



ASI-X PACKER

4" X 1.900"

Manual No:
DL-603-4000-089

Revision: **G**

Revision Date:
03/23/2021

Authored by: S. White

Approved by: H. Bringham

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

B-2) 1.900" 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)		
4	9.5 -11.0	3.476 – 3.548	3.250	1.50	1.900 EUE	60340 60340H ¹ 60340V ² 60340C ³ 60340HC ⁴ 60340VC ⁵
	10.46 - 12.95	3.340 – 3.476	3.187	1.50	1.900 EUE	60341 60341H ¹ 60341V ² 60341C ³ 60341HC ⁴ 60341VC ⁵

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

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

NOTE₂: Use of 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)
10,000 PSI	48,500 LBS

D & L OIL TOOLS
P.O. BOX 52220 TULSA, OK 74152
PHONE: (800) 441-3504 www.dloilttools.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 (8,000 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 right-hand turn 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 (8,000 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 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 or other 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
4	1.900	0.066 (DOWN)	-0.865 (UP)
	2.375	-1.529 (UP)	0.225 (DOWN)

Example: Consider a 4" X 1.900" ASI-X Packer 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" X 1.900" ASI-X Packer 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.



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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	DRAW BLOCK ASSEMBLY TOOL	AT045110

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 to access screws.

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

K-1.3) Compress drag blocks (22) with drag block assembly tool (T1).

K-1.4) Unscrew and remove set screws (6) from J-body (20).

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 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 through 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).



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K) DISASSEMBLY (cont'd)

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

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

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

K-1.13.1) Remove seal (24) and o-ring (31) from center coupling (10).

K-1.13.1.1) Remove o-ring (29) from 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.

CAUTION6: Do NOT wrench or clamp on seal surface.

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

CAUTION4: 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) For P/N 60341, unscrew and remove cap screws (32) from spring cage (5).

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

K-2.5.1) Remove wedges. Remove releasing slip (7), upper slips (8) and slip springs (25 or 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 (Fig. 2).

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

CAUTION6: 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 (25 or 26) into spring cage (5). Wedge slips outwards.

NOTE7: Install one (1ea) spring per slip (Figs. 3 and 4).

L-1.1.2) Install spring cage assembly onto inner mandrel (2). Remove wedges.

L-1.2) For P/N 60341, screw cap screws (32) into spring cage (5).

L-1.3) Install compression spring (4) onto inner mandrel (2).

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

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

CAUTION4: Compression spring (4) is compressed with spring tension against spring cage assembly.

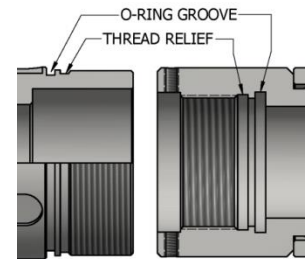


Fig. 2

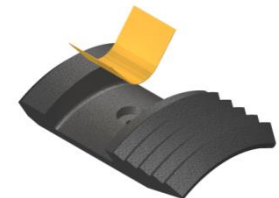


Fig. 3, P/N 60340



Fig. 4, P/N 60341



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L) ASSEMBLY (cont'd)

L-2) 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 (31) in o-ring groove in center coupling (10).

L-2.3) Install o-ring (29) in o-ring groove in bonded seal (24).

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

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

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).

CAUTIONs: 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 lower slip springs (25) into drag block body (18). Wedge slips outward.

NOTE7: Install one (1ea) spring per slip (Fig. 5).

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

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) with drag block assembly tool (T1).

NOTE8: Install three (3ea) springs per drag block (Fig. 6).

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

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

L-2.13) Screw set screws (6) into J-body (20). Release drag blocks (22).

L-2.14) Install o-ring (30) in o-ring groove in J-pin bottom sub (23).

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

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

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

L-2.16) Screw set screws (28) into J-pin bottom sub (23). Move J-body (20) as needed to access threaded holes.

