



# AXIAL INSTALLATION HD PACKER 5-1/2" X 2-3/8"

Manual No:  
**DL-625-5500-448**

Revision: **B**

Revision Date:  
**12/01/2011**

Authored by: B.Mathis

Approved by: D.Hushbeck

## A) DESCRIPTION

The D&L Axial Installation (AI) HD Packer is a heavy-duty service packer ideally suited for all types of squeeze cementing, formation fracturing, high pressure acidizing, etc. It is a large opening compression set packer with hydraulic button-type hold down. It withstands high pressure from above or below and uses a three-element packing system, J-slot, and a drag block mechanism for easy setting. The packer has a built-in unloader which circulates across the hold down buttons to improve retrievability and run in performance.

**NOTE<sub>1</sub>:** This packer is rated for differential pressure up to 10,000 PSI.

## B) SPECIFICATION GUIDE

CASING		RECOMMENDED HOLE SIZE (INCHES)	TOOL OD (INCHES)	TOOL ID (INCHES)	THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
SIZE (INCHES)	WEIGHT (LBS/FT)					
5-1/2	14.0 – 20.0#	4.778 – 5.012	4.625	2.00	2-3/8 EUE	62557
	20.0 – 23.0#	4.670 – 4.778	4.500	2.00	2-3/8 EUE	62556

**NOTE<sub>2</sub>:** Tools listed are straight set / straight pick-up.

**CAUTION<sub>1</sub>:** Before running the tool, check the pressure affected areas chart, and consider other effects to be certain that the unloader will remain closed during operation.

## C) SETTING PROCEDURES

Start the packer in the hole taking care that the J-lug is in the running slot. Lower the packer to setting depth taking care not to pick up more than 24" (61 cm) at any time.

At setting depth, pick up at least 36" (91 cm) and set down. As the packer takes weight, set at least 12,000 lbs of pipe weight on the packer.

## D) RETRIEVAL PROCEDURES

Pick up 36" (91 cm) and wait 5-10 minutes so pressure can equalize. Pick up and come out of hole taking care not to pick up more than 24" (61 cm) at any time.

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



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## E) PRESSURE AFFECTED AREAS GUIDE

SIZE (INCHES)	TUBING (INCHES)	ABOVE	BELOW
5-1/2" X 2-3/8"	2.375	0.19 DOWN	4.01 DOWN
	2.875	1.87 UP	5.45 DOWN

**Example:** A 5-1/2" X 2-3/8" HD Retrievable Packer run on 2-3/8" tubing with a differential hydrostatic pressure above the tool in the annulus equal to 3,000 PSI. How much must be pulled to open the unloader?

Use 0.19 down (from the chart) as the factor for this packer with differential mentioned above. This value multiplied by the pressure differential (3,000 PSI) gives the force (in lbs) acting on the mandrel (0.19 X 3,000 = 570 lbs). This is the pulling force needed to open the unloader.

## F) ELEMENT SELECTION GUIDE

NITRILE (STD)			
TEMPERATURE RANGE (F°)	DUROMETER		
	END	MIDDLE	END
70° - 125°	80	70	80
125° - 250°	90	70	90
250° - 300°	90	80	90
300° +	Contact D&L Sales		

RUBBER TYPE	TEMPERATURE RANGE
NITRILE	70° - 300°F
HSN (HNBR)	70° - 325°F
VITON	100° - 350°F
AFLAS	200° - 400°F

## G) DISASSEMBLY

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

G-1.1) Remove snap ring (38) from J-slot mandrel (20).

G-1.2) Unscrew and remove set screws (39) from J-pin extension sleeve (23).

G-1.3) Unscrew and remove J-pin extension sleeve cap (32) from J-pin extension sleeve (23).

G-1.4) Slide J-pin extension sleeve (23) and drag block body assembly upwards. Remove J-pins (36) from J-pin ring (33).

G-1.5) Remove J-pin ring (33) from J-slot mandrel (20).

