



ASI-X PACKER

6" X 2-7/8"

Manual No:
DL-603-6000-096

Revision: **F**

Revision Date:
02/23/2021

Authored by: S. White

Approved by: D. Hushbeck

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)2-7/8" DT-2 On/Off Tool—refer to technical manual *DL-512-2875-146*.

B-2)2-7/8" 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)		
6	12.0 – 20.0	5.352 – 5.620	5.188	2.38	2-7/8 EUE	60360 60360H ¹ 60360V ²

Elastomer Trim Options: ¹HSN, ²Viton

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	64,500 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 with enough weight to set the packer (12,000 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.

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 (12,000 lbs). 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

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) 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
6	2.375	2.06 (DOWN)	-3.37 (UP)
	2.875	0.00	-1.81 (UP)

Example: Consider a 6" X 2-7/8" ASI-X Packer set on 2.375" 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 6" X 2-7/8" ASI-X Packer run on 2.375" 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 2.06 in². Multiplying the differential pressure (3,000 PSI) by the pressure affected area (2.06 in²) results in a force of 6,180 lbs. The piston effect on the packer mandrel is a downward force of 6,180 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 (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) SPECIAL TOOLS

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

K) DISASSEMBLY

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

K-1.1) Unscrew and remove set screws (28) 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 (33) from J-pin bottom sub (23).

K-1.3) Unscrew and remove set screws (31) 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).

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

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

K-1.9) Wedge lower slips (17) outwards (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).



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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 set screws (6) from gage ring (29).

K-1.14) Remove gage ring (29) from center coupling (10).

K-1.15) Unscrew and remove center coupling (10) from upper cone (9).

K-1.15.1) Remove bonded seal (24) and o-ring (34) from center coupling (10).

K-1.15.1.1) Remove o-ring (32) from bonded seal (24).

K-1.16) Remove upper cone (9) and bearing bushing (30) from inner mandrel (2).

K-2) Unclamp and remove top sub (1) from vise. Clamp 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 spring cage 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) 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 upper slip springs (26) from spring cage (5).

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

L) 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.

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 spring cage assembly and install:

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

NOTE7: Uses two (2ea) springs per slip (Fig. 3).

L-1.1.2) Wedge releasing slip (7) and upper slips (8) outwards. Install spring cage 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) into 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) and bearing bushing (30) onto inner mandrel (2).

L-2.2) Install o-ring (34) into o-ring groove in center coupling (10).

L-2.3) Install o-ring (32) into o-ring groove in bonded seal (24).

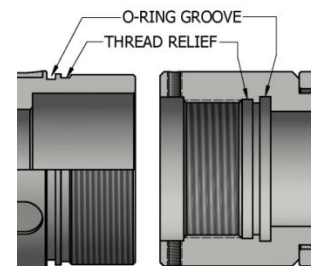


Fig. 2



Fig. 3



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L) ASSEMBLY (cont'd)

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).

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

L-2.7) Screw set screws (6) into gage ring (29).

L-2.8) Assemble and install rubber mandrel assembly:

L-2.8.1) Install rubber retainer (15), elements (13, 14), and rubber spacers (12) onto rubber mandrel (11).

L-2.8.2) Install rubber mandrel assembly onto inner mandrel (2).

L-2.8.3) Screw rubber mandrel (11) into center coupling (10).

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

L-2.9) Screw lower cone (16) into rubber retainer (15).

L-2.10) Assemble drag block body assembly and install:

L-2.10.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge lower slips (17) outwards.

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

L-2.11) Install drag block body assembly onto rubber mandrel (11). Remove wedges.

L-2.12) Screw rubber mandrel cap (19) onto rubber mandrel (11).

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

L-2.13) 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: Uses four (4ea) drag block springs per drag block (Fig. 5).

L-2.14) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22).

L-2.15) Screw J-body (20) onto drag block body (18) (**NOTE3:** Left-hand threads).

L-2.16) Screw set screws (31) into J-body (20). Release drag blocks (22).

L-2.17) Install o-ring (33) into o-ring groove in J-pin bottom sub (23).

