Manual No: DL-603-9625-005
			Revision: G
			Revision Date: 07/11/2023
<i>Authored by: M. Kelley</i>		<i>Approved by: J.McArthur</i>	

O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
07/11/2023	G	Added carbide options	J.Anderson	E.Visaez
10/31/2019	F	Added General Screw Torque Recommendations; Revised Elastomer Trim Temp. Guide nitrile rating, 60195610 was 60095610, 60195310 was 60395310, 60195230 was 60095230, 60195340 was 60395340	J.Anderson	E.Visaez
02/16/2016	E	Revised Elastomer Durometer Temperatures – Nitrile (90/80/90 Duro) was 250° - 300°F, Nitrile (Contact D&L Sales) was 300°F +, Rubber Type Temperature Ranges – Nitrile was 70° - 300°F, HSN was 70° - 325°F; Added max. casing weight on set tool, torque thru tool; Removed tool drift ID	J.Anderson	N.Banker
04/15/15	D	Added Related Tools, tool Drift ID, HSN and Viton options, max. tensile load, Pre-Installation Inspection and Storage Procedures, Recommended Hand Tools; Revised Releasing Procedures, Pressure Affected Area Guide	J.Anderson	K.Riggs