



ASI-X PACKER

7" X 3-1/2"

Manual No:
DL-603-7000-079

Revision: **M**

Revision Date:
08/02/2023

Authored by: S. White

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) 3-1/2" DT-2 On/Off Tool—refer to technical manual *DL-512-3500-131*.

B-2) 3-1/2" 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)	MINIMUM ID (INCHES)		
7	17.0 - 26.0	6.276 – 6.538	6.125*	3.00	3-1/2 EUE	60374 60374H ¹ 60374V ² 60374C ³ 60374HC ⁴ 60374VC ⁵
	26.0 - 32.0	6.094 – 6.276	5.875	3.00	3-1/2 EUE	60373 60373H ¹ 60373V ² 60373C ³ 60373HC ⁴ 60373VC ⁵
	35.0	6.004	5.812	3.00	3-1/2 EUE	60373-35 60373H-35 ¹ 60373V-35 ² 60373C-35 ³ 60373HC-35 ⁴ 60373VC-35 ⁵

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

*Maximum OD is over compressed drag blocks

D & L OIL TOOLS
P.O. BOX 52220 TULSA, OK 74152
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C) SPECIFICATION GUIDE (CONT'D)

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	105,000 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.

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 (14,000 lbs). 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.



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E) SETTING PROCEDURES (CONT'D)

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 (14,000 lbs). After setting the packer, the work string can be left in compression, tension or neutral.

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 to ensure that the packer remains set. 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 (SQ. INCHES)	
		ABOVE	BELOW
7	2.375	6.43 (DOWN)	-7.74 (UP)
	2.875	4.37 (DOWN)	-6.19 (UP)
	3.500	1.24 (DOWN)	-3.83 (UP)



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H) PRESSURE AFFECTED AREA GUIDE (CONT'D)

Example: Consider a 7" X 3-1/2" ASI-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 7" X 3-1/2" ASI-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 4.37 in². Multiplying the differential pressure (3,000 PSI) by the pressure affected area (4.37 in²) results in a force of 13,110 lbs. The piston effect on the packer mandrel is a downward force of 13,110 lbs.

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) SPECIAL TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAW BLOCK ASSEMBLY TOOL	AT070110

K) DISASSEMBLY

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

K-1.1) Move J-body (20) as needed to unscrew and remove set screws (31) from J-pin bottom sub (23).

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 (34) from J-pin bottom sub (23).

K-1.3) Unscrew and remove set screws (32) from J-body (20).

K-1.4) Compress drag blocks (22) with drag block assembly tool (T1).

K-1.5) Unscrew and remove J-body (20) from drag block body (18) (NOTE4: Left-hand threads).

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

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



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K) DISASSEMBLY (cont'd)

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 lower slip springs (25) 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).

NOTE₆: For added leverage, insert a rod thru upper cone (9) as needed.

K-1.12) Remove rubber mandrel assembly and disassemble:

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

K-1.12.1.1) Unscrew and remove gage ring (29) from rubber retainer (15).

K-1.13) Unscrew and remove gage ring (29) from center coupling (10).

K-1.14) Unscrew and remove center coupling (10) from upper cone (9).

K-1.14.1) Remove bonded seal (24) and o-ring (35) from center coupling (10).

K-1.14.1.1) Remove o-ring (33) from bonded seal (24).

K-1.15) Remove bearing bushing (30) and upper cone (9) from inner mandrel (2).

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

CAUTION₄: Do NOT wrench or clamp on seal surface.

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

CAUTION₅: Compression spring (4) is compressed with 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 body (6).

K-2.5) Wedge releasing slip (7) and upper slips (8) outwards (if needed). Remove upper slip body assembly and disassemble:

K-2.5.1) Remove wedges (if needed). Remove releasing slip (7), upper slips (8) and upper slip springs (26) from upper slip body (6).

K-2.5.2) Remove spring retainer ring (28) from upper slip body (6).

K-3) Remove inner mandrel (2) from vise.

L) ASSEMBLY

NOTE₇: 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 relief (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 spring retainer ring (28) into upper slip body (6).

