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

B-1) 4-1/2" DT-2 On/Off Tool and Stinger—refer to technical manual *DL-512-4500-140*.

C) SPECIFICATION GUIDE

CASING			TOOL		THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
SIZE (INCHES)	WEIGHT (LBS/FT)	RECOMMENDED HOLE SIZE (INCHES)	GAUGE OD (INCHES)	NOMINAL ID (INCHES)		
8-5/8	20.0 – 28.0	8.017 – 8.191	7.750 7.827*	4.00	4-1/2 EUE	60381HT 60381HTH[1] 60381HTV[2] 60381HTC[3] 60381HTHC[4] 60381HTVC[5]
	32.0 – 40.0	7.725 – 7.921	7.500	4.00	4-1/2 EUE	60382HT 60382HTH[1] 60382HTV[2] 60382HTC[3] 60382HTHC[4] 60382HTVC[5]

*****Maximum OD across retracted drag blocks.

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

NOTE$_1$: Tools listed are right-hand set / right-hand release.

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
8,000 PSI	190,000 LBS

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

D) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION$_1$: 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.

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$_2$: 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 tubing load. Rotate the tubing 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 (18,000 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 (18,000 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 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 the 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$_3$: 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.

G) PRESSURE AFFECTED AREA GUIDE

PACKER SIZE (INCHES)	**TUBING SIZE** (INCHES)	**PRESSURE AFFECTED AREA** (SQ. INCHES)	
		ABOVE	**BELOW**
8-5/8	2.875	11.11 (DOWN)	-12.69 (UP)
	3.500	7.98 (DOWN)	-10.53 (UP)
	4.500	1.70 (DOWN)	-5.30 (UP)

Example: Consider an 8-5/8" X 4-1/2" 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. How much force is 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 an 8-5/8" X 4-1/2" ASI-X Packer run on 2.875" tubing. In this example, the differential pressure from above the packer acts down on the seal area of the mandrel area across a pressure affected area of 11.11 in^2. Multiplying the differential pressure (3,000 PSI) by the pressure affected area (11.11 in^2) results in a downward force of 33,330 lbs. 33,330 lbs is the force which needs to be overcome when releasing the packer.

H) 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

I) RECOMMENDED TOOLS

I-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

I-2) SPECIAL TOOLS

ITEM	**QTY**	**DESCRIPTION**	**PART NUMBER**
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT010110

J) DISASSEMBLY

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

J-1.1) Unscrew and remove bottom sub nipple (28) from J-pin sub (23).

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

NOTE$_2$: Drag block body assembly must be free to rotate.

J-1.2.1) Remove o-ring (34) from J-pin sub (23).

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

J-1.4) Unscrew and remove set screws (31) from drag block body (18). Rotate drag block retainer (21) as needed to access set screws (31).

J-1.5) Unscrew and remove J-body (20) from drag block body (18) (**NOTE$_3$**: Left-hand threads).

J-1.5.1) Remove retaining ring (30) from J-body (20).

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

J-1.7) Release drag blocks (22) from assembly tool (T1) and remove drag blocks (22) and drag block springs (3) from drag block body (18).

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

NOTE$_4$: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

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

J-1.9.1) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from drag block body (18).

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

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

J-1.12) Remove rubber mandrel assembly and disassemble:

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

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

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

NOTE$_5$: For added leverage, insert a rod through upper cone (9) as needed.

J-1.14.1) Remove bonded seal (24) and o-rings (33) from center coupling (10).

J-1.15) Remove upper cone (9) from inner mandrel (2).

J-2) Unclamp and remove top sub (1) from vise and clamp inner mandrel (2) in vise.

NOTE$_6$: Do NOT wrench or clamp on seal surface.

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

CAUTION$_4$: Compression spring (4) is compressed with spring tension against upper slip body assembly.

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

J-2.3) Remove compression spring (4) from spring cage (5).

J-2.4) Unscrew and remove spring cage (5) from upper slip body (6).

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

J-2.5.1) Remove wedges (if needed). Remove releasing slip (7), upper slips (8), upper slip springs (26), and spring retaining ring (32) from upper slip body (6).

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

K) 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.

CAUTION5: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread reliefs (Fig. 2).

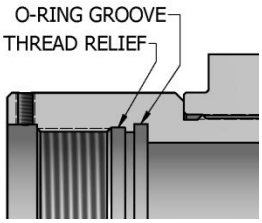


Fig. 2

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

NOTE6: Do NOT wrench or clamp on seal surface.

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

K-1.1.1) Install upper slips (8), releasing slip (7), upper slip springs (26) into upper slip body (6). Wedge slips outwards.

NOTE8: Install two (2ea) springs per slip (Fig. 3).

