



# ASI-X HT PACKER

## 5" X 2-3/8"

Manual No:  
**DL-603-5000-116**

Revision: **H**

Revision Date:  
**09/15/2017**

Authored by: S. White

Approved by: D. Hushbeck

### A) DESCRIPTION

The ASI-X HT 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 ASI-X HT Packer 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) 2-3/8" DT-2 On/Off Tool and Stinger—refer to technical manual *DL-512-2375-360*.

B-2) 2-3/8" 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)		
5	11.5 – 15.0	4.408 – 4.560	4.125	1.94	2-3/8 EUE	60350HT 60350HTH <sup>1</sup> 60350HTV <sup>2</sup>
	18.0 - 20.8	4.156 – 4.276	4.000	1.94	2-3/8 EUE	60352HT 60352HTH <sup>1</sup> 60352HTV <sup>2</sup>
	21.4	4.126	3.938	1.94	2-3/8 EUE	60353HT 60353HTH <sup>1</sup> 60353HTV <sup>2</sup>

Elastomer Trim Options: <sup>1</sup>HSN, <sup>2</sup>Viton

**NOTE<sub>1</sub>:** Tools listed are right-hand set / right-hand release.

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
10,000 PSI	55,000 LBS

D & L OIL TOOLS  
P.O. BOX 52220 TULSA, OK 74152  
PHONE: (800) 441-3504 [www.dloiltools.com](http://www.dloiltools.com)



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## D) PRE-INSTALLATION INSPECTION PROCEDURES

**CAUTION<sub>1</sub>:** 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

**CAUTION<sub>2</sub>:** 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 (10,000 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 (10,000 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 HT 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

As a last resort, if the packer will not release in the normal manner, a minimum straight pull of 47,500 lbs (may have to pull as high as 56,000 lbs) over work string weight can be applied – this will shear the J-pins on the J-pin bottom sub allowing the packer to be pulled. Tensile strength of tubing and connections should be considered. 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
5	1.900	1.48 (DOWN)	-2.28 (UP)
	2.063	0.97 (DOWN)	-1.91 (UP)
	2.375	-0.11 (UP)	-1.19 (UP)

**Example:** Consider a 5" X 2-3/8" 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 5" X 2-3/8" 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 -0.11 in<sup>2</sup>. Multiplying the differential pressure (3,000 PSI) by the pressure affected area (-0.11 in<sup>2</sup>) results in a force of -330 lbs. The piston effect on the packer mandrel is an upward force of 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) SPECIAL TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT055110

### K) DISASSEMBLY

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

K-1.1) Unscrew and remove bottom nipple (5) from J-pin bottom sub (23).

K-1.2) Unscrew and remove set screws (28) from J-pin bottom sub (23). Move J-body as need to access set screws (28)

K-1.3) Unscrew and remove J-pin bottom sub (23) from inner mandrel (2).

**NOTE<sub>3</sub>:** Drag block body assembly must be free to rotate.

K-1.3.1) Remove o-ring (30) from J-pin bottom sub (23).

K-1.4) Unscrew and remove set screws (28) from J-body (20).

K-1.5) Compress drag blocks (22) using drag block body assembly tool (T1). Unscrew and remove J-body (20) from drag block body (18) (**NOTE<sub>2</sub>:** Left-hand threads).

K-1.6) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).

K-1.7) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

**NOTE<sub>4</sub>:** For added leverage, insert a rod through rubber retainer (15) and rubber mandrel (11) as needed.

K-1.8) Wedge lower slips (17) outwards (if needed). Remove drag block body assembly and disassemble:

K-1.8.1) Remove wedges. Remove lower slips (17) and lower slip springs (25) from drag block body (18).

K-1.9) Unscrew and remove lower cone (16) from rubber retainer (15).



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### K) DISASSEMBLY (cont'd)

K-1.9.1) Unscrew rubber mandrel (11) from center coupling (10).

**NOTE:** For added leverage, insert a rod through upper cone (9) as needed.

K-1.10) Remove rubber mandrel assembly and disassemble:

K-1.10.1) Remove elements (13, 14), rubber spacers (12), and rubber retainer (15) from rubber mandrel (11).

K-1.11) Unscrew and remove center coupling (10) from upper cone (9).

K-1.11.1) Remove bonded seal (24) and o-ring (31) from center coupling (10).

K-1.11.1.1) Remove o-ring (29) from bonded seal (24).

K-1.12) Remove upper cone (9) from inner mandrel (2).

K-2) Remove top sub (1) from vise and clamp inner mandrel (2) in vise.