G-1.6) Unscrew and remove set screws (41) from J-pin extension sleeve (23).

G-1.7) Unscrew and remove J-pin extension sleeve (23) from drag block body (18).

G-1.8) Unscrew and remove set screws (40) from J-slot mandrel (20).

G-1.9) Unscrew and remove J-slot mandrel (20) from lower inner mandrel (34) (**NOTE<sub>9</sub>**: Left-hand threads).

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

G-1.9.1) Remove o-ring (44) from J-slot mandrel (20).

G-1.10) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

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

G-1.11) Compress drag blocks (22) using drag block body assembly tool (T1, T2). Remove drag block retainer (21) from drag block body (18).

G-1.12) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).



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### G) DISASSEMBLY (cont'd)

- G-1.13) Wedge lower slips (17) outward (if needed). Remove drag block body assembly and disassemble:
- G-1.13.1) Remove wedges. Remove lower slips (17) and lower slip springs (25) from drag block body (18).
- G-1.14) Unscrew and remove lower cone (16) from rubber retainer (15).
- G-1.15) Unscrew rubber mandrel (11) from valve body (29).
- G-1.16) Remove rubber mandrel assembly and disassemble:
- G-1.16.1) Remove elements (13, 14), rubber spacers (12), and rubber retainer (15) from rubber mandrel (11).
- G-1.17) Unscrew and remove valve body (29) from central body (10).
- NOTE<sub>5</sub>:** For added leverage, insert a rod thru central body (10) as needed.
- G-1.17.1) Remove o-ring (47) from valve body (29).
- G-1.18) Unscrew and remove central body (10) from hold down body (6).
- G-1.19) Unscrew and remove seal retainer (27) from seal receptacle (28).
- G-1.20) Unscrew and remove seal receptacle (28) from compensating mandrel (8).
- G-1.20.1) Remove quad seal (24) from seal retainer (27).
  - G-1.20.2) Remove o-rings (47, 48) from seal receptacle (28).
- G-1.21) Unscrew and remove set screws (39) from upper inner mandrel (2).
- G-1.22) Unscrew and remove lower inner mandrel (34) from upper inner mandrel (2).
- G-2) Remove top sub (1) from vise and clamp lower end of upper inner mandrel (2) in vise.
- NOTE<sub>6</sub>:** Do **NOT** wrench or clamp on seal surface.
- G-2.1) Unscrew and remove set screws (42) from top sub (1).
  - G-2.2) Unscrew and remove top sub (1) from upper inner mandrel (2).
    - G-2.2.1) Remove o-ring (46) from top sub (1).
  - G-2.3) Unscrew and remove set screws (39) from collet (35).
  - G-2.4) Unscrew and remove collet (35) from hold extension (4).
  - G-2.5) Unscrew and remove hold extension (4) from hold down body (6).
    - G-2.5.1) Remove o-ring (50) from hold extension (4).
  - G-2.6) Unscrew and remove hold down cap (5) from hold down body (6).
  - G-2.7) Move strap retainer (7) downwards out of way temporarily.
  - G-2.8) Unscrew and remove flat head cap screws (37) from hold down body (6).
  - G-2.9) Remove hold down straps (31) from hold down body (6).
  - G-2.10) Remove hold down button springs (26) from hold down buttons (30).
  - G-2.11) Remove hold down buttons (30) from hold down body (6) using button removal tool (T3).
    - G-2.11.1) Remove o-rings (43) from hold down buttons (30).
  - G-2.12) Remove hold down body (6) from upper inner mandrel (2).
    - G-2.12.1) Remove o-rings (48, 49) from hold down body (6).
  - G-2.13) Remove strap retainer (7) from upper inner mandrel (2).
  - G-2.14) Remove compensating mandrel (8) from upper inner mandrel (2).
    - G-2.14.1) Remove compensating piston (9) from compensating mandrel (8).
      - G-2.14.1.1) Remove o-rings (51, 52) from compensating piston (9).
- G-3) Remove upper inner mandrel (2) from vise.
- G-3.1) Remove o-ring (45) from upper inner mandrel (2).



