



DLH PACKER

13-3/8" X 5-1/2"

Manual No:
DL-935-13375-596

Revision: **D**

Revision Date:
12/15/2020

Authored by: *J.Anderson*

Approved by: *K.Riggs*

A) DESCRIPTION

The DLH Packer is a hydraulic-set single-string retrievable packer and may be used in virtually any production application. Tubing pump pressure is used to set the packer and the setting force is locked into the packer by a body lock ring. A large internal by-pass reduces swabbing when running and retrieving. The by-pass closes when the packer is set, and opens during the releasing process to allow pressure equalization. Shear screws are used to control the packer release.

B) RELATED TOOLS (sold separately)

B-1) 5-1/2" Pump-Out Plug (P/N varies)—refer to technical manual *DL-597-0000-431*.

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)		
13-3/8	54.5 – 77.0	12.275 – 12.615	12.000	5.000	5-1/2 LTC	93513 93513H ¹ 93513V ² 93513C ³ 93513HC ⁴ 93513VC ⁵

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

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
6,000 PSI	380,000 LBS

D) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION: 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

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



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D) PRE-INSTALLATION INSPECTION PROCEDURES (cont'd)

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

E-1) RUNNING SEQUENCE

Running speed is critical, especially in heavy or viscous fluid where excess speed can result in swabbing off the packing element or in creating pressure waves which could lead to creating a preset condition. As a guide it is recommended that running speed should not be more than 30 seconds per joint (range II or 30 feet). **Do not exceed this speed**, particularly when running the packer in the heaviest weight casing for the range for which the packer is dressed.

A run in the well with a junk basket and suitable sized gauge ring or a bit and scraper is strongly recommended prior to running. The location of any tight spots should be noted and the running speed for the packer through these spots should be reduced.

Being a hydraulically set packer, it can be subject to preset conditions by pressure waves through the fluid. A slow steady running speed should be used and sudden stops and starts, such as when setting or pulling slips, should be avoided. Make-up the packer to the tubing string in the desired position and to the required torque. Transmission of make-up torque through the packer should be avoided.

Run the packer to the desired setting depth at the recommended speed and taking precautions listed above. While running in the hole, the packer body is rigidly connected to the packer mandrel and external forces caused by debris or tight spots are transmitted directly to the tubing. These forces load the mandrel through the chamber and body locks. Unless the string sequence is initiated by tubing pressure, the packer will not set.

Typically the tubing will be landed prior to setting. Establish a plug in the tubing below the packer using a drop ball, wireline plug, or other device. Apply pressure to the tubing to the recommended pressure for the given size of packer and hold for 5 minutes. If the well completion allows, apply annulus pressure to test the packer.

E-2) SETTING SEQUENCE

Internal tubing pressure enters the setting chamber through the setting port and acts upward on the setting sleeve and downward on the setting chamber/lower cone. When the applied load acting on these pistons exceeds the value of the setting initiation shear screws, they will shear and allow the setting process to proceed.

The setting sleeve pushes up through the setting shear screws between the rubber mandrel and setting sleeve closing the valve and setting the upper slips. The setting chamber/lower cone pushes down setting the lower slips.

Further pressuring shears the setting shear screws and packs off the packer elements. All this setting force is mechanically locked in place by the packer lock ring as it slides over the threads on the setting sleeve.

NOTE₁: No mandrel movement occurs during the setting sequence. However, some residual tension will remain in the tubing due to the tubing elongation caused by piston effects. This should be taken into consideration when deciding on field shear-out adjustments.



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F) RELEASING PROCEDURES

The packer is released by tension on the tubing string which triggers the following sequence of events:

- The upper and lower shear screws shear as the tension exceeds the shear value. The mandrel begins to move up relative to the packer body. The by-pass valve opens and movement upward raises the upper slip support thereby releasing the upper slips. Continued upward movement lifts the packer body, relaxing the packer elements and pulling the bottom cone upwards releasing the lower slips.
- The final stage of un-setting occurs when the lower section (lower slip body and lower slips) reach the bottom sub. They are then latched down by a split ring snapping into the shoulder/groove on the bottom sub, thus allowing the tool to move freely up or down.
- After unsetting, wait 10 minutes to allow the rubber to relax and then pull out of the hole. The valve will be open allowing fluid to by-pass the rubber through the passage under the rubber mandrel.
- The shear release value is adjustable by adding or removing shear screws from the shear housing, or by using steel screws. The upper brass shear screws (P/N 32045910) are rated to 5,000 lbs/screw, the lower brass shear screws (P/N DL60442) are rated to 6,000 lbs/screw.