L-2.18) Screw J-pin bottom sub (23) onto inner mandrel (2).

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

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

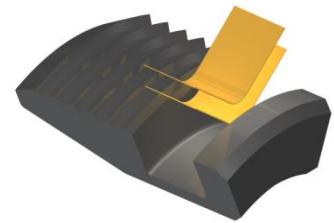


Fig. 4

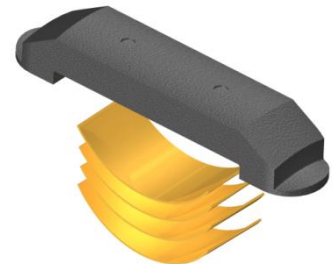


Fig. 5

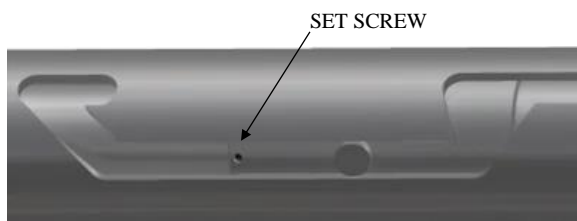


Fig. 6

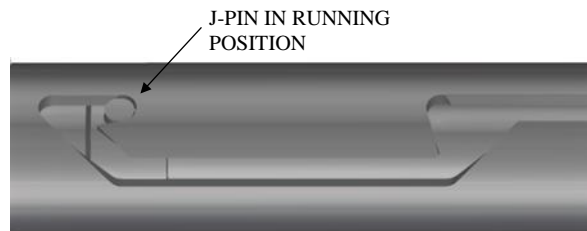


Fig. 7

L-2.19) Rotate J-body (20) as needed to position J-pin of J-pin bottom sub (23) along J-slot to access threaded holes (Fig. 6). Screw set screws (28) into J-pin bottom sub (23).

L-2.20) Position J-pin of J-pin bottom sub (23) 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 60360
1	1	TOP SUB	DLMS80	60156610
2	1	INNER MANDREL	DLMS41X80	60356210
3	16	DRAG BLOCK SPRING	-	9100900
4	1	COMPRESSION SPRING	DLMCRSP	60356920
5	1	SPRING CAGE	DLMS60	60156325
6	2	SET SCREW 1/4-20 UNC X 5/16	STEEL	SSS025C031
7	1	RELEASING SLIP	DLMS110	60060125
8	2	UPPER SLIP	DLMS35	60060115
9	1	UPPER CONE	DLMS80	60356410
10	1	CENTER COUPLING	DLMS80	60056620
11	1	RUBBER MANDREL	DLMS60	60056220
12	2	RUBBER SPACER	DLMS35	60260840
13	1	ELEMENT	70 DURO NITRILE	60260511
14	2	ELEMENT	90 DURO NITRILE	60260513
15	1	RUBBER RETAINER	DLMS35	60260850
16	1	LOWER CONE	DLMS60	60056420
17	4	LOWER SLIP	DLMS35	60060135
18	1	DRAG BLOCK BODY	DLMS80	60060335
19	1	RUBBER MANDREL CAP	DLMS60	60156230
20	1	J-BODY	DLMS60	60156340
21	1	DRAG BLOCK RETAINER	DLMS60	60060915
22	4	DRAG BLOCK	DLMSDB8	9056900
23	1	J-PIN BOTTOM SUB	DLMS110 / DLMS60	60056650
24	1	BONDED SEAL	NITRILE	60056520
25	8	LOWER SLIP SPRING	-	7155901
26	6	UPPER SLIP SPRING	-	7155902
27	1	SPRING CAGE CAP	DLMS60	60160810
28	2	SET SCREW 1/4-20 UNC X 3/8	STEEL	SSS025C037
29	1	GAGE RING	DLMS35	60260830
30	1	BEARING BUSHING	DLMS60	60056224



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M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60360
31	3	SET SCREW 5/16-18 UNC X 3/8	STEEL	SSS031C037
32	1	151 O-RING	90 DURO NITRILE	90151
33	1	231 O-RING	90 DURO NITRILE	90231
34	1	235 O-RING	90 DURO NITRILE	90235

