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) 2-3/8” DT-2 On/Off Tool—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)	**ID** (INCHES)		
7	17.0 - 20.0	6.456 – 6.538	6.250	3.00	3-1/2 EUE	60374-625 60374H-625[1] 60374V-625[2]

Elastomer Trim Options: [1]HSN, [2]Viton

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	110,000 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

E-1) COMPRESSION SET

Run the packer to setting depth. Pick up the tubing 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 tubing while releasing torque. Slack off on the tubing sufficient weight to set the packer (14,000 lbs). Pull tension to assure that the upper slips are set. The tubing 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 tubing and rotate 1/4 turn to the right at the packer then lower the tubing 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 tubing 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 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

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)

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 set 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 (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) 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).

NOTE$_3$: Drag block body assembly must be free to rotate.

K-1.2.1) Remove o-ring (36) 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) using drag block body assembly tool (T1).

K-1.5) Unscrew and remove J-body (20) from drag block body (18) (**NOTE$_4$**: 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).

NOTE$_5$: 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) Unscrew and remove socket cap screws (33) from drag block body (18).

K-1.9.2) Remove lower slip support (34) from drag block body (18).

K-1.9.3) Remove wedges. Remove lower slips (17) and lower slip springs (25) from drag block body (18).

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).

NOTE6: For added leverage, insert a rod through 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-1.12.2) 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 (37) from center coupling (10).

K-1.14.1.1) Remove o-ring (35) 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.

NOTE7: Do NOT wrench or clamp on seal surface.

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

CAUTION2: 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 spring retainer ring (28) from upper slip body (6).

K-2.5.2) Remove wedges. Remove releasing slip (7), upper slips (8) and upper slip springs (26) from upper slip body (6).

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

L) ASSEMBLY

NOTE8: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order and orientation.

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

NOTE7: Do NOT wrench or clamp on seal surface.

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

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

NOTE9: Uses two (2ea) springs per slip (Fig. 1).

L-1.1.2) Install spring retainer ring (28) into upper slip body (6).

L-1.1.3) Screw spring cage (5) into upper slip body (6).

L-1.1.4) Install upper slip body assembly onto inner mandrel (2). Remove wedges.

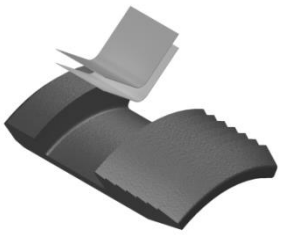


Fig. 2

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).

CAUTION2: Compression spring (4) is compressed with spring tension against upper slip body assembly.

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) and bearing bushing (30) onto inner mandrel (2).

L-2.2) Install o-ring (37) in groove in center coupling (10).

L-2.3) Install o-ring (35) in groove in bonded seal (24).

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

CAUTION$_3$: Do not rip or tear o-ring during installation.

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

NOTE$_6$: For added leverage, insert a rod through 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).

CAUTION$_3$: 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.

NOTE$_9$: Uses two (2ea) springs per slip (Fig. 2).

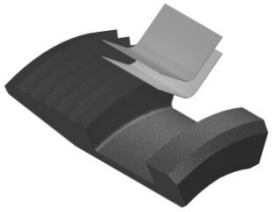


Fig. 2

L-2.9.2) Install lower slip body (34) into drag block body (18).

L-2.9.3) Align threaded holes of drag block body (18) with pocket holes in lower slip support (34). Screw socket cap screws (33) into drag block body (18).

L-2.9.4) Install drag block body assembly onto rubber mandrel (11). Remove wedges.

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

NOTE$_5$: For added leverage, insert a rod through 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) using drag block body assembly tool (T1).

NOTE$_{10}$: Uses (6ea) drag block springs per drag block (Fig. 3).

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) (**NOTE$_4$**: Left-hand threads).

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

L-2.15) Install o-ring (36) in groove in J-pin bottom sub (23).

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

NOTE$_3$: Drag block body assembly must be free to rotate.

CAUTION$_3$: Do not rip or tear o-ring during installation.

Fig. 3

L-2.17) Move J-body (20) as needed to screw set screws (31) into J-pin bottom sub (23).