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

K-2.1) Unscrew and remove spring cage cap (27) from upper slip body (6).

**CAUTION:** 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 upper slip body (6).

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

K-2.4.1) Remove releasing slip (7), upper slips (8) and upper slip springs (26) from upper slip body (6).

K-2.4.2) Remove spring retaining ring (21) from upper slip body (6).

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

### L) ASSEMBLY

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

**CAUTION:** 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.

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

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

L-1.1.1) Install spring retaining ring (21) into upper slip body (6)

L-1.1.2) Install upper slips (8), releasing slip (7) and upper slip springs (26) into upper slip body (6).

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

L-1.1.3) 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) onto inner mandrel (2) and into upper slip body (6).

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

L-1.4) Screw spring cage cap (27) into upper slip body (6).

**CAUTION:** 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) onto inner mandrel (2).

L-2.2) Install o-ring (29) in groove in bonded seal (24).

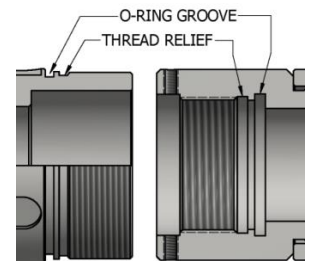


Fig. 2

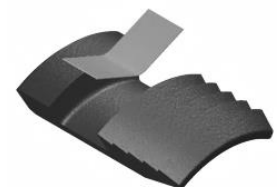


Fig. 3



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### L) ASSEMBLY (cont'd)

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

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

L-2.4) Install o-ring (31) in groove in center coupling (10).

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

**NOTE5:** For added leverage, insert a rod through upper cone (9) as needed.

L-2.6) Assemble and install rubber mandrel assembly:

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 lower slip springs (25) 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). Remove wedges.

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

**NOTE4:** For added leverage, insert a rod through rubber retainer (15) and rubber mandrel (11) as needed.

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 drag block (Fig. 5).

L-2.11) Screw J-body (20) onto drag block body (18) capturing ends of drag blocks (22) (**NOTE2:** Left-hand threads).

L-2.12) Release drag blocks (22).

L-2.13) Screw set screws (28) into J-body (20).

L-2.14) Install o-ring (30) in 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.

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

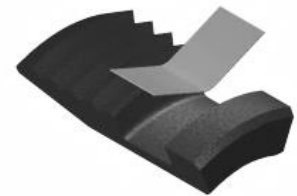


Fig. 4

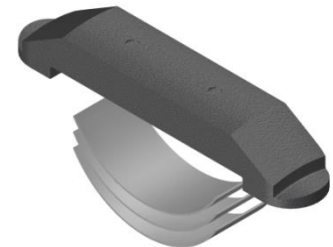


Fig. 5

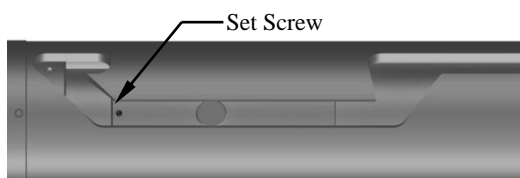


Fig. 6

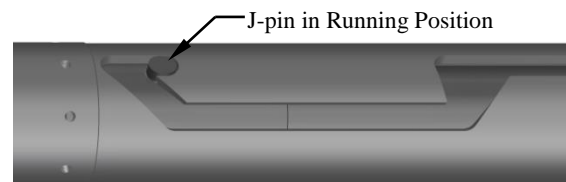



Fig. 7

L-2.16) Screw set screws (28) into J-pin bottom sub (23). Move J-body assembly as needed to access threaded holes (Fig. 6).

L-2.17) Screw bottom nipple (5) into J-pin bottom sub (23).