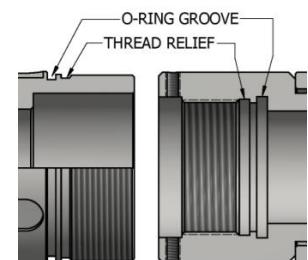


Fig. 2



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L) ASSEMBLY (cont'd)

L-1.1.2) Screw spring cage (5) into upper slip body (6).

L-1.1.3) Install upper slips (8), releasing slip (7), and upper slip springs (26) into upper slip body (6).

NOTE₅: Install two (2ea) springs per slip (Fig. 3).

L-1.1.4) Wedge releasing slip (7) and upper slips (8) outwards. Install upper slip body assembly onto inner mandrel (2). Remove wedges.

L-1.2) Install compression spring (4) into spring cage (5).

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

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

CAUTION₅: Compression spring (4) is compressed with spring tension against upper slip body assembly.

L-2) Remove inner mandrel (2) from vise. Clamp top sub (1) in vise.

L-2.1) Install upper cone (9) and bearing bushing (30) onto inner mandrel (2).

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

L-2.3) Install o-ring (33) in groove in bonded seal (24).

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

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

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

NOTE₆: For added leverage, insert a rod thru upper cone (9) as needed.

L-2.6) Screw gage ring (29) onto center coupling (10).

L-2.7) Assemble rubber mandrel assembly and install:

L-2.7.1) Screw gage ring (29) onto rubber retainer (15).

L-2.7.2) Install rubber retainer (15), elements (13, 14) and rubber spacers (12) onto rubber mandrel (11).

L-2.7.3) Install rubber mandrel assembly onto inner mandrel (2).

L-2.7.4) Screw rubber mandrel (11) into center coupling (10).

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

L-2.8) Screw lower cone (16) into rubber retainer (15).

L-2.9) Assemble drag block body assembly and install:

L-2.9.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge slips outward.

NOTE₈: Install two (2ea) springs per slip (Fig. 4).

L-2.9.2) Install drag block body assembly onto rubber mandrel (11). Remove wedges.

L-2.10) Screw rubber mandrel cap (19) onto rubber mandrel (11).

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

L-2.11) Install drag blocks (22) and drag block springs (3) into drag block body (18). Compress drag blocks (22) with drag block assembly tool (T1).

NOTE₉: Install six (6ea) springs per drag block (Fig. 5).

L-2.12) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22).

L-2.13) Screw J-body (20) onto drag block body (18) (NOTE₄: Left-hand threads).

L-2.14) Screw set screws (32) into J-body (20). Release drag blocks (22).

L-2.15) Install o-ring (34) in groove in J-pin bottom sub (23).

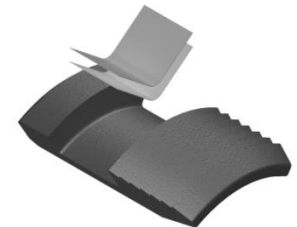


Fig. 3

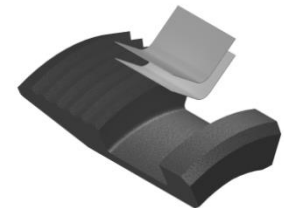


Fig. 4



Fig. 5



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L) ASSEMBLY (cont'd)

L-2.16) Screw J-pin bottom sub (23) onto inner mandrel (2).

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

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

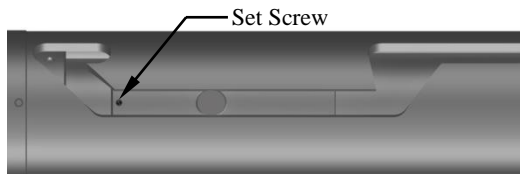


Fig. 6

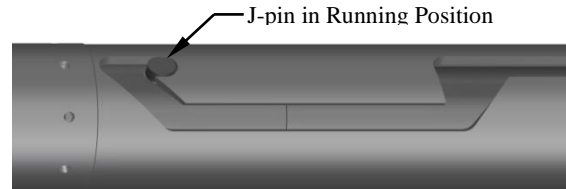



Fig. 7

L-2.17) Screw set screws (6) into J-pin bottom sub (23). Move J-body (20) as needed (Fig. 6).

L-2.18) Screw bottom nipple (28) into J-pin bottom sub (23).


