



DLT THERMAL PACKER, 625°F

7" X 3-1/2"

Manual No:
DL-740-7000-721

Revision: **A**

Revision Date:
06/24/2014

Authored by: J.Anderson

Approved by: D.Hushbeck

A) DESCRIPTION

The DLT Thermal Packer is used in steam injection/production applications. The DLT Thermal Packer maintains the design features of the reliable ASI-X Packer and includes a packing element that can be packed-off with tension to allow the packer to be set at shallow depth. The DLT Thermal Packer is capable of setting in shallow wells, and will hold pressure from above and below. It's design also features an adjustable safety shear release.

The standard DLT Thermal Packer is 1/4 right-hand rotation to set, and 1/4 right-hand rotation to release with other J-slot designs available upon request. The thermal elements are available in 450° F and 625° F versions.

A D&L Expansion Joint can be run above the DLT packer to allow for tubing expansion and contraction.

B) 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)	DRIFT ID (INCHES)		
7	17.0 – 26.0	6.276 – 6.538	6.000 6.062*	3.00	2.867	3-1/2 EUE	74074-625F

*Maximum OD across retracted drag blocks.

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

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)	TORQUE THRU TOOL (MAX)	TEMPERATURE RATING (MAX)
5,000 PSI	90,000 LBS	1,500 FT-LBS	625°F

C) 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.

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.

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

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D) 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.

D-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 at least 14,000 lbs to assure that the element is set. The tubing can then be left in tension, compression or neutral.

D-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 (see setting force guide). Repeat the setting procedure. After setting the packer, the tubing can be left in compression, tension or neutral.

E) 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. Continue to pick up to release the upper slips, relax the elements and release the lower slips so the packer can be re-set or removed from the well.

In the event the packer will not release in the normal manner, the J-pin ring is equipped with an emergency shear release. The shear screws can be sheared with straight pickup above tubing weight. The shear release value is adjustable from 22,000 lbs to 66,000 lbs (5,500 lbs/screw) by adding or removing shear screws from the J-pin ring. When released in this manner, the anchor will reset when moved down the hole.

CAUTION₃: High differential pressure below the anchor may cause the upper slips to wedge in tighter, requiring an extra amount of tension to release the upper slips.

F) PRESSURE AFFECTED AREA GUIDE

PACKER SIZE (INCHES)	TUBING SIZE (INCHES)	PRESSURE (SQ. INCHES)	
		ABOVE	BELOW
7" X 3-1/2"	2.375	5.19 DOWN	6.50 UP
	2.875	3.13 DOWN	4.94 UP
	3.500	-	2.59 UP

Example: Consider a 7" X 3-1/2" Thermal 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 a 7" X 3-1/2" DLT 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 3.13 in². Multiplying the differential pressure (3,000 PSI) by the pressure affected area (3.13 in²) results in a downward force of 9,390 lbs. 9,390 lbs is the force which needs to be overcome when releasing the packer.



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G) STORAGE PROCEDURES

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) RECOMMENDED TOOLS

H-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

H-2) SPECIAL TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT070110

I) DISASSEMBLY

- I-1) Clamp top sub (1) in vise.
- I-1.1) Unscrew and remove bottom gage ring (10) from bottom sub (28).
- I-1.2) Unscrew and remove bottom sub (28) from inner mandrel (2) and disassemble:
- NOTE₂**: Drag block body assembly must be free to rotate.
- I-1.2.1) Unscrew and remove shear screws (15) from J-pin ring (23).
- I-1.2.2) Remove J-pin ring (23) from bottom sub (28).
- I-1.3) Unscrew and remove set screws (32) from J-body (20).
- I-1.4) Unscrew and remove J-body (20) from drag block body (18) (**NOTE₅**: Left-hand threads).
- I-1.5) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11). Move drag block body assembly as necessary to access rubber mandrel cap (19).
- I-1.6) Wedge lower slips (17) outward (if needed). Remove drag block body assembly and disassemble:
- I-1.6.1) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from lower slip body (12).
- I-1.6.2) Compress drag blocks (22) using drag block assembly tool (T1).
- I-1.6.3) Unscrew and remove set screws (32) from lower slip body (12).
- I-1.6.4) Unscrew and remove lower slip body (12) from drag block body (18).
- I-1.6.5) Remove drag block retainer (21) from drag block body (18).