K-1.1.2) Install spring retaining ring (28) into upper slip body (6).

K-1.1.3) Install upper slip body assembly onto inner mandrel (2). Remove wedges.

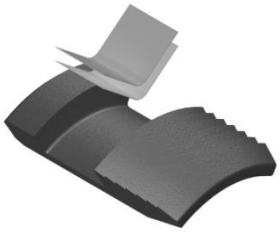


Fig. 3

K-1.2) Screw spring cage (5) into upper slip body (6).

K-1.3) Install compression spring (4) onto inner mandrel (2) and into spring cage (5).

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

K-1.5) Screw spring cage cap (27) onto spring cage (5).

CAUTION4: Compression spring (4) will be compressed with spring tension against upper slip body assembly.

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

K-2.1) Install upper cone (9) onto inner mandrel (2).

K-2.2) Install o-rings (33) in grooves in center coupling (10).

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

CAUTION6: Do not rip or tear o-ring during installation.

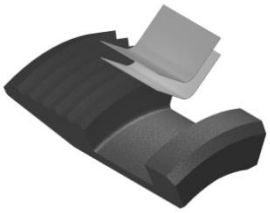


Fig. 4

K-2.4) Screw center coupling (10) onto upper cone (9).

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

K-2.5) Screw gage ring (29) onto center coupling (10).

K-2.6) Assemble rubber mandrel assembly and install:

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

K-2.6.2) Install rubber mandrel assembly onto inner mandrel (2) and screw rubber mandrel (11) into center coupling (10).

CAUTION6: Do not rip or tear o-ring during installation.

K-2.7) Screw lower cone (16) into rubber retainer (15).

K-2.8) Assemble drag block body assembly and install:

K-2.8.1) 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).

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

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

NOTE4: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

K) ASSEMBLY (cont’d)

K-2.10) Install drag blocks (22) and drag block springs (3) in drag block body (18). Compress drag blocks (22) with drag block assembly tool (T1).

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

Fig. 5

K-2.11) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22). Align holes in drag block retainer (21) to access threaded holes in drag block body (18).

K-2.12) Install retaining ring (30) onto J-body (20).

K-2.13) Screw J-body (20) into drag block body (18) (**NOTE3**: Left-hand threads).

K-2.14) Screw set screws (31) into drag block body (18)

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

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

NOTE2: Drag block body assembly must be free to rotate.

CAUTION6: Do not rip or tear o-ring during installation.

K-2.17) Screw bottom sub nipple (28) into J-pin sub (23).

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

L) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60381HT	P/N 60382HT
1	1	TOP SUB	DLMS110	60195610HT	
2	1	INNER MANDREL	DLMS110	60382210HT	
3	36	DRAG BLOCK SPRING	-	9101900	
4	1	COMPRESSION SPRING	DLMCRSP	60395920	
5	1	SPRING CAGE	DLMS60	60195310	
6	1	UPPER SLIP BODY	DLMS80	60382320	60382320HT
7	1	RELEASING SLIP	DLMS110	60082125	
8	2	UPPER SLIP	DLMS35	60082115	
9	1	UPPER CONE	DLMS110	60382410	
10	1	CENTER COUPLING	DLMS80	60095620	
11	1	RUBBER MANDREL	DLMS110	60313220HT	
12	2	RUBBER SPACER	DLMS35	60281840	60285840
13	1	ELEMENT	80 DURO NITRILE	60281512	60285512
14	2	ELEMENT	90 DURO NITRILE	60281513	60285513
15	1	RUBBER RETAINER	DLMS60	60281850	60282850
16	1	LOWER CONE	DLMS110	60382420HT	
17	4	LOWER SLIP	DLMS35	60082135	
18	1	DRAG BLOCK BODY	DLMS35	60382335	
19	1	RUBBER MANDREL CAP	DLMS60	60195230	
20	1	J-BODY	DLMS60	60195340	
21	1	DRAG BLOCK RETAINER	DLMS60	60381910	60382910
22	6	DRAG BLOCK	DLMSDB8	9080900	
23	1	J-PIN SUB	DLMS110	60395634HT	
24	1	BONDED SEAL	90 DURO NITRILE	60095520	
25	8	LOWER SLIP SPRING	-	7170901	
26	6	UPPER SLIP SPRING	-	7170902	
27	1	SPRING CAGE CAP	DLMS35	60095810	
28	1	BOTTOM SUB NIPPLE	DLMS110	60395636	
29	1	GAGE RING	DLMS80	60281830	60282830
30	1	RETAINING RING	DLMS60	60082911	
31	3	SET SCREW 3/8-16 UNC X 1/2	STEEL	SSS037C050	
32	1	SPRING RETAINING RING	DLMS35	60382820	
33	2	160 O-RING	90 DURO NITRILE	90160	
34	1	O-RING	90 DURO NITRILE	90348	90349

REDRESS KIT (RDK)		60381050HT	60382050HT
ASSEMBLED WEIGHT		497 LBS	488 LBS

L) PARTS LIST (cont'd)

L-1) ELASTOMER TRIM OPTIONS

NOTE$_{10}$: For temperature range, refer to Elastomer Trim Temperature Guide.