NOTE: An alternate lower shear screw made of steel is available and is rated to 10,000 lbs/screw.

- Two (2) upper shear screws should always be used in the upper slip support.
- The recommended shear screw arrangement:
 - o Total shear value = 68,000 lbs
 - Upper shear screws = Four (4 qty) for 20,000 lbs shear
 - Lower shear screws = Eight (8 qty) for 48,000 lbs shear

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) SETTING AREA GUIDE

VALVE ID (INCHES)	BALANCE AREA UNPLUGGED		SHEAR VALUE (PSI/SCREW)	SETTING AREA (SQ INCHES)	SETTING INITIATION (PSI)	RECOMMENDED SETTING (PSI)
	ABOVE (SQ INCHES)	BELOW (SQ INCHES)				
6.150	11.577 (DOWN)	47.382 (UP)	139	60.154	625	1,000



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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 HAND TOOLS

- VISE
- GLOVES
- ALLEN WRENCHES
- TAPE MEASURE
- O-RING PICK
- BAR
 - 1/2-INCH
 - 3/4-INCH
- PAINT BRUSH, 2-INCH
- PIPE WRENCH, 4-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

K) DISASSEMBLY

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

K-1.1) Unscrew and remove set screws (37) from bottom sub (28).

K-1.2) Unscrew and remove bottom sub (28) from inner mandrel (2).

NOTE: Back up on inner mandrel (2) with wrench above bottom sub (28) as needed.

K-1.2.1) Remove o-ring (43) from bottom sub (28).

K-1.3) Unscrew and remove shear screws (34) from lower slip body (18).

K-1.4) Remove lower slip body assembly from inner mandrel (2) and disassemble:

K-1.4.1) Unscrew and remove socket cap screw (38) from lower slip body (18).

K-1.4.2) Wedge lower slips (17) outward (if needed). Remove lower slip support (32) from lower slip body (18).

K-1.4.3) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from lower slip body (18).

K-1.4.4) Remove internal ring (23) from lower slip body (18).

K-1.5) Unscrew and remove lower cone (16) from setting chamber (30).

K-1.5.1) Remove o-rings (45, 46) from lower cone (16).

K-1.6) Unscrew and remove shear screws (39) from setting chamber cap (22).

K-1.7) Unscrew and separate setting chamber cap (22) from setting chamber (30).

K-1.8) Unscrew and remove shear screw (47) from setting chamber (30).

K-1.9) Unscrew and remove setting chamber (30) from lock ring (3).

K-1.10) Remove snap ring (36) from inner mandrel (2).



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K) DISASSEMBLY (cont'd)

