



DLH PACKER

7-5/8" X 3-1/2"

Manual No:
DL-935-7625-250

Revision: **D**

Revision Date:
12/15/2020

Authored by: J.Anderson

Approved by: D.Hushbeck

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. The standard DLH Packer is designed for differential pressures up to 7,500 psi.

B) RELATED TOOLS (sold separately)

B-1) 3-1/2" Pump-Out Plug (P/N varies)—refer to applicable technical manual.

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)		
7-5/8	24.0 – 29.7	6.875 – 7.025	6.672	3.00	3-1/2 EUE	93578 93578H ¹ 93578V ² 93578C ³ 93578HC ⁴ 93578VC ⁵
	29.7 – 33.7	6.765 – 6.875	6.563	3.00	3-1/2 EUE	93578A 93578AH ¹ 93578AV ² 93578AC ³ 93578AHC ⁴ 93578AVC ⁵
	33.7 – 39.0	6.625 – 6.765	6.453	3.00	3-1/2 EUE	93577 93577H ¹ 93577V ² 93577C ³ 93577HC ⁴ 93577VC ⁵

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

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
7,500 PSI	119,000 LBS

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

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 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

CAUTION₂: Do not run the tool without properly tightening connections. Running the tool with loose connections may damage the tool and cause malfunction.

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.



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E) SETTING PROCEDURES (cont'd)

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.

CAUTION₃: If the packer is used in a multi-zone completion above a permanent packer and locator type seal, care should be taken to ensure that no set down weight can be exerted on the locator as this will act on the shear system and try to unset 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 downwards 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.

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 a groove in the inner mandrel, 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.

NOTE₂: 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 = 58,000 lbs
 - Upper shear screws = Two (2ea) for 10,000 lbs shear
 - Lower shear screws (brass) = Eight (8ea) for 48,000 lbs shear



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G) SETTING AREA GUIDE

VALVE ID (INCHES)	BALANCE AREA UNPLUGGED		SHEAR VALUE (PSI/SCREW)	SETTING AREA (IN ²)	SETTING INITIATION (PSI)	RECOMMENDED SETTING (PSI)
	ABOVE (IN ²)	BELOW (IN ²)				
3.630	3.015 (DOWN)	7.466 (UP)	348	9.584	1,000	2,500

H) 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.

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, 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

K) DISASSEMBLY

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

K-1.1) Unscrew and remove bottom sub (28) from inner mandrel (2).

NOTE: Place back-up wrench on inner mandrel above bottom sub while wrenching on bottom sub.

K-1.2) Unscrew and remove shear screws (34) from lower slip body (18).

K-1.3) Remove lower slip body assembly and disassemble:

K-1.3.1) Unscrew and remove socket cap screws (36) from lower slip body (18).



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K) DISASSEMBLY (cont'd)

- K-1.3.2) Wedge lower slips (17) outward (if needed). Remove lower slip support (32) from lower slip body (18).
- K-1.3.3) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from lower slip body (18).
- K-1.3.4) Remove internal ring (35) from lower slip body (18).
- K-1.4) Unscrew setting chamber (30) from lower cone (16). Move setting chamber assembly up out of way temporarily.
- K-1.5) Unscrew and remove shear screws (19) from lower end of setting sleeve (21).
- K-1.6) Remove lower cone (16) from inner mandrel (2).
 - K-1.6.1) Remove o-rings (40, 42) from lower cone (16).
- K-1.7) Unscrew and separate setting chamber cap (22) from setting chamber (30).
- K-1.8) Unscrew and remove shear screw (45) from setting chamber (30).
- K-1.9) Unscrew and remove setting chamber (30) from lock ring (3).
- K-1.10) Remove snap ring (27) from inner mandrel (2).
- K-1.11) Unscrew and remove shear screws (19) from upper end of setting sleeve (21).
- K-1.12) Unscrew and remove setting sleeve (21) from rubber retainer (15).
- K-1.13) Remove setting sleeve assembly from inner mandrel (2) and disassemble.
 - K-1.13.1) Remove setting chamber cap (22) from setting sleeve (21).
 - K-1.13.2) Unscrew and/or slide lock ring (3) from setting sleeve (21) (**NOTE4:** Left-hand threads).
 - NOTE17:** Using snap ring spreader pliers, the lock ring (3) may be spread slightly to be removed from setting sleeve (21).
 - K-1.13.3) Remove o-rings (42, 44) 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-1.16) 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 (38, 39) from center coupling (10).
- K-1.18) Unscrew and remove by-pass housing (20) from upper cone (9).
 - K-1.18.1) Remove bonded seal (24) and o-ring (43) from by-pass housing (20).
 - K-1.18.1.1) Remove o-ring (37) from bonded seal (24).
- K-1.19) Unscrew and remove set screws (31) from valve piston (5).
- K-1.20) Unscrew and remove valve piston (5) from inner mandrel (2).
 - K-1.20.1) Remove o-ring (44) from valve piston (5).
- K-2) Remove top sub (1) from vise. Clamp inner mandrel (2) in vise.
 - NOTES:** Do **NOT** wrench or clamp on seal surface.
 - K-2.1) Unscrew and remove shear screws (23) from upper slip support (33).
 - K-2.2) Unscrew and remove top sub (1) from inner mandrel (2).
 - K-2.3) Wedge releasing slip (7) and upper slips (8) outward (if needed). Unscrew and remove upper slip support (33) from upper slip body (6).



