	<h1>ASI-X PACKER</h1> <p>4-1/2” X 1.900” (15.1 – 16.6#)</p>	Manual No: DL-603-4500-1664
		Revision: A
		Revision Date: 04/21/2023
Authored by: J.Anderson		Approved by: E.Visaez

A) DESCRIPTION

The ASI-X Packer is the most versatile of the mechanically set retrievable packers and may be used in any production application. The ASI-X Packer is suited for treating, testing, injecting, pumping wells, and flowing wells, deep or shallow. The 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, right-hand release.

B) RELATED TOOLS (sold separately)

B-1) 1.900" DT-2 On/Off Tool and Stinger —refer to technical manual *DL-512-1900-386*.

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)		
4-1/2	15.1 - 16.6	3.754 – 3.826	3.594	1.50	1.900 EUE	60343 60343H ¹ 60343V ² 60343C ³ 60343HC ⁴ 60343VC ⁵

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

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

NOTE₂: Use of a Double Hook J-slot Packer is recommended when running with a pumpjack to help prevent the packer from unsetting during well production.

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
7,000 PSI	35,000 LBS

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.

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 (cont'd)

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) SETTING PROCEDURES

CAUTION: 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 tubing to allow for setting stroke (12-13") plus desired tubing load. Rotate the tubing 1/4 right-hand turn at the packer, and then lower the tubing while releasing torque. Slack off on the tubing sufficient weight to set the packer (10,000 lbs). Pull tension to assure that the upper slips are set. The tubing 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 tubing and rotate 1/4 turn to the right at the packer then lower the tubing slacking off available weight to set the packer lower slips. Pull tension to set upper slips and pack off elements (10,000 lbs). After setting the packer, the tubing 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 tubing 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 may cause the upper slips to wedge in tighter, requiring an extra amount of tension to release the upper slips.

F-1) EMERGENCY RELEASE

If the packer will not release in the normal manner, apply hard right-hand torque (800-1,000 ft-lbs) to break the tack weld on the J-pin ring. Rotate the work string to the right approximately 15 turns to release the J-pin ring and retrieve the packer. When released in this manner, the packer will reset when moved down the hole.

G) PRESSURE AFFECTED AREA GUIDE

PACKER SIZE (INCHES)	TUBING SIZE (INCHES)	PRESSURE AFFECTED AREA (IN ²)	
		ABOVE	BELOW
4-1/2	1.900	0.066 (DOWN)	-0.865 (UP)
	2.375	-1.529 (UP)	0.225 (DOWN)

Example: Consider a 4-1/2" ASI-X set on 1.900" 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 4-1/2" ASI-X run on 1.900" 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 0.066 in². Multiplying the differential pressure (3,000 psi) by the pressure affected area (0.066 in²) results in a force of 198 lbs. The piston effect on the packer mandrel is a downward force of 198 lbs.

H) 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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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 (F°)
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	AT045110

K) DISASSEMBLY

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

K-1.1) Unscrew and remove set screws (25) from J-pin bottom sub (23). Move J-body (20) as needed.

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

NOTE₃: Drag block body assembly must be free to rotate.

K-1.2.1) Remove o-ring (29) from J-pin bottom sub (23).

K-1.3) Unscrew and remove set screws (6) from J-body (20).

K-1.4) Unscrew and remove J-body (20) from drag block body (18) (**NOTE₄:** Left-hand threads).

K-1.5) Compress drag blocks (22) with drag block body assembly tool (T1).

K-1.6) Remove drag block retainer (21) from drag block body (18).

K-1.7) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).

K-1.8) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

NOTE₅: For added leverage, insert a rod thru rubber retainer (15) and rubber mandrel (11) as needed.

K-1.9) Wedge lower slips (17) outward (if needed). Remove drag block body assembly and disassemble:

K-1.9.1) Remove wedges (if needed). Remove lower slips (17) and slip springs (26) from drag block body (18).

K-1.10) Unscrew and remove lower cone (16) from rubber retainer (15).

K-1.11) Unscrew rubber mandrel (11) from center coupling (10).



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K) DISASSEMBLY (cont'd)

K-1.12) Remove rubber mandrel assembly from inner mandrel (2) and disassemble:

K-1.12.1) Remove elements (13, 14), rubber spacers (12) and rubber retainer (15) from rubber mandrel (11).

K-1.13) Unscrew and remove center coupling (10) from upper cone (9).

K-1.13.1) Remove bonded seal (24) and o-ring (30) from center coupling (10).

K-1.13.1.1) Remove o-ring (28) from bonded seal (24).

K-1.14) Remove upper cone (9) from inner mandrel (2).

K-2) Unclamp and remove top sub (1) from vise. Clamp lower part of inner mandrel (2) in vise.

NOTE₆: Do **NOT** wrench or clamp on seal surface.

K-2.1) Unscrew and remove spring cage cap (27) from spring cage (5).