- K-1.11) Unscrew and remove setting piston (19) from setting sleeve (21).
 - K-1.11.1) Remove o-rings (45, 46) from setting piston (19).
- K-1.12) Unscrew and remove shear screws (31) from setting sleeve (19).
- K-1.13) Unscrew and remove setting sleeve (21) from rubber retainer (15).
 - K-1.13.1) Unscrew and/or slide lock ring (3) from setting sleeve (21) (**NOTE4:** Left-hand threads).
NOTE5: Using snap ring spreader pliers, the lock ring (3) may be spread slightly to be removed from setting sleeve (21).
- K-1.14) Unscrew rubber mandrel (11) from center coupling (10).
- K-1.15) Remove rubber mandrel assembly from inner mandrel (2) and disassemble:
 - K-1.15.1) Remove elements (13, 14), rubber spacers (12), and rubber retainer (15) from rubber mandrel (11).
 - K-1.15.2) Remove seal retaining ring (35) from rubber mandrel (11).
- K-1.16) Unscrew and remove gage ring (29) from center coupling (10).
- K-1.17) Unscrew and remove center coupling (10) from by-pass housing (20).
 - K-1.17.1) Remove o-rings (41, 42) and bonded seal (24) from center coupling (10).
 - K-1.17.1.1) Remove o-ring (40) from bonded seal (24).
- K-1.18) Unscrew and remove by-pass housing (20) from upper cone (9).
- K-1.19) Unscrew and remove set screws (37) from valve piston (5).
- K-1.20) Unscrew and remove valve piston (5) from inner mandrel (2).
 - K-1.20.1) Remove o-rings (45) from valve piston (5).
- K-2) Remove top sub (1) from vise and clamp inner mandrel (2) in vise.
NOTE6: Do **NOT** wrench or clamp on seal surface.
 - K-2.1) Unscrew and remove shear screws (27) from upper slip support (33).
 - K-2.2) Unscrew and remove set screws (37) from top sub (1). Rotate upper slip support (33) as needed to access set screws (37).
 - K-2.3) Unscrew and remove top sub (1) from inner mandrel (2).
 - K-2.3.1) Remove o-ring (43) from top sub (1).
 - K-2.4) Remove upper slip body assembly from inner mandrel (2) and disassemble:
 - K-2.4.1) Wedge releasing slip (7) and upper slips (8) outward (if needed). Unscrew and remove upper slip support (33) from upper slip body (6).
 - K-2.4.2) Remove wedges (if needed). Remove releasing slip (7), upper slips (8), and upper slip springs (26) from upper slip body (6).
 - K-2.5) Remove upper cone (9) from inner mandrel (2).
 - K-2.6) Remove balance piston (4) from inner mandrel (2).
 - K-2.6.1) Remove o-rings (44, 45) from balance piston (4).
- K-3) Remove inner mandrel (2) from vise.



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L) ASSEMBLY

NOTE₇: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order and orientation.

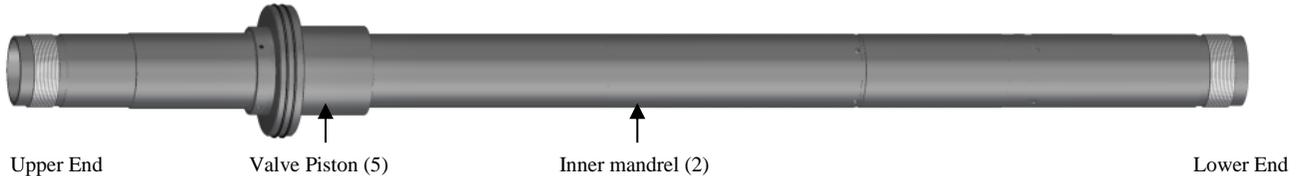


Fig. 1

L-1) Install o-rings (45) in grooves in valve piston (5).

L-2) From lower end of inner mandrel (2), slide valve piston (5) onto inner mandrel (2). Screw valve piston (5) onto inner mandrel (2) (Fig. 1).

L-3) Screw set screws (37) into valve piston (5) (Fig. 1).

L-4) Install o-rings (44) in inner grooves and o-rings (45) in outer grooves in balance piston (4).

L-5) From upper end of inner mandrel (2), slide balance piston (4) onto inner mandrel (2) downward until it contacts shoulder on inner mandrel (2).

NOTE₈: Stand inner mandrel (2) on end if needed.

L-6) Install upper cone (9) onto inner mandrel (2). Use upper cone (9) to tap balance piston (4) into position against valve piston (5) (Fig. 2).

CAUTION₁: Do not rip or tear o-rings during installation.

L-7) Assemble upper slip body assembly and install:

L-7.1) Install upper slip springs (26), releasing slip (7), and upper slips (8) into upper slip body (6). Wedge releasing slip (7) and upper slips (8) outwards.

NOTE₉: Install two (2ea) springs per slip (Fig. 3).

L-7.2) Screw upper slip support (33) into upper slip body (6). Remove wedges.

L-7.3) Install upper slip body assembly onto inner mandrel (2).

L-8) Install o-ring (43) in groove in top sub (1).

L-9) Screw top sub (1) onto inner mandrel (2). Screw set screws (37) into top sub (1).