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K) DISASSEMBLY (cont'd)

K-2.4) Remove upper slip body assembly from inner mandrel (2) and disassemble:

K-2.4.1) 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 (41, 44) from balance piston (4).

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

L) ASSEMBLY

NOTE6: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order and orientation.

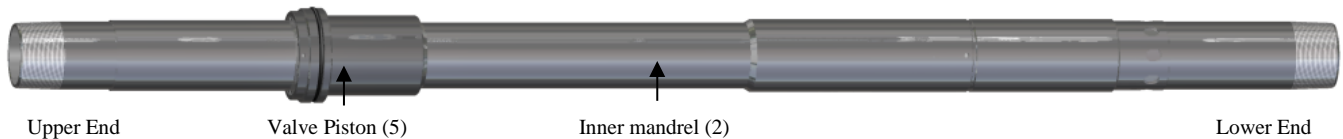


Fig. 2

L-1) Install o-ring (44) in groove 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. 2).

L-3) Screw set screws (31) into valve piston (5).

L-4) Install o-rings (41, 44) into grooves on balance piston (4) (Fig. 3).

L-5) From upper end of inner mandrel (2), slide balance piston (4) onto inner mandrel (2) until it contacts/stops at the first shoulder.



Fig. 3

NOTE7: 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) down into position against valve piston (5) (Fig. 3).

CAUTION4: Do not rip or tear o-ring during installation.

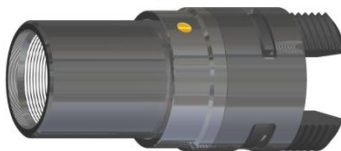


Fig. 4



Fig. 5

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 (Fig. 4).

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

L-7.3) Remove wedges from slips.

L-7.4) Install top sub (1) into upper slip support (33). Align groove in top sub (1) with threaded holes in upper slip support (33).

L-7.5) Screw shear screws (23) into upper slip support (33). Tighten until shear screws (23) contact top sub (1). Back shear screws (23) out 1/4 turn.



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L) ASSEMBLY (cont'd)

L-7.6) Install upper slip body assembly onto inner mandrel (2). Screw top sub (1) onto inner mandrel (2) (Fig. 5).

NOTE₈: Be sure shear screws were backed out properly allowing top sub to screw on easily.

L-8) Assemble by-pass housing assembly:

L-8.1) Install o-ring (43) in groove in by-pass housing (20).

L-8.2) Install o-ring (37) in groove in bonded seal (24).

L-8.3) Install bonded seal (24) in by-pass housing (20).

CAUTION₄: Do not rip or tear o-ring during installation.

L-8.4) Install o-rings (38, 39) in grooves in center coupling (10).

L-8.5) Screw gage ring (29) onto center coupling (10).

L-8.6) Screw center coupling (10) into by-pass housing (20). Hand-tighten until o-ring (39) contacts ID of by-pass housing (20) (Fig. 6).