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

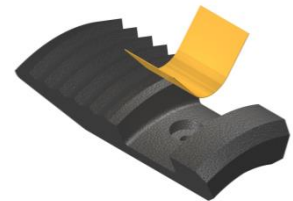


Fig. 5

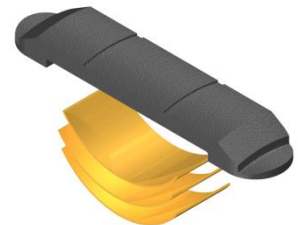


Fig. 6



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M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	9.5 – 11.0# P/N 60340	10.46 – 12.95# P/N 60341
1	1	TOP SUB	DLMS60	60140610 (60340610*)	60141610 (60340610*)
2	1	INNER MANDREL	DLMS80	60140210	60141210
3	12	DRAG BLOCK SPRING	DLMELG	9100900	
4	1	COMPRESSION SPRING	DLMCSP	60340920	
5	1	SPRING CAGE	DLMS60	60140326	60141325
6	4	SET SCREW 1/4-20 UNC X 1/4	STEEL	SSS025C025	
7	1	RELEASING SLIP	DLMS110	60040125	
8	2	UPPER SLIP	DLMS60	60040115	
9	1	UPPER CONE	DLMS60	60040410	60041410
10	1	CENTER COUPLING	DLMS60	60240620	60241620
11	1	RUBBER MANDREL	DLMS60	60340220	60341220
12	2	RUBBER SPACER	DLMS60	60240840	60241840
13	1	ELEMENT	70 DURO NITRILE	60240511	
14	2	ELEMENT	90 DURO NITRILE	60240513	
15	1	RUBBER RETAINER	DLMS60	60140850	60141850
16	1	LOWER CONE	DLMS60	60140420	60141420
17	4	LOWER SLIP	DLMS60	60040135	
18	1	DRAG BLOCK BODY	DLMS60	60040335	60041335
19	1	RUBBER MANDREL CAP	DLMS60	60140230 (60040230*)	
20	1	J-BODY	DLMS60	60140340 (60340340*)	60141340 (60341340*)
21	1	DRAG BLOCK RETAINER	DLMS60	60040910	60041910
22	4	DRAG BLOCK	DLMSDB8	9045900	9040900
23	1	BOTTOM SUB	DLMS110 / DLMS60	60340650	
24	1	BONDED SEAL	DLMS60 / 90 DURO NITRILE	60040520	
25	-	LOWER SLIP SPRING	DLMELG	7145900 7 QTY	4 QTY
26	3	UPPER SLIP SPRING	DLMELG	-	7045900
27	1	SPRING CAGE CAP	DLMS60	60140810 (60040810*)	60141810 (60041810*)

* P/N may be substituted.



ASI-X PACKER

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M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	9.5 – 11.0# P/N 60340	10.46 – 12.95# P/N 60341
28	2	SET SCREW 1/4-20 UNC X 5/16	STEEL	SSS025C031	
29	1	140 O-RING	90 DURO NITRILE	90140	
30	1	224 O-RING	90 DURO NITRILE	90224	
31	1	227 O-RING	90 DURO NITRILE	90227	
32	3	SOCKET CAP SCREW 1/4-20 UNC X 1/4	STEEL	-	SCS025C025

REDRESS KIT (RDK)		60340050	60341050
ASSEMBLED WEIGHT		85 LBS	79 LBS

M-1) ELASTOMER TRIM OPTIONS

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

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	9.5 – 11.0# P/N 60340H	10.46 – 12.95# P/N 60341H
13	1	ELEMENT	70 DURO HSN	60240511H	
14	2	ELEMENT	90 DURO HSN	60240513H	
24	1	BONDED SEAL	90 DURO HSN	60040520H	
29	1	140 O-RING	90 DURO HSN	90140H	
30	1	224 O-RING	90 DURO HSN	90224H	
31	1	227 O-RING	90 DURO HSN	90227H	

REDRESS KIT (RDK)		60340050H	60341050H
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M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	9.5 – 11.0# P/N 60340V	10.46 – 12.95# P/N 60341V
13	1	ELEMENT	70 DURO VITON	60240511V	
14	2	ELEMENT	90 DURO VITON	60240513V	
24	1	BONDED SEAL	90 DURO VITON	60040520V	
29	1	140 O-RING	90 DURO VITON	90140V	
30	1	224 O-RING	90 DURO VITON	90224V	
31	1	227 O-RING	90 DURO VITON	90227V	

REDRESS KIT (RDK)		60340050V	60341050V
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M) PARTS LIST (cont'd)

M-2) CARBIDE OPTION

ITEM	QTY	DESCRIPTION	MATERIAL	9.5 – 11.0# P/N 60340C	10.46 – 12.95# P/N 60341C
8	2	CARBIDE UPPER SLIP	DLMS60	60040115C	
17	4	CARIBIDE LOWER SLIP	DLMS60	60040135C	
22	4	CARBIDE DRAG BLOCK	DLMSDB8	9045900C	9040900C