CAUTION₁: Do not rip or tear o-ring during installation.

L-10) Slide upper slip body assembly onto top sub (1). Align threaded holes in upper slip support (33) with groove in top sub (1) (Fig. 4).

L-11) Screw shear screws (27) into upper slip support (33). Tighten until shear screws (27) contact top sub (1). Back shear screws (27) out 1/4 turn.

L-12) Assemble by-pass housing assembly:

L-12.1) Install o-ring (40) in groove in bonded seal (24).

L-12.2) Install bonded seal (24) in center coupling (10).

CAUTION₁: Do not rip or tear o-ring during installation.

L-12.3) Install o-ring (41) in upper groove and o-ring (42) in lower groove in center coupling (10).

L-12.4) Screw gage ring (29) onto center coupling (10).

L-12.5) Screw center coupling (10) into by-pass housing (20) (Fig. 5).



Fig. 2

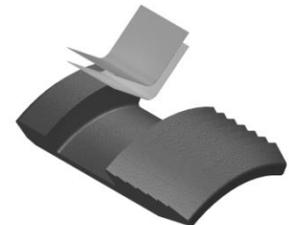


Fig. 3



Fig. 4



Fig. 5



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L) ASSEMBLY (cont'd)

L-13) Clamp by-pass housing (20) of by-pass housing assembly in vise.



Fig. 6



Fig. 7

L-14) Assemble rubber mandrel assembly:

L-14.1) Stand rubber mandrel (11) on end with threads facing upwards. Install rubber retainer (15), elements (13, 14), and rubber spacers (12) onto rubber mandrel (11) (Fig. 6).

NOTE₁₀: Do not damage threads. Use plastic or rubber hammer as needed.

L-15) Assemble rubber mandrel assembly into by-pass housing assembly:

L-15.1) Screw rubber mandrel (11) of rubber mandrel assembly into center coupling (10) of by-pass housing assembly (Fig. 7). Hand-tighten until body of rubber mandrel (11) makes contact with o-ring (42).

CAUTION₁: Do not rip or tear o-ring during installation.

L-15.2) Tighten rubber mandrel (11) and connections in sub-assembly by wrenching on rubber mandrel (11).

L-16) Assemble setting chamber assembly:

L-16.1) Install o-ring (45) in outer groove and o-rings (46) in inner grooves in setting piston (19).

L-16.2) Screw setting piston (19) into setting sleeve (21).

L-16.3) Stand setting sleeve (21) on end with upper end facing upwards.

L-16.4) Install setting chamber (30) over setting sleeve (21).

L-16.5) Install lock ring (3) onto setting sleeve (21) until outer threads contact threads in setting chamber (30). Rotate setting chamber (30) to thread lock ring (3) into setting chamber (30) leaving enough room for setting chamber cap (22) to be installed. Align threaded hole in setting chamber (30) with gap in lock ring (3).

NOTE₁₁: Lock ring ID threads **MUST NOT** engage with threads on setting sleeve (21).

NOTE₁₂: Threads on lock ring (3) are directional – lock ring (3) **MUST** be installed in correct direction for tool to work properly.

L-16.6) Screw shear screw (45) into setting chamber (30). Tighten until screw (45) contacts setting sleeve (21). Back off 1/4 turn.

L-16.7) Screw setting chamber cap (22) into setting chamber (30).

L-16.8) Align threaded holes in setting chamber cap (22) with holes in setting sleeve (21). Screw shear screws (39) into setting chamber cap (22) (Fig. 9).

L-17) Assemble setting chamber assembly onto rubber mandrel assembly:



Fig. 8

L-17.1) Install setting chamber assembly onto rubber mandrel (11). Screw rubber retainer (15) onto setting sleeve (21) (Fig. 8).

NOTE₁₃: If needed, using a plastic or rubber hammer, tap upwards on rubber retainer (15) to unbind the rubber retainer (15) and elements (13, 14) enough to thread rubber retainer (15) onto setting chamber assembly.



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L) ASSEMBLY (cont'd)

- L-18) Remove assembly from vise and set aside temporarily.
- L-19) Clamp top sub (1) and mandrel assembly in vise.