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I) DISASSEMBLY (cont'd)

I-1.6.6) Release drag blocks (3). Remove drag blocks (22) and drag block springs (3) from drag block body (18).

I-1.7) Unscrew and remove lower cone (16) from lower gage ring (30).

I-1.8) Unscrew and remove recovery sleeve (14) from rubber mandrel (11).

I-1.9) Remove lower gage ring (30) and thermal element (13) from rubber mandrel (11).

I-1.10) Unscrew and remove upper gage ring (29) from rubber mandrel (11).

I-1.11) Unscrew and remove rubber mandrel (11) from upper cone (9).

NOTE₃: Do NOT wrench or clamp on seal surface.

I-1.11.1) Remove thermal seal (24) from rubber mandrel (11).

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

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

NOTE₃: Do NOT wrench or clamp on seal surface.

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

CAUTION₄: Compression spring (4) is compressed and has spring tension against upper slip body assembly.

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

I-2.3) Unscrew and remove spring cage (5) from upper slip body (6).

I-2.4) Remove compression spring (4) from inner mandrel (2).

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

I-2.5.1) Remove wedges (if needed). Remove spring retaining ring (31), releasing slip (7), upper slips (8), and upper slip springs (26) from upper slip body (6).

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

J) ASSEMBLY

NOTE₄: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

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

NOTE₃: Do NOT wrench or clamp on seal surface.

J-1.1) Assemble upper slip body assembly:

J-1.1.1) Install spring retaining ring (31) into upper slip body (6).

J-1.1.2) 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) outward.

NOTE₆: Install two (2ea) springs per slip (Fig. 2).

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

J-1.2) Install compression spring (4) onto inner mandrel (2).

J-1.3) Screw spring cage (5) into upper slip body (6).

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

J-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.

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

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

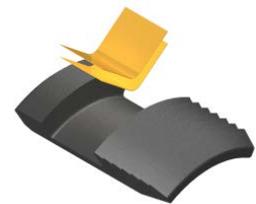


Fig. 2



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J) ASSEMBLY (cont'd)

J-2.2) Install thermal seal (24) into rubber mandrel (11).

J-2.3) Install rubber mandrel (11) onto inner mandrel (2). Screw rubber mandrel (11) into upper cone (9).

CAUTION₅: Do not damage seal during installation.

J-2.4) Screw upper gage ring (29) onto rubber mandrel (11).

J-2.5) Install thermal element (13) and gage ring (30) onto rubber mandrel (11).

J-2.6) Screw recovery sleeve (14) onto rubber mandrel (11).

J-2.7) Screw lower cone (16) into lower gage ring (30).

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

J-2.8.1) 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).

NOTE₇: Install six (6ea) springs per block (Fig. 3).

J-2.8.2) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22).

J-2.8.3) Screw lower slip body (12) onto drag block body (18).

J-2.8.4) Screw set screws (32) into lower slip body (12). Release drag blocks.

J-2.8.5) Install lower slips (17) and lower slip springs (25) into lower slip body (12). Wedge lower slips (17) outward.

NOTE₆: Install two (2ea) springs per slip (Fig. 4).

J-2.8.6) Install drag block body assembly. Remove wedges.

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

J-2.10) Screw J-body (20) onto drag block body (18) (**NOTE₅:** Left-hand threads.)

J-2.11) Screw set screws (32) into J-body (20).

J-2.12) Assemble bottom sub assembly and install:

J-2.12.1) Install J-pin ring (23) onto bottom sub (28). Align threaded holes in J-pin ring (23) with recessed holes in bottom sub (28).

J-2.12.2) Screw shear screws (15) into J-pin ring (23). Tighten until shear screws (15) make contact with bottom sub (28). Back shear screws (15) out 1/4 turn.

J-2.12.3) Screw bottom sub (28) onto inner mandrel (2). Position J-pin on upper tension shoulder of J-body (20).

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

J-2.13) Screw bottom gage ring (10) onto bottom sub (28).