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## H) ASSEMBLY

**NOTE<sub>7</sub>:** Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order & orientation.

H-1) Install o-ring (45) in groove in upper inner mandrel (2)

H-2) Clamp lower part of upper inner mandrel (2) in vise.

**NOTE<sub>6</sub>:** Do **NOT** wrench or clamp on seal surface.

H-2.1) Install o-rings (51, 52) in grooves in compensating piston (9).

H-2.2) Install compensating piston (9) onto compensating mandrel (8).

**NOTE<sub>8</sub>:** Be sure compensating piston is installed in correct direction.

**CAUTION<sub>2</sub>:** Do not rip or tear o-ring during installation.

H-2.3) Install compensating mandrel (8) onto upper inner mandrel (2).

H-2.4) Install strap retainer (7) onto inner mandrel (2) - move downwards out of way temporarily.

H-2.5) Install o-rings (48, 49) in grooves in hold down body (6).

H-2.6) Install hold down body (6) onto upper inner mandrel (2).

H-2.7) Install o-rings (43) in grooves in hold down buttons (30).

H-2.8) Install hold down buttons (30) into hold down body (6).

**CAUTION<sub>2</sub>:** Do not rip or tear o-rings during installation.

H-2.9) Set hold down button springs (26) in place on hold down buttons (30).

H-2.10) Set hold down straps (31) in place on hold down buttons (30).

H-2.11) Screw flat head cap screws (37) into hold down body (6).

H-2.12) Install strap retainer (7) onto hold down body (6) capturing ends of hold down straps (31).

H-2.13) Screw hold down cap (5) onto hold down body (6) capturing ends of hold down straps (31).

H-2.14) Install o-ring (50) in groove in hold extension (4).

H-2.15) Screw hold extension (4) into hold down body (6).

**CAUTION<sub>2</sub>:** Do not rip or tear o-rings during installation.

H-2.16) Screw collet (35) onto hold extension (4).

H-2.17) Screw set screws (39) into collet (35).

H-2.18) Install o-ring (46) in groove in top sub (1).

H-2.19) Screw top sub (1) onto upper inner mandrel (2).

H-2.20) Screw set screws (42) into top sub (1).

H-3) Remove upper inner mandrel (2) from vise. Clamp top sub (1) in vise.

H-3.1) Screw lower inner mandrel (34) into upper inner mandrel (2).

H-3.2) Screw set screws (39) into upper inner mandrel (2).

H-3.3) Install o-rings (47, 48) in grooves in seal receptacle (28).

H-3.4) Screw seal receptacle (28) onto compensating mandrel (8).

**CAUTION<sub>2</sub>:** Do not rip or tear o-rings during installation.

H-3.5) Install quad seal (24) into place on seal receptacle (28).

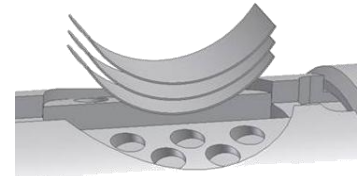
H-3.6) Screw seal retainer (27) onto seal receptacle (28).

**CAUTION<sub>3</sub>:** Do not rip or tear quad seal during installation.

H-3.7) Screw central body (10) onto hold down body (6).

**CAUTION<sub>2</sub>:** Do not rip or tear o-rings during installation.

H-3.8) Install o-ring (47) in groove in valve body (29).





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#### H) ASSEMBLY (cont'd)

H-3.9) Screw valve body (29) into central body (10).

**NOTE<sub>5</sub>:** For added leverage, insert a rod thru central body (10) as needed.

H-3.10) Assemble rubber mandrel assembly and install:

H-3.10.1) Install rubber retainer (15), elements (13, 14), and rubber spacers (12) onto rubber mandrel (11).

H-3.10.2) Install rubber mandrel assembly onto upper inner mandrel (34).