Fig. 9

- L-20) While gripping in element area, slide pre-assembled assemblies (by-pass housing assembly, rubber mandrel assembly, and setting chamber assembly) onto mandrel assembly and onto upper cone (9) (Fig. 9).

NOTE₁₄: DO NOT grip on setting chamber assembly as this may cause lock ring (3) to prematurely lock in place.

CAUTION₁: Do not rip or tear o-ring during installation.

- L-21) Install snap ring (36) in groove in inner mandrel (2).
- L-22) Screw upper cone (9) into by-pass housing (20).

NOTE₁₅: For added leverage, insert rod or punch tool into holes in center coupling (10) as needed.

- L-23) Install o-ring (46) in inner groove and o-ring (45) in outer groove in lower cone (16).
- L-24) Install lower cone (16) onto inner mandrel (2). Screw lower cone (16) into setting chamber (30). Back up on setting chamber (30) with wrench as needed.

CAUTION₁: Do not rip or tear o-ring during installation.

- L-25) Align threaded holes in setting sleeve (21) with pocket holes in rubber mandrel (11).

NOTE₁₆: Ensure large holes in setting sleeve (21) are aligned with large holes in rubber mandrel (11) as well.



Fig. 10

- L-26) Screw shear screws (31) into setting sleeve (21). Tighten until shear screws (31) contact rubber mandrel (11). Back shear screws (31) out 1/4 turn (Fig. 10).

NOTE₁₇: Shear screws (31) **MUST** be below the OD surface of the setting sleeve (21).
Adjust shear screws (31) as required.

- L-27) Assemble lower slip body assembly and install:

- L-27.1) Install internal ring (23) in groove in lower slip body (18).
- L-27.2) Install lower slip springs (25) and lower slips (17) into lower slip body (18).
NOTE₉: Install two (2ea) springs per slip (Fig. 11).
- L-27.3) Wedge lower slips (17) outward. Install lower slip support (32) into lower slip body (18).

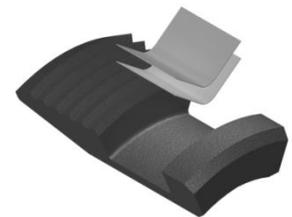


Fig. 11

- L-27.4) Align hole in lower slip support (32) with threaded hole in lower slip body (18). Screw socket cap screw (38) into lower slip body (18). Remove wedges.
- L-27.5) Install lower slip body assembly onto inner mandrel (2).



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L) ASSEMBLY (cont'd)

Fig. 12



L-27.6) Align threaded holes in lower slip body (18) with recessed holes in inner mandrel (2). Screw shear screws (34) into lower slip body (18). Tighten until shear screws (34) contact inner mandrel (2). Back shear screws (34) out 1/4 turn (Fig. 12).

L-28) Install o-ring (43) in groove in bottom sub (28).

L-29) Screw bottom sub (28) onto inner mandrel (2) (Fig. 14).

L-30) Screw set screws (37) into bottom sub (28).

L-31) Unclamp top sub (1) from vise and remove assembled tool.

NOTE₁₈: If pressure testing of the packer is desired, refer to technical manual *DL-937-13375-1308*. Pressure testing of the packer is not mandatory.

M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93513
1	1	TOP SUB	DLMS80	93513610
2	1	INNER MANDREL	DLMS80	93513210
3	1	LOCK RING	DLMS80	93513011
4	1	BALANCE PISTON	DLMS80	93513918
5	1	VALVE PISTON	DLMS80	93513960
6	1	UPPER SLIP BODY	DLMS80	60313320
7	2	RELEASING SLIP	DLMS110	60013125
8	3	UPPER SLIP	DLMS35	60013115
9	1	UPPER CONE	DLMS80	93513410
10	1	CENTER COUPLING	DLMS80	93513230
11	1	RUBBER MANDREL	DLMS80	93513220
12	2	RUBBER SPACER	DLMS35	60313840
13	1	ELEMENT	70 DURO NITRILE	60213511
14	2	ELEMENT	90 DURO NITRILE	60213513
15	1	RUBBER RETAINER	DLMS80	93513850
16	1	LOWER CONE	DLMS80	93513420
17	6	LOWER SLIP	DLMS35	60013135
18	1	LOWER SLIP CAGE	DLMS80	93513325
19	1	SETTING PISTON	DLMS80	93513751