CAUTION₄: Do not rip or tear o-ring during installation.



Fig. 6

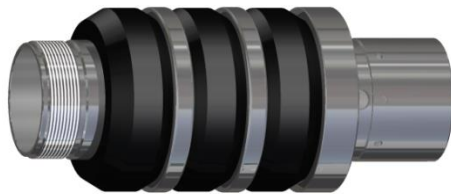


Fig. 7



Fig. 8

L-9) Assemble rubber mandrel assembly:

L-9.1) Stand rubber mandrel (11) on end with threads up. Install rubber retainer (15), elements (13, 14), and rubber spacers (12) onto rubber mandrel (11) (Fig. 7).

NOTE₁₁: Do not damage threads - use plastic or rubber hammer as needed.

L-10) Assemble rubber mandrel assembly into by-pass housing assembly:

L-10.1) Clamp by-pass housing assembly in vise - clamp on by-pass housing (20).

L-10.2) Screw rubber mandrel (11) (of rubber mandrel assembly) into center coupling (10) (of by-pass housing assembly). Hand-tighten until body of rubber mandrel (11) makes contact with o-ring (38) (Fig. 8).

CAUTION₄: Do not rip or tear o-ring during installation.

L-10.3) Tighten rubber mandrel (11) (of rubber mandrel assembly) by wrenching on rubber mandrel (11) to tighten connections in sub-assembly.

L-11) Assemble setting chamber assembly:

L-11.1) Install o-rings (42, 44) in grooves in setting sleeve (21).

L-11.2) Stand setting sleeve (21) on end with threads up.

L-11.3) Install setting chamber (30) over setting sleeve (21).



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L) ASSEMBLY (cont'd)

L-11.4) 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 leaving enough room for setting chamber cap (22) to be installed. Align threaded hole in setting chamber (30) with gap in lock ring (3).

NOTE₉: ID threads **MUST NOT** engage with threads on setting sleeve (21).

NOTE₁₀: Threads on lock ring (3) are directional - it **MUST** be installed in correct direction for tool to work properly.

L-11.5) Screw shear screw (45) into setting chamber (30). Tighten until screw (45) contacts setting mandrel (21). Back off 1/4 turn.

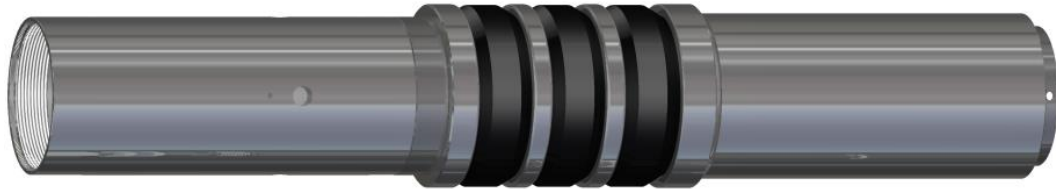
L-11.6) Screw setting chamber cap (22) into setting chamber (30) (Fig. 9: Setting sleeve not shown for clarity).

L-12) Assemble setting chamber assembly onto rubber mandrel assembly:

L-12.1) During the sub-assembly process, the rubber retainer (15) and elements (13, 14) get in a slight bind. Using a plastic or rubber hammer, tap upwards on rubber retainer (15) to unbind them enough to thread onto setting chamber assembly.

NOTE₁₁: Do not damage threads - use plastic or rubber hammer as needed.

Fig. 9



L-12.2) Install setting chamber assembly onto rubber mandrel (11). Screw rubber retainer (15) onto setting sleeve (21) (Fig. 9).

L-12.3) Remove assembly from vise and set aside temporarily.



Fig. 10

L-13) Clamp top sub (1) and mandrel assembly in vise.

L-13.1) While gripping in the element area, slide pre-assembled assemblies (by-pass housing assembly, rubber mandrel assembly, and setting chamber assembly) onto mandrel assembly past making contact with o-rings and on upwards to upper cone (9) (Fig. 10).

NOTE₁₂: **DO NOT** grip on the setting chamber assembly as this may cause the lock ring to prematurely lock in place.

L-13.2) Tap setting chamber assembly upwards to rubber retainer (15).