H-3.10.3) Screw rubber mandrel (11) into valve body (29).

**CAUTION<sub>2</sub>:** Do not rip or tear o-rings during installation

H-3.11) Screw lower cone (16) into rubber retainer (15).

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

H-3.12) Assemble drag block body assembly and install:

H-3.12.1) Install lower slips (17) and lower slip springs (25) into drag block body (18).

H-3.12.2) Wedge lower slips (17) outward (if needed). Install drag block body assembly onto rubber mandrel (11).

H-3.13) Install drag blocks (22) and drag block springs (3) in drag block body (18).

H-3.14) Compress drag blocks (22) using drag block body assembly tool (T1, T2). Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22). Release drag blocks (22).

H-3.15) Screw rubber mandrel cap (19) onto rubber mandrel (11).

H-3.16) Install o-ring (44) in groove in J-slot mandrel (20).

H-3.17) Screw J-slot mandrel (20) onto lower inner mandrel (34) (**NOTE<sub>9</sub>:** Left-hand threads).

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

H-3.18) Screw set screws (40) into J-slot mandrel (20).

H-3.19) Screw J-pin extension sleeve (23) onto drag block body (18).

H-3.20) Screw set screws (41) into J-pin extension sleeve (23).

H-3.21) Slide J-pin extension sleeve (23) and drag block body assembly upwards. Install J-pin ring (33) onto J-slot mandrel (20).

H-3.22) Align holes in J-pin ring (33) with slots in J-slot mandrel (20). Install J-pins (36) into J-pin ring (33).

H-3.23) Screw J-pin extension sleeve cap (32) into J-pin extension sleeve (23).

H-3.24) Screw set screws (39) into J-pin extension sleeve (23).

H-3.25) Install snap ring (38) in groove in J-slot mandrel (20).

H-4) Remove top sub (1) from vise and remove assembled tool.

#### I) TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT055110
T2	20	SQUARE HEAD SET SCREW 1/2-13 UNC X 4"	SQS050C400
T3	1	BUTTON REMOVAL TOOL	AT-BRT000



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## J) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 62556 (20.0 – 23.0#)	P/N 62557 (14.0 – 20.0#)
1	1	TOP SUB	P-110	62557615	
2	1	UPPER INNER MANDREL	P-110	62557210	
3	24	DRAG BLOCK SPRING		9100900	
4	1	HOLD EXTENSION	P-110	62557310	
5	1	HOLD DOWN CAP	P-110	61357370	61355370
6	1	HOLD DOWN BODY	P-110	61357321	
7	1	STRAP RETAINER	P-110 / 1026	61357650	61355650
8	1	COMPENSATING MANDREL	P-110	62557240	
9	1	COMPENSATING PISTON	P-110	61355710	
10	1	CENTRAL BODY	P-110	61355381	
11	1	RUBBER MANDREL	P-110	62557220	
12	2	RUBBER SPACER	1026	60257840	60255840
13	1	ELEMENT	80 DURO NITRILE	60257512	60255512
14	2	ELEMENT	90 DURO NITRILE	60257513	60255513
15	1	RUBBER RETAINER	P-110	61157850HT	61155850HT
16	1	LOWER CONE	P-110	60055420HT	
17	4	LOWER SLIP - CARBIDE	P-110	60055135C	
18	1	DRAG BLOCK BODY	P-110 / 1026	61355335	61357335
19	1	RUBBER MANDREL CAP	1026	60055230	
20	1	J-SLOT MANDREL	P-110	62557340	
21	1	DRAG BLOCK RETAINER	1026	60057910	60055910
22	6	DRAG BLOCK - CARBIDE	4140	9045900C	9055900C
23	1	J-PIN EXTENSION SLEEVE	P-110	62557370	
24	1	QUAD SEAL	90 DURO NITRILE	61355520	
25	8	LOWER SLIP SPRING		7155901	
26	12	COIL BUTTON SPRING		61355975	
27	1	SEAL RETAINER	L-80	61355530	
28	1	SEAL RECEPTICAL	P-110	61355730	
29	1	VALVE BODY	P-110	61357350	61355350
30	6	HOLD DOWN BUTTON - CARBIDE	STRESSPROOF	61356140C	61357140C