CAUTION₂: Compression spring (4) is compressed with spring tension against spring cage assembly.

K-2.2) Unscrew and remove top sub (1) from inner mandrel (2).

K-2.3) Remove compression spring (4) from inner mandrel (2).

K-2.4) Wedge releasing slip (7) and upper slips (8) outwards (if needed). Remove spring cage assembly and disassemble:

K-2.4.1) Remove wedges (if needed). Remove releasing slip (7), upper slips (8) and slip springs (26) from spring cage (5).

K-3) Unclamp and remove inner mandrel (2) from vise.

L) ASSEMBLY

NOTE₃: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

CAUTION₁: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread reliefs unless stated otherwise (Fig. 2).

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

NOTE₆: Do **NOT** wrench or clamp on seal surface.

L-1.1) Assemble spring cage assembly and install:

L-1.1.1) Install upper slips (8), releasing slip (7), and slip springs (26) into spring cage (5).

L-1.1.2) Wedge releasing slip (7) and upper slips (8) outwards. Install spring cage assembly onto inner mandrel (2). Remove wedges.

NOTE₈: Install one (1ea) spring per slip (Fig. 3).

L-1.2) Install compression spring (4) onto inner mandrel (2).

L-1.3) Screw top sub (1) onto inner mandrel (2).

L-1.4) Screw spring cage cap (27) into spring cage (5).

CAUTION₂: 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-ring (30) in groove in center coupling (10).

L-2.3) Install o-ring (28) in groove in bonded seal (24).

L-2.4) Install bonded seal (24) into center coupling (10).

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

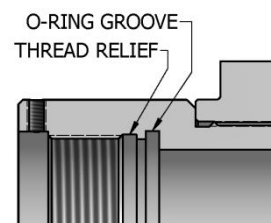


Fig. 2

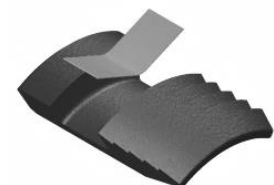


Fig. 3



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L) ASSEMBLY (cont'd)

L-2.5) Screw center coupling (10) onto upper cone (9).

L-2.6) Assemble rubber mandrel assembly and install:

L-2.6.1) Install rubber retainer (15), elements (13, 14), and rubber spacers (12) onto rubber mandrel (11).

L-2.6.2) Install rubber mandrel assembly onto inner mandrel (2).

L-2.6.3) Screw rubber mandrel (11) into center coupling (10).

CAUTION₃: 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 and install:

L-2.8.1) Install lower slips (17) and slip springs (26) into drag block body (18). Wedge slips outward.

NOTE₈: Install one (1ea) spring per slip (Fig. 4).

L-2.8.2) Install drag block body assembly onto rubber mandrel (11).

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

L-2.10) Install drag blocks (22) and drag block springs (3) into drag block body (18). Compress drag blocks (22) using drag block body assembly tool (T1).

NOTE₉: Install three (3ea) springs per slip (Fig. 5).

L-2.11) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22). Release drag blocks (22).

L-2.12) Screw J-body (20) onto drag block body (18) (**NOTE₄**: Left-hand threads).

NOTE₃: Drag block body assembly must be free to rotate.

L-2.13) Screw set screws (6) into J-body (20).

L-2.14) Install o-ring (29) in groove in J-pin bottom sub (23).

L-2.15) Screw J-pin bottom sub (23) onto inner mandrel (2).

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

L-2.16) Screw set screws (25) into J-pin bottom sub (23). Move J-body (20) as needed.

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

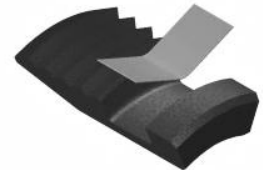


Fig. 4

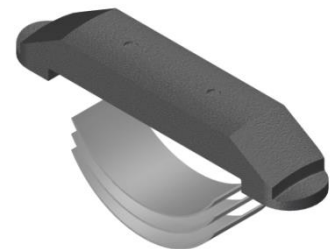


Fig. 5

M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60343
1	1	TOP SUB	DLMS60	60140610
2	1	INNER MANDREL	DLMS80	60140210
3	12	DRAG BLOCK SPRING		9100900
4	1	COMPRESSION SPRING	DLMCRSP	60340920
5	1	SPRING CAGE	DLMS60	60140326
6	7	1/4-20 UNC X 1/4 SOCKET SET SCREW	STEEL	SSS025C025
7	1	RELEASING SLIP	DLMS110	60043125