NOTE₁₁: Do not damage threads. Use plastic or rubber hammer as needed.

L-14) Install snap ring (27) in groove in inner mandrel (2).

L-15) Screw upper cone (9) into by-pass housing (20).

NOTE₁₃: For added leverage, insert a rod or punch tool into holes in by-pass housing (20) as needed.

L-16) Install o-rings (40, 42) in grooves in lower cone (16).



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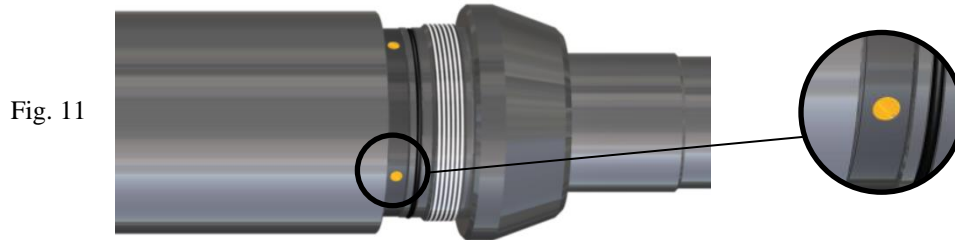
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L) ASSEMBLY (cont'd)



L-17) Install lower cone (16) onto inner mandrel (2). Tap lower cone (16) into place. Align threaded holes in lower cone (16) with holes in setting sleeve (21).

CAUTION4: Do not rip or tear o-ring during installation.

L-18) Screw shear screws (19) into setting sleeve (21). Tighten until shear screws (19) contact lower cone (16). Back shear screws (19) out 1/4 turn (Fig. 11).



L-19) Assemble lower slip body assembly and install:

L-19.1) Install internal ring (35) in groove in lower slip body (18) (Fig. 12).

L-19.2) Install lower slip springs (25) and lower slips (17) into lower slip body (18).

L-19.3) Wedge lower slips (17) outward. Install lower slip support (32) into lower slip body (18).

L-19.4) Align holes in lower slip support (32) with threaded holes in lower slip body (18). Screw socket cap screws (36) into lower slip body (18).

L-19.5) Remove wedges from slips.

L-19.6) Install lower slip body assembly onto inner mandrel (2).

L-19.7) 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. 13).

L-20) Screw bottom sub (28) onto inner mandrel (2) (Fig. 12).



L-21) Slide setting chamber assembly down. Tap setting chamber assembly downwards onto lower cone (16) over o-rings (40, 44). Screw setting chamber (30) onto lower cone (16) (Fig. 13).

CAUTION4: Do not rip or tear o-ring during installation.



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L) ASSEMBLY (cont'd)

- L-22) Wrench on setting chamber (30) to tighten. May have to put downward pressure to get threads started. Back up on lower cone (16) with wrench as needed.
- L-23) Align threaded holes in setting sleeve (21) with holes in rubber mandrel (11). May have to tap setting chamber assembly downwards using hammer and brass block to align holes.
NOTE₁₄: Align large hole in setting sleeve (21) with large hole in rubber mandrel (11).
- L-24) Screw shear screws (19) into upper end of setting sleeve (21). Tighten until shear screws (19) contact rubber mandrel (11). Back shear screws (19) out 1/4 turn (Fig. 14).
NOTE₁₅: Shear screws (19) **MUST** be below the OD surface of the setting sleeve (21). Adjust shear screws (19) as required.
- L-25) Unclamp top sub (1) from vise and remove assembled tool.
NOTE₁₈: If pressure testing of the packer is desired, refer to technical manual *DL-937-6625-1178*. Pressure testing of the packer is not mandatory.



