



DLH PACKER

9-5/8" X 3-1/2"

Manual No:
DL-935-9625-037

Revision: **E**

Revision Date:
10/12/2021

Authored by: *B.Mathis*

Approved by: *B.Oligschlaeger*

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) 3-1/2" Pump-Out Plug—refer to technical manual *DL-597-0000-431*.

C) SPECIFICATION GUIDE

CASING			TOOL OD (INCHES)	TOOL ID (INCHES)	THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
SIZE (INCHES)	WEIGHT (LBS/FT)	RECOMMENDED HOLE SIZE (INCHES)				
9-5/8	32.3 - 43.5	8.755-9.001	8.500	3.00	3-1/2 EUE	93596-WBAE 93596H-WBAE ¹ 93596V-WBAE ² 93596C-WBAE ³ 93596HC-WBAE ⁴ 93596VC-WBAE ⁵
	43.5 - 53.5	8.535-8.755	8.250	3.00	3-1/2 EUE	93595-WBAE 93595H-WBAE ¹ 93595V-WBAE ² 93595C-WBAE ³ 93595HC-WBAE ⁴ 93595VC-WBAE ⁵

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

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
7,500 PSI	190,000 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.

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)

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.

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—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 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.



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E) SETTING PROCEDURES (cont'd)

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 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.

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

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)				
4.750	4.760 (DOWN)	17.391 (UP)	238	23.071	1,100	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.



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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, 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).

NOTE₃: Place back-up wrench on inner mandrel above bottom sub while wrenching on bottom sub.

K-1.2) Unscrew and remove shear screws (37) 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 (38) from lower slip body (18).

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. Remove lower slips (17) and lower slip springs (25) from lower slip body (18).

K-1.3.4) Remove internal ring (31) 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 (35) from setting piston (21).

K-1.6) Remove lower cone (16) from setting piston (21) and from inner mandrel (2).

K-1.6.1) Remove o-rings (41, 44) 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 (23) from inner mandrel (2).

K-1.11) Unscrew and remove shear screws (19) from upper end of setting sleeve (27).

K-1.12) Unscrew setting sleeve (27) from rubber retainer (15).



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K) DISASSEMBLY (cont'd)

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 (27).

K-1.13.2) Unscrew and/or slide lock ring (3) from setting sleeve (27) (**NOTE4:** Left-hand threads).

NOTE17: Using snap ring spreader pliers, the lock ring (3) may be spread slightly to be removed from setting sleeve (27).

K-1.13.3) Unscrew and remove setting piston (21) from setting sleeve (27).

K-1.13.3.1) Remove o-rings (41, 44) from setting piston (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 (40, 43) and bonded seal (24) from center coupling (10).

K-1.17.1.1) Remove o-ring (39) 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 (34) 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.

CAUTION4: Do **NOT** wrench or clamp on seal surface.

K-2.1) Unscrew and remove shear screws (36) 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).

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

K-2.4.1) Remove wedges. 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 (42, 44) from balance piston (4).

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



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L) ASSEMBLY

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

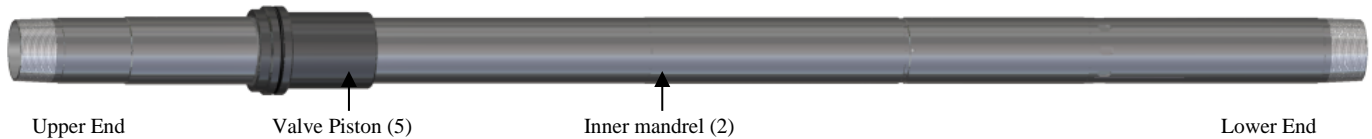


Fig. 1

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. 1).

L-3) Screw set screws (34) into valve piston (5).

L-4) Install o-rings (42, 44) into grooves on balance piston (4) (Fig. 1).

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. 2

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. 2).

CAUTION3: Do not rip or tear o-ring during installation.



Fig. 3



Fig. 4

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. 3).

NOTE5: Install two (2ea) springs per slip.

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 (36) into upper slip support (33). Tighten until shear screws (36) make contact with top sub (1). Back shear screws (36) out 1/4 turn.

L-7.6) Install upper slip body assembly onto inner mandrel (2). Screw top sub (1) onto inner mandrel (2) (Fig. 4).

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 (39) in groove in bonded seal (24).

L-8.2) Install bonded seal (24) in center coupling (10).

CAUTION3: Do not rip or tear o-ring during installation.

L-8.3) Install o-rings (40, 43) in grooves in center coupling (10).