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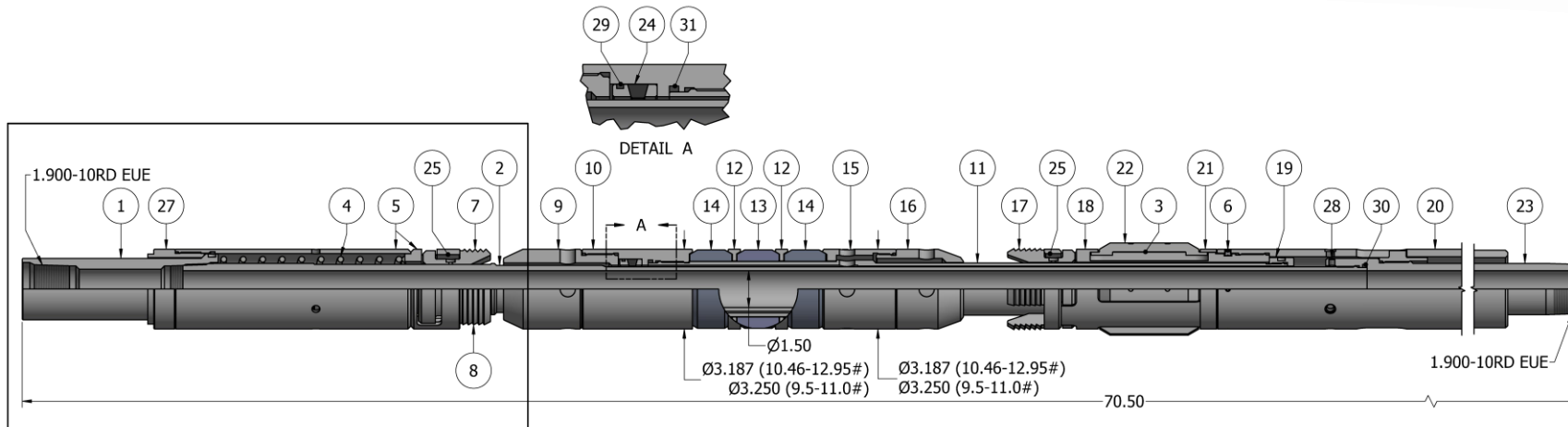
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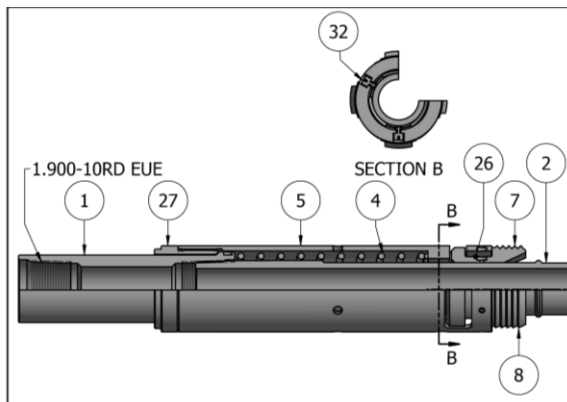
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N) TECHNICAL ILLUSTRATION




P/N 60340



P/N 60341

This document is uncontrolled when printed. For the current revision, refer to the electronic copy in the Vault database.

	<h1 style="text-align: center;">ASI-X PACKER</h1> <h2 style="text-align: center;">4" X 1.900"</h2>		Manual No: DL-603-4000-089
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O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
03/23/2021	G	Revised nitrile temp. ratings; Added carbide options	J.Anderson	E.Visaez
07/01/2016	F	Revised Pressure Affected Area Guide, Elastomer Trim Temperature Guide was Element Selection Guide, 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, P/N 7145900 was 7145901, qty 7 was 4, P/N 60340 Item #1 60140610 was 60141610, 60140810 was 60040810; Added related tool 1.900" Stinger, P/N 60141610, P/N 60340 set screws P/N SSS025C031; Removed P/N 7145902	J.Anderson	N.Banker
03/26/14	E	Revised max. differential pressure was 7,000, PN 60140326 was 60040325, 60141326 was 60341325; 7145901 was 7145900, 7145902 was 7045900; Added related tools, pre-installation and storage procedures	J.Anderson	R.Dyer
06/04/13	D	Added HSN and Viton options (60340H, 60340V, 60341H, 60341V), note for use of double hook J-slot packers, recommended tools, revision history; Removed AFLAS from element selection guide.	J.Anderson	B.Oligschlaeger