REDRESS KIT (RDK)		60360050
ASSEMBLED WEIGHT		191 LBS

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 60360H
13	1	ELEMENT	70 DURO HSN	60260511H
14	2	ELEMENT	90 DURO HSN	60260513H
24	1	BONDED SEAL	90 DURO HSN	60056520H
32	1	151 O-RING	90 DURO HSN	90151H
33	1	231 O-RING	90 DURO HSN	90231H
34	1	235 O-RING	90 DURO HSN	90235H

REDRESS KIT (RDK)		60360050H
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M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60360V
13	1	ELEMENT	70 DURO VITON	60260511V
14	2	ELEMENT	90 DURO VITON	60260513V
24	1	BONDED SEAL	90 DURO VITON	60056520V
32	1	151 O-RING	90 DURO VITON	90151V
33	1	231 O-RING	90 DURO VITON	90231V
34	1	235 O-RING	90 DURO VITON	90235V

REDRESS KIT (RDK)		60360050V
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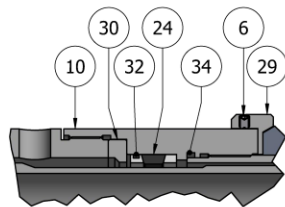
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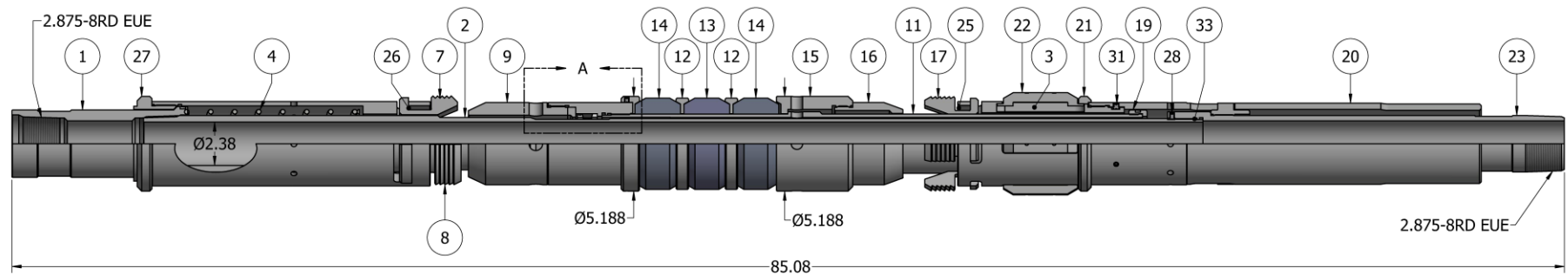
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N) TECHNICAL ILLUSTRATION



DETAIL A



	<h1 style="text-align: center;">ASI-X PACKER</h1> <h2 style="text-align: center;">6" X 2-7/8"</h2>		Manual No: DL-603-6000-096
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O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
02/23/2021	F	60060335 was 60056335, 9056900 was 9057900, 60060915 was 60060910	J.Anderson	D.McKeon
10/02/2019	E	Revised 60156610 was 60070610, 60160810 was 60060810, 60156325 was 60356325, 60156230 was 60056230, 60156340 was 60356340, Elastomer Trim Temp. Guide temp ratings; Added General Screw Torque Recommendations	J.Anderson	E.Visaez
01/23/15	D	Revised P/N SSS031C037 was SSS037C037 and Elastomer Trim Temperature Guide was Element Selection Guide, Pressure Affected Area Guide; Added related tools, drift ID to specifications guide, note for use of double hook J-slot packers, tensile load max, pre-installation inspection procedures, storage procedure and figures 2, 6, 7 to assembly instructions.	D.Barlow	K.Riggs
09/13/13	C	Revised assembled weight was 188 lbs; Added HSN and Viton options (60360H, 60360V, 60358H, 60358V, 60359H, 60359V), note for use of double hook J-slot packers, recommended tools, revision history	J.Anderson	H.Bringham