L-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60381HTH	P/N 60382HTH
13	1	ELEMENT	80 DURO HSN	60281512H	60285512H
14	2	ELEMENT	90 DURO HSN	60281513H	60285513H
24	1	BONDED SEAL	90 DURO HSN	60095520H	
33	2	160 O-RING	90 DURO HSN	90160H	
34	1	O-RING	90 DURO HSN	90348H	90349H

REDRESS KIT (RDK)		60381050HTH	60382050HTH

L-1.2) VITON

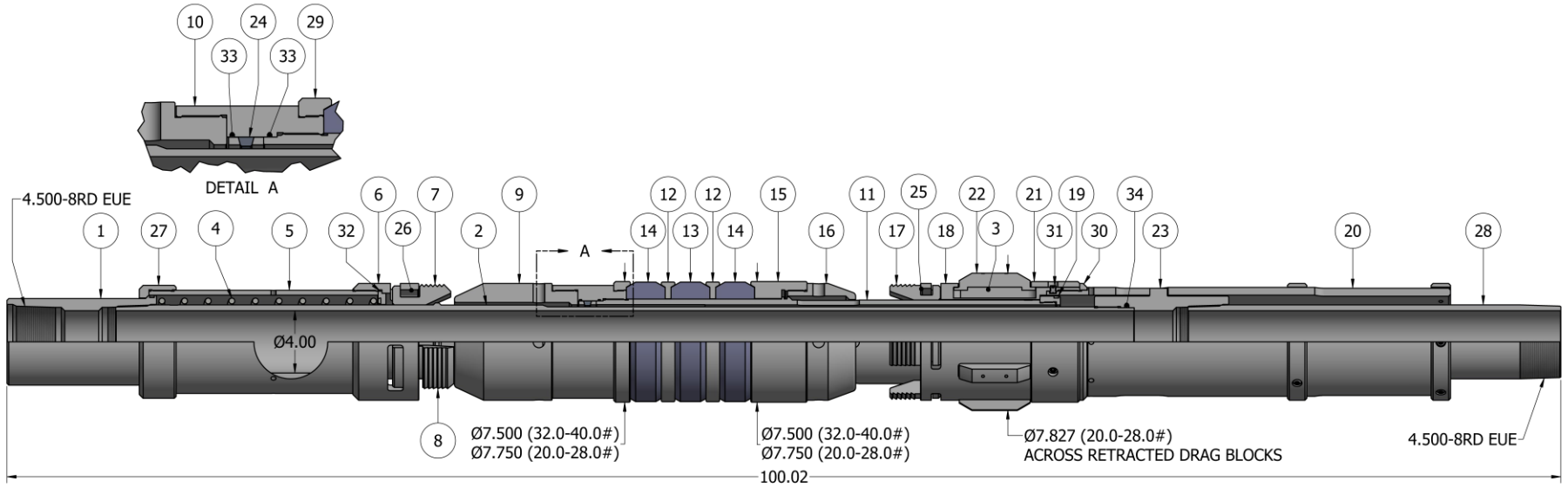
ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60381HTV	P/N 60382HTV
13	1	ELEMENT	80 DURO VITON	60281512V	60285512V
14	2	ELEMENT	90 DURO VITON	60281513V	60285513V
24	1	BONDED SEAL	90 DURO VITON	60095520V	
33	2	160 O-RING	90 DURO VITON	90160V	
34	1	O-RING	90 DURO VITON	90348V	90349V

REDRESS KIT (RDK)		60381050HTV	60382050HTV

L-2) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60381HTC	P/N 60382HTC
8	2	CARBIDE UPPER SLIP	DLMS110	60082115C	
17	4	CARBIDE LOWER SLIP	DLMS110	60082135C	
22	6	CARBIDE DRAG BLOCK	DLMSDB8	9080900C	

M) TECHNICAL ILLUSTRATION



N) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
02/07/2022	B	Revised 60195610HT was 60095610HT, 60195310 was 60395310, 60195230 was 60095230, 60195340 was 60395340, elastomer trim temp. ratings, Added HSN, Viton, Carbide options	J.Anderson	E.Visaez
07/02/14	A	Created new manual	-	-