L-2.19) Position J-pin in running position in J-slot of J-body (20) (Fig. 7).

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

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M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374	P/N 60373	P/N 60373-35
1	1	TOP SUB	DLMS80	60073610 (60173610*)		
2	1	INNER MANDREL	DLMS80	60373210		60373210-35
3	24	DRAG BLOCK SPRING	-	9101900		
4	1	COMPRESSION SPRING	DLMCRSP	60373920		
5	1	SPRING CAGE	DLMS60	60373310 (60174310*)		60373310 (60173310*)
6	1	UPPER SLIP BODY	DLMS60	60073320		60073320-35
7	1	RELEASING SLIP	DLMS110	60073125		
8	2	UPPER SLIP	DLMS35	60073115		
9	1	UPPER CONE	DLMS60	60373410		
10	1	CENTER COUPLING	DLMS80	60273620		
11	1	RUBBER MANDREL	DLMS60	60073220		
12	2	RUBBER SPACER	DLMS35	60274840	60273840	60273840-35
13	1	ELEMENT	70 DURO NITRILE	60274511	60273511	
14	2	ELEMENT	90 DURO NITRILE	60274513	60273513	
15	1	RUBBER RETAINER	DLMS60	60273850		
16	1	LOWER CONE	DLMS60	60073420		
17	4	LOWER SLIP	DLMS35	60073135		
18	1	DRAG BLOCK BODY	DLMS35 / DLMS60	60073335		60073335-35
19	1	RUBBER MANDREL CAP	DLMS60	60073230 (60173230*)		
20	1	J-BODY	DLMS60	60373340 (60173340*)		


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M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374	P/N 60373	P/N 60373-35
21	1	DRAG BLOCK RETAINER	DLMS60	60073910		60073910-35
22	4	DRAG BLOCK	DLMSDB8	9080900	9070900	
23	1	J-PIN BOTTOM SUB	DLMS110 / DLMS60	60373650		
24	1	BONDED SEAL	DLMS60 / 90 DURO NITRILE	60073520		
25	8	LOWER SLIP SPRING	-	7170901		
26	6	UPPER SLIP SPRING	-	7170902		
27	1	SPRING CAGE CAP	DLMS60	60074810 (60174810*)		60073810-35
28	1	SPRING RETAINER RING	DLMS35	60073820		
29	2	GAGE RING	DLMS60	60274830	60273830	60273830-35
30	1	BEARING BUSHING	DLMS35	60373224		
31	2	SET SCREW 1/4-20 UNC	STEEL	SSS025C037 (3/8" LONG)	SSS025C043 (7/16" LONG)	SSS025C037 (3/8" LONG)
32	3	SET SCREW 3/8-16 UNC X 3/8	STEEL	SSS037C037		
33	1	155 O-RING	90 DURO NITRILE	90155		
34	1	237 O-RING	90 DURO NITRILE	90237		
35	1	243 O-RING	90 DURO NITRILE	90243		

REDRESS KIT (RDK)		60374050	60373050	
ASSEMBLED WEIGHT		315 LBS	314 LBS	310 LBS

*P/N may be substituted.

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M-2) ELASTOMER TRIM OPTIONS

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

M-2.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374H	P/N 60373H	P/N 60373H-35
13	1	ELEMENT	70 DURO HSN	60274511H	60273511H	
14	2	ELEMENT	90 DURO HSN	60274513H	60273513H	
24	1	BONDED SEAL	90 DURO HSN	60073520H		
33	1	155 O-RING	90 DURO HSN	90155H		
34	1	237 O-RING	90 DURO HSN	90237H		
35	1	243 O-RING	90 DURO HSN	90243H		

REDRESS KIT (RDK)		60374050H	60373050H
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M-2.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374V	P/N 60373V	P/N 60373V-35
13	1	ELEMENT	70 DURO VITON	60274511V	60273511V	
14	2	ELEMENT	90 DURO VITON	60274513V	60273513V	
24	1	BONDED SEAL	90 DURO VITON	60073520V		
33	1	155 O-RING	90 DURO VITON	90155V		
34	1	237 O-RING	90 DURO VITON	90237V		
35	1	243 O-RING	90 DURO VITON	90243V		