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M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60343
8	2	UPPER SLIP	DLMS35	60043115
9	1	UPPER CONE	DLMS60	60040410
10	1	CENTER COUPLING	DLMS60	60243620
11	1	RUBBER MANDREL	DLMS60	60340220
12	2	RUBBER SPACER	DLMS60	60243840
13	1	ELEMENT	70 DURO NITRILE	60243511
14	2	ELEMENT	90 DURO NITRILE	60243513
15	1	RUBBER RETAINER	DLMS80	60243850
16	1	LOWER CONE	DLMS60	60040420
17	4	LOWER SLIP	DLMS35	60043135
18	1	DRAG BLOCK BODY	DLMS80	60043335
19	1	RUBBER MANDREL CAP	DLMS60	60140230
20	1	J-BODY	DLMS80	60143340
21	1	DRAG BLOCK RETAINER	DLMS60	60043910
22	4	450 DRAG BLOCK	DLMSDB8	9045900
23	1	J-PIN SUB	DLMS110 / DLMS60	60340650
24	1	BONDED SEAL	DLMS60 / 90 DURO NITRILE	60040520
25	2	1/4-20 UNC X 5/16 SOCKET SET SCREW	STEEL	SSS025C031
26	7	SLIP SPRING		7145900
27	1	SPRING CAGE CAP	DLMS80	60143810
28	1	140 O-RING	90 DURO NITRILE	90140
29	1	224 O-RING	90 DURO NITRILE	90224
30	1	227 O-RING	90 DURO NITRILE	90227

REDRESS KIT (RDK)		60343050
ASSEMBLED WEIGHT		94 LBS



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M) PARTS LIST (cont'd)

M-1) ELASTOMER TRIM OPTIONS

NOTE₁₀: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60343H
13	1	ELEMENT	70 DURO HSN	60243511H
14	2	ELEMENT	90 DURO HSN	60243513H
24	1	BONDED SEAL	DLMS60 / 90 DURO HSN	60040520H
28	1	140 O-RING	90 DURO HSN	90140H
29	1	224 O-RING	90 DURO HSN	90224H
30	1	227 O-RING	90 DURO HSN	90227H

REDRESS KIT (RDK)		60343050H
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M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60343V
13	1	ELEMENT	70 DURO VITON	60243511V
14	2	ELEMENT	90 DURO VITON	60243513V
24	1	BONDED SEAL	DLMS60 / 90 DURO VITON	60040520V
28	1	140 O-RING	90 DURO VITON	90140V
29	1	224 O-RING	90 DURO VITON	90224V
30	1	227 O-RING	90 DURO VITON	90227V

REDRESS KIT (RDK)		60343050V
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M-2) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60343C
8	2	CARBIDE UPPER SLIP	DLMS110	60043115C
17	4	CARBIDE LOWER SLIP	DLMS110	60043135C
22	4	CARBIDE DRAG BLOCK	8620	9045900C



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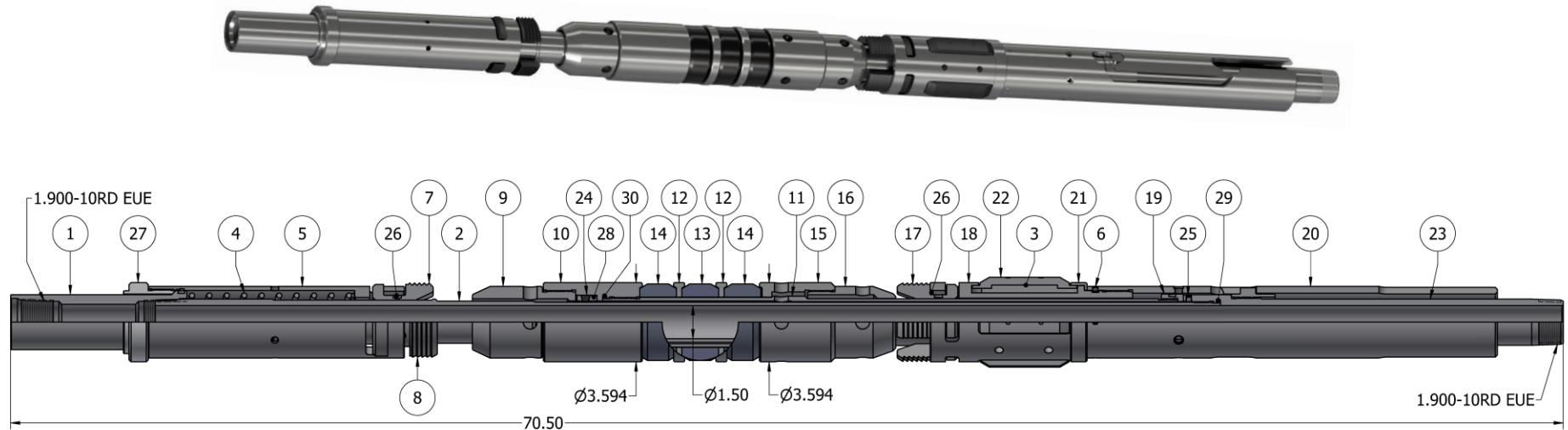
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N) TECHNICAL ILLUSTRATION



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O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
04/21/2023	A	Created manual	-	-