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

M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374-625
1	1	TOP SUB	DLMS80	60173610
2	1	INNER MANDREL	DLMS80	60373210
3	24	DRAG BLOCK SPRING	-	9101900
4	1	COMPRESSION SPRING	DLMS60	60373920
5	1	SPRING CAGE	DLMCRSP	60173310
6	1	UPPER SLIP BODY	DLMS60	60073320-625
7	1	RELEASING SLIP	DLMS60	60073125
8	2	UPPER SLIP	DLMS110	60073115
9	1	UPPER CONE	DLMS35	60373410
10	1	CENTER COUPLING	DLMS60	60273620
11	1	RUBBER MANDREL	DLMS60	60073220
12	2	RUBBER SPACER	DLMS80	60274840-625
13	1	ELEMENT	DLMS60	60274511-625
14	2	ELEMENT	DLMS35	60274513-625
15	1	RUBBER RETAINER	70 DURO NITRILE	60273850
16	1	LOWER CONE	90 DURO NITRILE	60073420
17	4	LOWER SLIP	DLMS60	60074135-625
18	1	DRAG BLOCK BODY	DLMS60	60073335-625
19	1	RUBBER MANDREL CAP	DLMS60	60173230
20	1	J-BODY	DLMS35	60173340
21	1	DRAG BLOCK RETAINER	DLMS35 / DLMS60	60073910-625
22	4	DRAG BLOCK	DLMS60	9070900
23	1	J-PIN BOTTOM SUB	DLMSDB8	60373650
24	1	BONDED SEAL	DLMS110 / DLMS60	60073520
25	8	LOWER SLIP SPRING	DLMS60 / 90 DURO NITRILE	7170901
26	6	UPPER SLIP SPRING	-	7170902
27	1	SPRING CAGE CAP	-	60174810
28	1	SPRING RETAINER RING	DLMS35	60073820-625
29	2	GAGE RING	DLMS60	60274830-625
30	1	BEARING BUSHING	DLMS35	60373224
31	2	SET SCREW 1/4-20 UNC X 3/8	STEEL	SSS025C037
32	3	SET SCREW 3/8-16 UNC X 3/8	DLMS80	SSS037C037

M) PARTS LIST (cont’d)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374-625
33	2	SOCKET CAP SCREW 5/16-18 UNC X 7/16	STEEL	SCS031C043
34	1	LOWER SLIP SUPPORT	DLMS60	60374912
35	1	155 O-RING	90 DURO NITRILE	90155
36	1	237 O-RING	90 DURO NITRILE	90237
37	1	243 O-RING	90 DURO NITRILE	90243

REDRESS KIT (RDK)		60374050-625
ASSEMBLED WEIGHT		325 LBS

M-1) ELASTOMER TRIM OPTIONS

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

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374H-625
13	1	ELEMENT	70 DURO HSN	60274511H-625
14	2	ELEMENT	90 DURO HSN	60274513H-625
24	1	BONDED SEAL	90 DURO HSN	60073520H
35	1	155-90 O-RING	90 DURO HSN	90155H
36	1	237-90 O-RING	90 DURO HSN	90237H
37	1	243-90 O-RING	90 DURO HSN	90243H

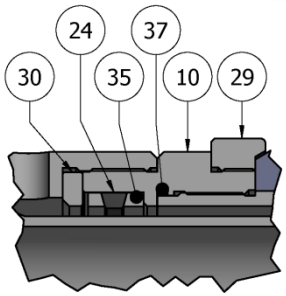
REDRESS KIT (RDK)		60374050H-625

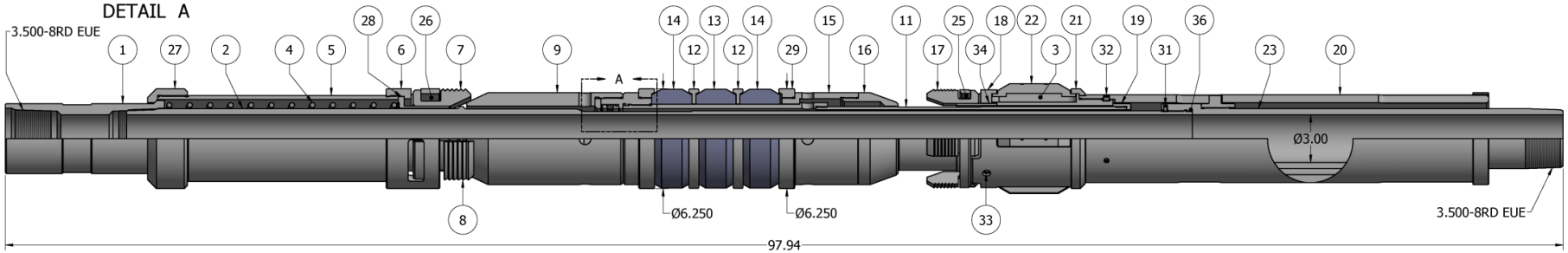
M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374V-625
13	1	ELEMENT	70 DURO VITON	60274511V-625
14	2	ELEMENT	90 DURO VITON	60274513V-625
24	1	BONDED SEAL	90 DURO VITON	60073520V
35	1	155-90 O-RING	90 DURO VITON	90155V
36	1	237-90 O-RING	90 DURO VITON	90237V
37	1	243-90 O-RING	90 DURO VITON	90243V

REDRESS KIT (RDK)		60374050V-625

N) TECHNICAL ILLUSTRATION





O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
05/07/2019	C	Added Pre-Installation Inspection Procedures, Revised Elastomer Trim Temp. Guide	J.Anderson	Z.Speer
12/13/13	B	Revised assembled weight was 327 lbs, P/N 60173610 was 60073610, P/N 60174310 was 60373310, P/N 60173230 was 60073230, P/N 60173340 was 60373340, P/N 60174810 was 60073810-625; Added Viton option, added double hook j-slot note	J.Anderson	K.Riggs
02/12/13	A	Created new manual.	-	J.McArthur