L-2.18) Position J-pin in running position in J-slot of J-pin bottom sub (23) (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	11.5 – 15.0# P/N 60350HT	18.0 – 21.0# P/N 60352HT	21.4# P/N 60353HT
1	1	TOP SUB	DLSM110	60145610HT (60045610HT*)		
2	1	INNER MANDREL	DLMS110	60045210HT		60044210HT
3	12	DRAG BLOCK SPRING	INCONEL	9100900		
4	1	COMPRESSION SPRING	CHROME VANADIUM	60345920		
5	1	BOTTOM NIPPLE	DLMS80	60355636		
6	1	UPPER SLIP BODY	DLMS110 / DLMS60	60150325HT (60050325HT*)		60153325HT (60053325HT*)
7	1	RELEASING SLIP	DLMS110	60050125		
8	2	UPPER SLIP	DLMS35	60050115		
9	1	UPPER CONE	DLMS110	60045410HT		
10	1	CENTER COUPLING	DLMS60	60250620	60252620	60253620
11	1	RUBBER MANDREL	DLMS110	60045220		60044220
12	2	RUBBER SPACER	DLMS35	60250840	60252840	60253840
13	1	ELEMENT	80 DURO NITRILE	60250512	60252512	60253512
14	2	ELEMENT	90 DURO NITRILE	60250513	60252513	60253513
15	1	RUBBER RETAINER	DLMS60	60250850	60252850	60253850
16	1	LOWER CONE	DLMS110	60045420HT		
17	4	LOWER SLIP	DLMS35	60050135		
18	1	DRAG BLOCK BODY	DLMS60	60050335		60053335
19	1	RUBBER MANDREL CAP	DLMS60	60145230 (60045230*)		

\*P/N may be substituted.

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### M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	11.5 – 15.0# P/N 60350HT	18.0 – 21.0# P/N 60352HT	21.4# P/N 60353HT
20	1	J-BODY	DLMS110	60145340HT (60045340HT*)		
21	1	SPRING RETAINING RING	DLMS60	60045820		
22	4	DRAW BLOCK	DLMSDB8	9057900	9056900	9055900
23	1	J-PIN BOTTOM SUB	DLMS110	60045634HT		
24	1	BONDED SEAL	90 DURO NITRILE	60045520		
25	4	LOWER SLIP SPRING	ELGILOY	7145901		
26	3	UPPER SLIP SPRING	-	7145902		
27	1	SPRING CAGE CAP	DLMS60	60145810 (60045810*)		
28	6	SET SCREW 1/4-20 UNC X 3/8	STEEL	SSS025C037		
29	1	145 O-RING	90 DURO NITRILE	90145		
30	1	228 O-RING	90 DURO NITRILE	90228		
31	1	232 O-RING	90 DURO NITRILE	90232		

REDRESS KIT (RDK)		60350050HT	60352050HT	60353050HT
ASSEMBLED WEIGHT		121 LBS	120 LBS	117 LBS

\*P/N may be substituted.



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### M-1) ELASTOMER TRIM OPTIONS

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

#### M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	11.5 – 15.0# P/N 60350HTH	18.0 – 21.0# P/N 60352HTH	21.4# P/N 60353HTH
13	1	ELEMENT	80 DURO HSN	60250512H	60252512H	60253512H
14	2	ELEMENT	90 DURO HSN	60250513H	60252513H	60253513H
24	1	BONDED SEAL	90 DURO HSN	60045520H		
29	1	145 O-RING	90 DURO HSN	90145H		
30	1	228 O-RING	90 DURO HSN	90228H		
31	1	232 O-RING	90 DURO HSN	90232H		
REDRESS KIT (RDK)				60350050HTH	60352050HTH	60353050HTH

#### M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	11.5 – 15.0# P/N 60350HTV	18.0 – 21.0# P/N 60352HTV	21.4# P/N 60353HTV
13	1	ELEMENT	80 DURO VITON	60250512V	60252512V	60253512V
14	2	ELEMENT	90 DURO VITON	60250513V	60252513V	60253513V
24	1	BONDED SEAL	90 DURO VITON	60045520V		
29	1	145 O-RING	90 DURO VITON	90145V		
30	1	228 O-RING	90 DURO VITON	90228V		
31	1	232 O-RING	90 DURO VITON	90232V		
REDRESS KIT (RDK)				60350050HTV	60352050HTV	60353050HTV