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M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93577	P/N 93578	P/N 93578A
1	1	TOP SUB	DLMS80		93573610	
2	1	INNER MANDREL	DLMS80		93573210	
3	1	LOCK RING	DLMS80		93573011	
4	1	BALANCE PISTON	DLMS80		93573918	
5	1	VALVE PISTON	DLMS110		93573960	
6	1	UPPER SLIP BODY	DLMS80	93577320	93578320	93578A320
7	1	RELEASING SLIP	DLMS110		60075125	
8	2	UPPER SLIP	DLMS35		60075115	
9	1	UPPER CONE	DLMS80		93577410	
10	1	CENTER COUPLING	DLMS80		93573230	
11	1	RUBBER MANDREL	DLMS80		93573220	
12	2	RUBBER SPACER	DLMS35	60277840	60378840	93578A840
13	1	ELEMENT	70 DURO NITRILE	60277511	60378511	60277511
14	2	ELEMENT	90 DURO NITRILE	60277513	60378513	60277513
15	1	RUBBER RETAINER	DLMS35	93577850	93578850	93578A850
16	1	LOWER CONE	DLMS80		93577420	
17	4	LOWER SLIP	DLMS35		60075135	
18	1	LOWER SLIP BODY	DLMS80	93577325	93578325	93578A325
19	12	SHEAR SCREW (2375#)	DLM360BRS		60100990	
20	1	BY-PASS HOUSING	DLMS110		93573311	
21	1	SETTING SLEEVE	DLMS80		93573751	
22	1	SETTING CHAMBER CAP	DLMS60		93577315	
23	2	SHEAR SCREW (5000#) 5/8-18	DLM360BRS		32045910	
24	1	BONDED SEAL	90 DURO NITRILE		93573520	
25	8	LOWER SLIP SPRING	-		7170901	



DLH PACKER

7-5/8" X 3-1/2"

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Approved by: D.Hushbeck

M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93577	P/N 93578	P/N 93578A
26	6	UPPER SLIP SPRING	-	7170902		
27	1	SNAP RING	DLMS110	93573980		
28	1	BOTTOM SUB	DLMS80	93573630		
29	1	GAGE RING	DLMS80	60277830	93578830	93578A830
30	1	SETTING CHAMBER	DLMS110	93577314		
31	2	SET SCREW 1/4-20 UNC X 3/8	STEEL	SSS025C037		
32	1	LOWER SLIP SUPPORT	DLMS60	93577912		
33	1	UPPER SLIP SUPPORT	DLMS80	93577810		
34	8	SHEAR SCREW (6000#)	DLM360BRS	DL60442		
35	1	SMALLEY MEDIUM HEAVY DUTY INTERNAL RING	DLMSC	WHT-475		
36	2	SOCKET CAP SCREW 3/8-16 UNC	STEEL	SCS037C087 (7/8" LONG)	SCS037C100 (1" LONG)	SCS037C087 (7/8" LONG)
37	1	156-90 O-RING	90 DURO NITRILE	90156		
38	1	245-90 O-RING	90 DURO NITRILE	90245		
39	1	248-90 O-RING	90 DURO NITRILE	90248		
40	1	249-90 O-RING	90 DURO NITRILE	90249		
41	1	342-90 O-RING	90 DURO NITRILE	90342		
42	2	344-90 O-RING	90 DURO NITRILE	90344		
43	1	346-90 O-RING	90 DURO NITRILE	90346		
44	3	351-90 O-RING	90 DURO NITRILE	90351		
45	1	SLOTTED SHEAR SCREW (1200#) 1/4-20 UNC X 1/4	DLM360BRS	BSSSLT025C025		

REDRESS KIT (RDK)		93577050	93578050	93578A050
ASSEMBLED WEIGHT		301 LBS	307 LBS	304 LBS

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M) PARTS LIST (cont'd)


M-1) ELASTOMER TRIM OPTIONS

NOTE16: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93577H	P/N 93578H	P/N 93578AH
13	1	ELEMENT	70 DURO HSN	60277511H	60378511H	60277511H
14	2	ELEMENT	90 DURO HSN	60277513H	60378513H	60277513H
24	1	BONDED SEAL	90 DURO HSN	93573520H		
37	1	156-90 O-RING	90 DURO HSN	90156H		
38	1	245-90 O-RING	90 DURO HSN	90245H		
39	1	248-90 O-RING	90 DURO HSN	90248H		
40	1	249-90 O-RING	90 DURO HSN	90249H		
41	1	342-90 O-RING	90 DURO HSN	90342H		
42	2	344-90 O-RING	90 DURO HSN	90344H		
43	1	346-90 O-RING	90 DURO HSN	90346H		
44	3	351-90 O-RING	90 DURO HSN	90351H		