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M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93513
20	1	BY-PASS HOUSING	DLMS80	93513311
21	1	SETTING SLEEVE	DLMS80	93513752
22	1	SETTING CHAMBER CAP	DLMS80	93513315
23	1	SMALLEY MEDIUM HEAVY DUTY INTERNAL RING	-	WHM-750
24	1	BONDED SEAL	90 DURO NITRILE	93513520
25	12	LOWER SLIP SPRING	-	7170901
26	10	UPPER SLIP SPRING	-	7170902
27	4	SHEAR SCREW (5000#) 5/8-18 UNF X .45	DLM360BRS	32045910
28	1	BOTTOM SUB	DLMS80	93513630
29	1	GAGE RING	DLMS80	93513830
30	1	SETTING CHAMBER	DLMS80	93513314
31	8	SHEAR SCREW (5500#) 1/2-13 UNC X 1/2	DLM360BRS	BSSSLT050C050
32	1	LOWER SLIP SUPPORT	DLMS80	93513912
33	1	UPPER SLIP SUPPORT	DLMS80	93513810
34	8	SHEAR SCREW (6000#)	DLM360BRS	DL60442
35	1	SEAL RETAINING RING	DLMS35	93513950
36	1	SNAP RING	DLMS110	93513980
37	8	SET SCREW 1/2-13 UNC X 1/2	STEEL	SSS050C050
38	1	SOCKET CAP SCREW 1/2-13 UNC X 1-1/2	STEEL	SCS050C150
39	6	SHEAR SCREW (6200#) 1/2-13 UNC X 5/8	DLMSLS	SSSSTL050C062
40	1	169 O-RING	90 DURO NITRILE	90169
41	1	366 O-RING	90 DURO NITRILE	90366
42	1	273 O-RING	90 DURO NITRILE	90273
43	2	359 O-RING	90 DURO NITRILE	90359
44	2	362 O-RING	90 DURO NITRILE	90362
45	6	377 O-RING	90 DURO NITRILE	90377
46	3	361 O-RING	90 DURO NITRILE	90361
47	1	SLOTTED SHEAR SCREW (1200#) 1/4-20 UNC X 1/4	DLM360BRS	BSSSLT025C025

REDRESS KIT (RDK)	93513050
ASSEMBLED WEIGHT	1,473 LBS



DLH PACKER

13-3/8" X 5-1/2"

Manual No:
DL-935-13375-596

Revision: **D**

Revision Date:
12/15/2020

Authored by: J.Anderson

Approved by: K.Riggs

M) PARTS LIST (cont'd)

M-1) ELASTOMER TRIM OPTIONS

NOTE2: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93513H
13	1	ELEMENT	70 DURO HSN	60213511H
14	2	ELEMENT	90 DURO HSN	60213513H
24	1	BONDED SEAL	90 DURO HSN	93513520H
40	1	169 O-RING	90 DURO HSN	90169H
41	1	366 O-RING	90 DURO HSN	90366H
42	1	273 O-RING	90 DURO HSN	90273H
43	2	359 O-RING	90 DURO HSN	90359H
44	2	362 O-RING	90 DURO HSN	90362H
45	6	377 O-RING	90 DURO HSN	90377H
46	3	361 O-RING	90 DURO HSN	90361H

REDRESS KIT (RDK)		93513050H
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M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93513V
13	1	ELEMENT	70 DURO VITON	60213511V
14	2	ELEMENT	90 DURO VITON	60213513V
24	1	BONDED SEAL	90 DURO VITON	93513520V
40	1	169 O-RING	90 DURO VITON	90169V
41	1	366 O-RING	90 DURO VITON	90366V
42	1	273 O-RING	90 DURO VITON	90273V
43	2	359 O-RING	90 DURO VITON	90359V
44	2	362 O-RING	90 DURO VITON	90362V
45	6	377 O-RING	90 DURO VITON	90377V
46	3	361 O-RING	90 DURO VITON	90361V