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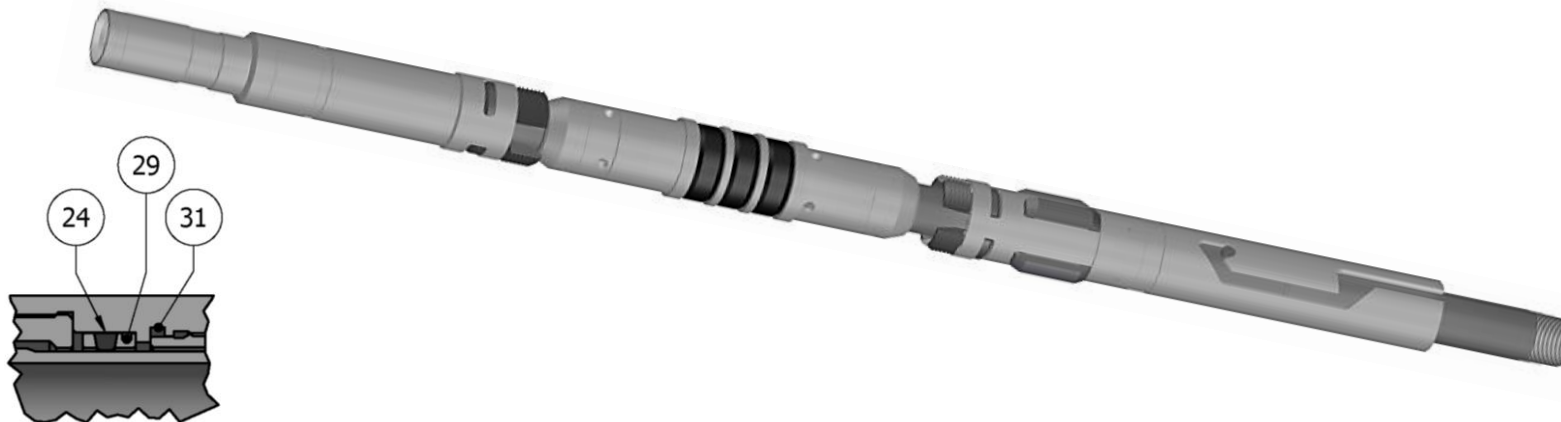
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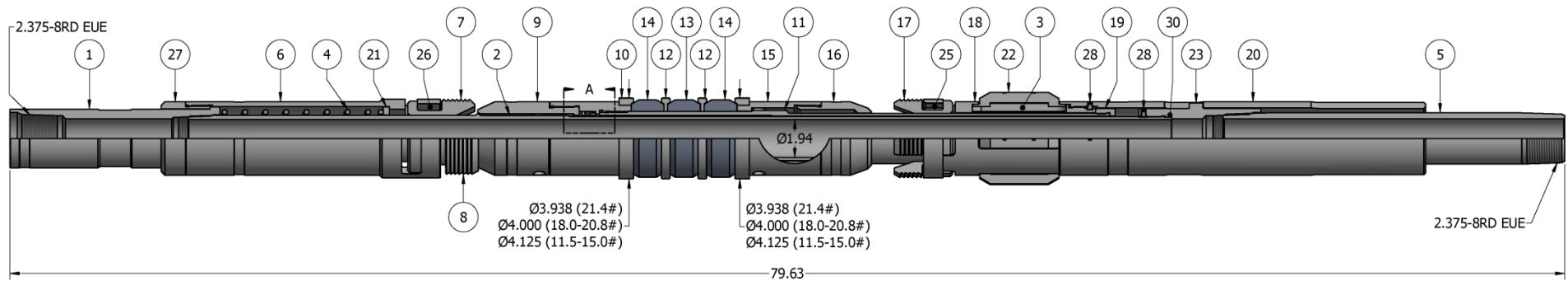
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### N) TECHNICAL ILLUSTRATION



DETAIL A



	<h1>ASI-X HT PACKER</h1> <h2>5” X 2-3/8”</h2>		Manual No:	
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			Revision: H	
			Revision Date:	
		09/15/2017		
Authored by: S. White		Approved by: D. Hushbeck		

### O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
09/15/2017	H	Revised max. tensile load was 40,000 lb, Elastomer Trim Temperature Guide nitrile temp. rating was 70-250°	J.Anderson	D.Hushbeck
06/08/2016	G	Removed tool drift ID; Revised Emergency Release shear values, Elastomer Trim Temperature Guide Nitrile and HSN temperature ranges ; Added General Screw Torque Recommendations	J.Anderson	K.Riggs
05/20/2015	F	Added Related Tools, tool drift ID, Pre-Installation Inspection and Storage Procedures, P/N 60045610HT, 60050325HT, 60045230, 60045340HT, 60045810; Revised Pressure Affected Area Guide;	J.Anderson	K.Riggs
06/27/13	E	Revised P/N 60145610HT was 60045610HT, P/N 60150325HT was 60050325HT, P/N 60153325HT was 60053325HT, P/N 60145230 was 60045230, P/N 60145340HT was 60045340HT, P/N 60145810 was 60045810. Added HSN and Viton options (60350HTV, 60352HTH, 60352HTV, 60353HTH, 60353HTV)	J.Anderson	J.McArthur
04/11/13	D	Revised P/N9055900 was 9055900C, P/N 60050115 was 60050115C, P/N 60050135 was 60050135C; Added recommended hand tools, HSN option (P/N 60350HTH), revision history; Removed AFLAS from element selection guide;	J.Anderson	B.Oligschlaeger