REDRESS KIT (RDK)		93577050H	93578050H	93578A050H
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M) PARTS LIST (cont'd)

M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93577V	P/N 93578V	P/N 93578AV
13	1	ELEMENT	70 DURO VITON	60277511V	60378511V	60277511V
14	2	ELEMENT	90 DURO VITON	60277513V	60378513V	60277513V
24	1	BONDED SEAL	90 DURO VITON	93573520V		
37	1	156-90 O-RING	90 DURO VITON	90156V		
38	1	245-90 O-RING	90 DURO VITON	90245V		
39	1	248-90 O-RING	90 DURO VITON	90248V		
40	1	249-90 O-RING	90 DURO VITON	90249V		
41	1	342-90 O-RING	90 DURO VITON	90342V		
42	2	344-90 O-RING	90 DURO VITON	90344V		
43	1	346-90 O-RING	90 DURO VITON	90346V		
44	3	351-90 O-RING	90 DURO VITON	90351V		
REDRESS KIT (RDK)				93577050V	93578050V	93578A050V

M-2) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93577C	P/N 93578C	P/N 93578AC
8	2	CARBIDE UPPER SLIP	DLMS35	60075115		
17	4	CARBIDE LOWER SLIP	DLMS35	60075135		



DLH PACKER

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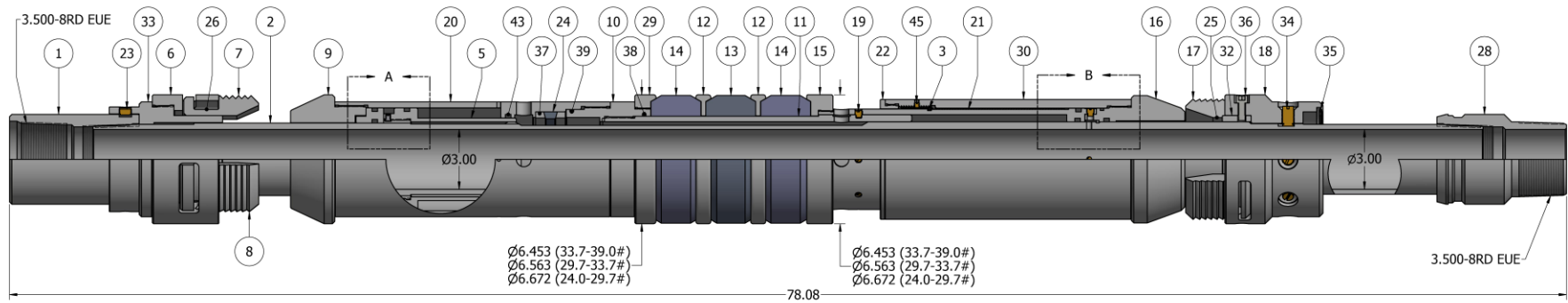
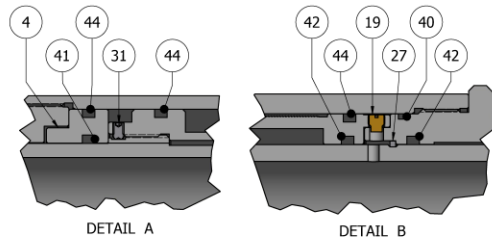
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Authored by: *J.Anderson*

Approved by: *D.Hushbeck*

N) TECHNICAL ILLUSTRATION



	DLH PACKER 7-5/8" X 3-1/2"	Manual No: DL-935-7625-250
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O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
12/15/2020	D	Added carbide options, Pre-Installation Inspection Procedures, BSSSLT025C025; Revised Elastomer Trim Temp Guide; Replaced Pressure Test with Note18	J.Anderson	E.Visaez
01/03/14	C	Revised P/N 32045910 was DL51775, redress kit P/N for P/N 93578A was 93578050; Added maximum tensile load, HSN and Viton options for P/N 93578A (93578AH, 93578HV).	J.Anderson	K.Riggs
11/16/12	B	Rewrote entire technical manual.	J.Anderson	D.Hushbeck