REDRESS KIT (RDK)		60374050V	60373050V
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M-3) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374C	P/N 60373C	P/N 60373C-35
8	2	CARBIDE UPPER SLIP	DLMS110	60073115C		
17	4	CARBIDE LOWER SLIP	DLMS110	60073135C		
22	4	CARBIDE DRAG BLOCK	DLMSDB4	9080900C	9070900C	



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7" X 3-1/2"

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DL-603-7000-079

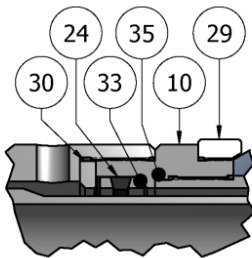
Revision: **M**

Revision Date:
08/02/2023

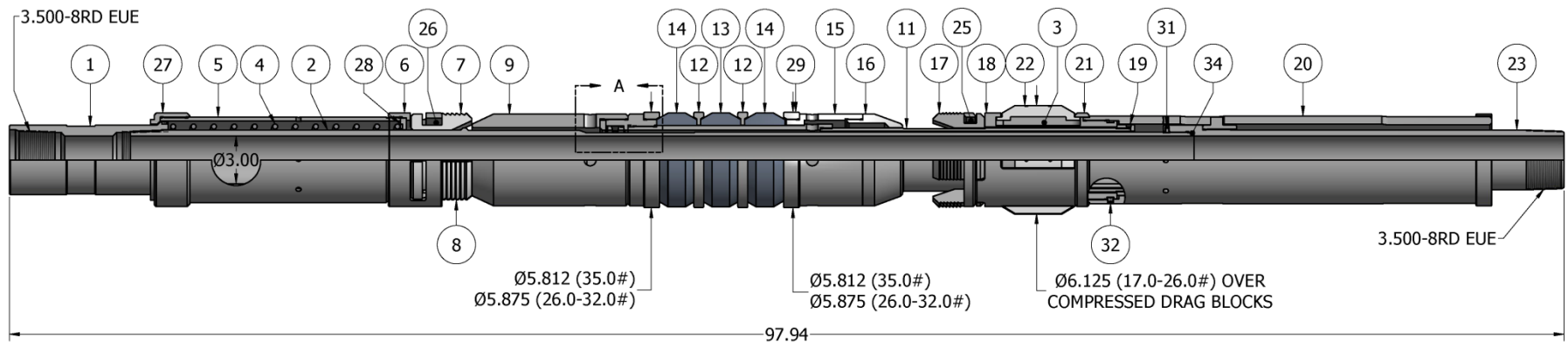
Authored by: S. White


Approved by: J. McArthur

N) TECHNICAL ILLUSTRATION



DETAIL A



	<h1 style="text-align: center;">ASI-X PACKER</h1> <h2 style="text-align: center;">7" X 3-1/2"</h2>		Manual No: DL-603-7000-079
			Revision: M
			Revision Date: 08/02/2023
Authored by: S. White		Approved by: J. McArthur	

O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
08/02/2023	M	Added carbide options	J.Anderson	E.Visaez
07/16/2018	L	Revised Elastomer Trim Temp Guide	J.Anderson	K.Plunkett
12/02/2016	K	Added General Screw Torque Recommendations; Revised Elastomer Trim Temperature Guide Nitrile and HSN temp. ratings; Removed tool drift ID	J.Anderson	D.Hushbeck
04/28/15	J	Added Related Tools, tool Drift ID; Revised Pressure Affected Area Guide; Added P/N 60073610, 60373310, 60073230, 60373340, 60073810	J.Anderson	K.Riggs
06/19/13	H	Revised P/N 60173610 was 60073610, 60174310 and 60173310 was 60373310, 60173230 was 60073230, 60173340 was 60373340, 60174810 was 60073810, pressure affected area guide 3.83 was 3.47, pressure affected area guide example Added note for use of double hook J-slot packers, max tensile load	S. McEntire	J. McArthur
02/04/13	G	Revised technical illustration to include detail view, P/N 90243 item 35 was 34; P/N 90237 item 34 was 35; Added recommended hand tools, revision history, HSN and Viton options (P/Ns 60374H, 60374V, 60373H, 60373V, 60373H-35, 60373V-35);	J.Anderson	J.McArthur