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## J) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 62556 (20.0 – 23.0#)	P/N 62557 (14.0 – 20.0#)
31	3	HOLD DOWN STRAP	P-110		61355360
32	1	J-PIN EXTENSION SLEEVE CAP	P-110		62557880
33	1	J-PIN RING	P-110		62557875
34	1	LOWER INNER MANDREL	P-110		62557211
35	1	COLLET	P-110		62557660
36	2	J-PIN	P-110		62557870
37	3	FLAT HEAD CAP SCREW 5/16-18 UNC X 1/2	STEEL		FHSC031C050
38	1	SNAP RING	P-110		62557102
39	12	SET SCREW 1/4-20 UNC X 1/4	STEEL		SSS025C025
40	4	SET SCREW 5/16-18 UNC X 1/2	STEEL		SSS031C050
41	4	SET SCREW 5/16-18 UNC X 5/8	STEEL		SSS031C062
42	3	SET SCREW 3/8-16 UNC X 3/8	STEEL		SSS037C037
43	6	224-90 O-RING	NITRILE		90224
44	1	228-90 O-RING	NITRILE		90228
45	1	229-90 O-RING	NITRILE		90229
46	1	231-90 O-RING	NITRILE		90231
47	2	235-90 O-RING	NITRILE		90235
48	2	236-90 O-RING	NITRILE		90236
49	1	241-90 O-RING	NITRILE		90241
50	1	334-90 O-RING	NITRILE		90334
51	1	339-90 O-RING	NITRILE		90339
52	1	342-90 O-RING	NITRILE		90342

ASSEMBLED WEIGHT		313 LBS	315 LBS
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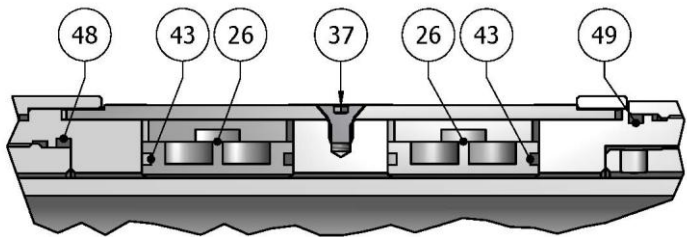
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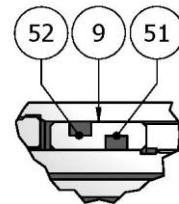
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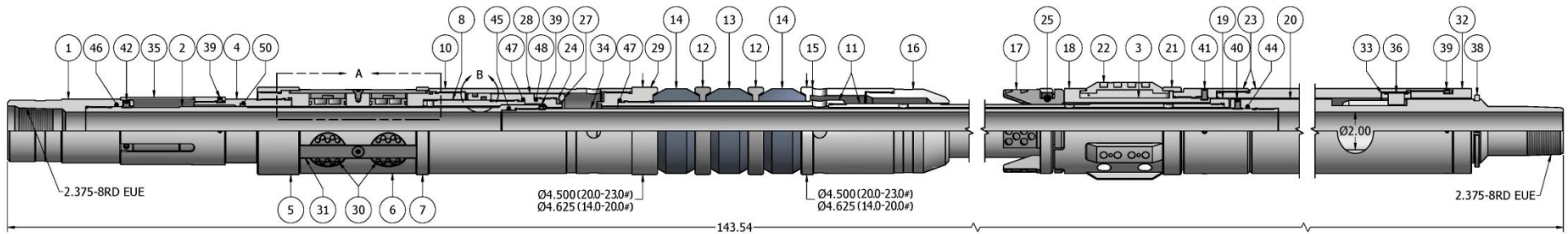
## K) TECHNICAL ILLUSTRATION



DETAIL A



DETAIL B



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