REDRESS KIT (RDK)		93513050V
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M-2) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93513C
8	3	CARBIDE UPPER SLIP	DLMS35	60013115C
17	6	CARBIDE LOWER SLIP	DLMS35	60013135C



DLH PACKER

13-3/8" X 5-1/2"

Manual No:
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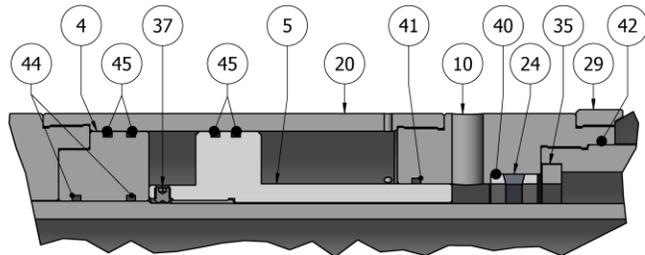
Revision: **D**

Revision Date:
12/15/2020

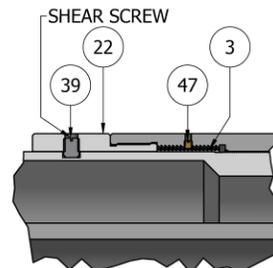
Authored by: *J.Anderson*

Approved by: *K.Riggs*

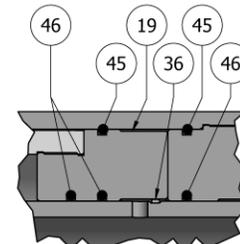
N) TECHNICAL ILLUSTRATION



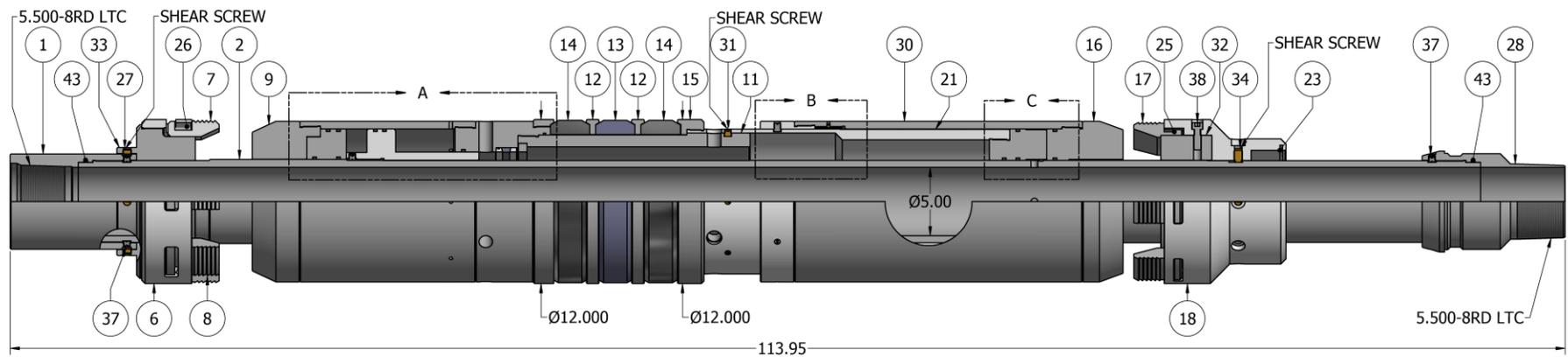
DETAIL A



DETAIL B



DETAIL C



	DLH PACKER 13-3/8" X 5-1/2"	Manual No: DL-935-13375-596
		Revision: D
		Revision Date: 12/15/2020
<i>Authored by: J.Anderson</i>		<i>Approved by: K.Riggs</i>

O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGE	REVISED BY	APPROVED BY
12/15/2020	D	Added carbide options, BSSSLT025C025, Note18	J.Anderson	E.Visaez
02/07/2020	C	Added P/N 90361; Revised P/N 90362 qty was 5, P/N 90366 qty was 2	J.Anderson	N.Banker
10/15/2018	B	Revised entire manual	J.Anderson	K.Riggs
02/10/14	A	Created new manual	-	-