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

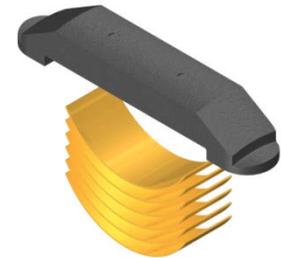


Fig. 3

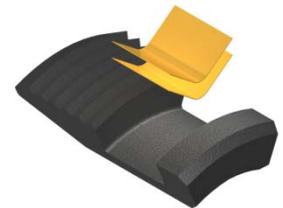


Fig. 4



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K) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 74074-625F (17.0 – 26.0#)
1	1	TOP SUB	1026	74073610
2	1	INNER MANDREL	L-80	74070210
3	18	DRAG BLOCK SPRING	STEEL	9101900
4	1	COMPRESSION SPRING	CHROME VANADIUM	60373920
5	1	SPRING CAGE	1026	60073310
6	1	UPPER SLIP BODY	1026	60073320
7	1	RELEASING SLIP	P-110	60073125
8	2	UPPER SLIP	1026	60073115
9	1	UPPER CONE	L-80	60473410
10	1	BOTTOM GAGE RING	1026	74070840
11	1	RUBBER MANDREL	L-80	74273220
12	1	LOWER SLIP BODY	1026	60474325
13	1	THERMAL ELEMENT	-	D10-001-00
14	1	RECOVERY SLEEVE	1018	74270912
15	12	SHEAR SCREW (5500#) 1/2-13 UNC X 7/16	BRASS	BSSSLT050C043
16	1	LOWER CONE	L-80	74270420
17	3	LOWER SLIP	1026	60073135
18	1	DRAG BLOCK BODY	1026	74070335
19	1	RECOVERY SLEEVE CAP	1026	74070230
20	1	J-BODY	1026	74070340
21	1	DRAG BLOCK RETAINER	1026	74070910
22	3	DRAG BLOCK	8620	9080900
23	1	J-PIN RING	P-110	74070875
24	1	THERMAL SEAL	-	69870530
25	6	LOWER SLIP SPRING	STEEL	7170901
26	6	UPPER SLIP SPRING	STEEL	7170902
27	1	SPRING CAGE CAP	1026	60074810



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K) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 74074-625F (17.0 – 26.0#)
28	1	BOTTOM SUB	1026	74073630
29	1	UPPER GAGE RING	1026	74273830
30	1	LOWER GAGE RING	1026	74273835
31	1	SPRING RETAINING RING	1026	60073820
32	9	SET SCREW 3/8-16 UNC X 3/8	STEEL	SSS037C037

REDRESS KIT (RDK)		74074-625F050
ASSEMBLED WEIGHT		275 LBS



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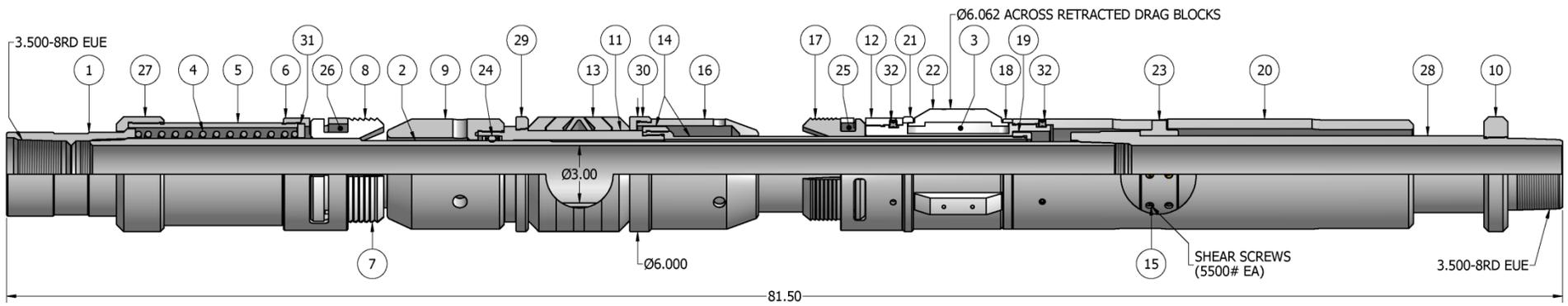
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L) TECHNICAL ILLUSTRATION



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M) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
06/24/14	A	Created new manual	-	-