L-8.4) Screw gage ring (29) onto center coupling (10).



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L) ASSEMBLY (cont'd)

L-8.5) Screw center coupling (10) into by-pass housing (20) (Fig. 5).

L-9) Clamp by-pass housing (20) of by-pass housing assembly in vise.

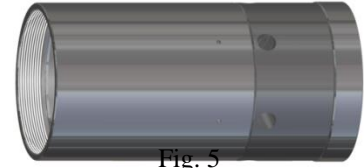


Fig. 5

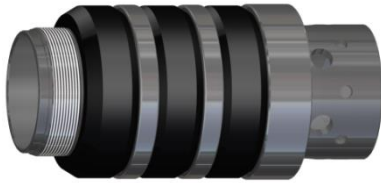


Fig. 6

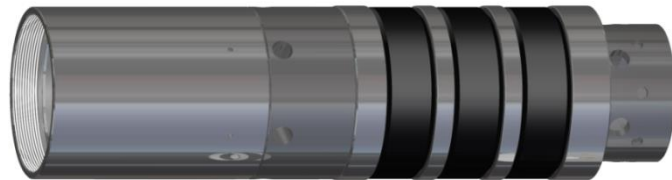


Fig. 7

L-10) Assemble rubber mandrel assembly:

L-10.1) 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).

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

L-11) Assemble rubber mandrel assembly into by-pass housing assembly:

L-11.1) 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 (40) (Fig. 7).

CAUTION₃: Do not rip or tear o-ring during installation.

L-11.2) Tighten rubber mandrel (11) (of rubber mandrel assembly) and connections in sub-assembly by wrenching on rubber mandrel (11).

L-12) Assemble setting chamber assembly:

L-12.1) Install o-rings (41, 44) in grooves in setting piston (21).

L-12.2) Screw setting piston (21) into setting sleeve (27).

L-12.3) Stand setting sleeve (27) on end with upper end facing upwards.

L-12.4) Install setting chamber (30) over setting sleeve (27).

L-12.5) Install lock ring (3) onto setting sleeve (27) 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 (Fig. 8).

NOTE₉: ID threads **MUST NOT** engage with threads on setting sleeve (27).

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

L-12.6) Align threaded hole in setting chamber (30) with gap in lock ring (3). Screw shear screw (45) into setting chamber (30). Tighten until screw contacts setting sleeve (27). Back off 1/4 turn.

L-12.7) Screw setting chamber cap (22) into setting chamber (30) (Fig. 9, setting sleeve not shown for clarity).

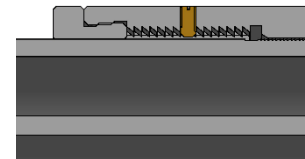


Fig 8



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L) ASSEMBLY (cont'd)

L-13) Assemble setting chamber assembly onto rubber mandrel assembly:

L-13.1) 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.

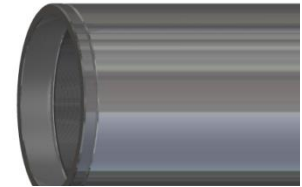


Fig. 9

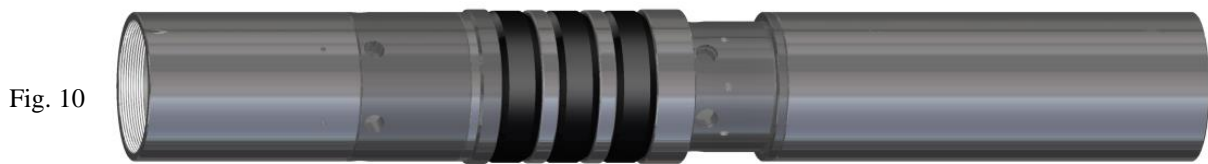


Fig. 10

L-13.2) Install setting chamber assembly onto rubber mandrel (11). Screw rubber retainer (15) onto setting sleeve (27) (Fig. 10).

L-14) Remove assembly from vise and set aside temporarily.

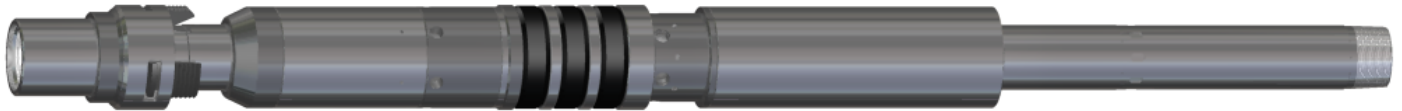


Fig. 11

L-15) Clamp top sub (1) and mandrel assembly in vise.

L-16) 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. 11).

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

L-17) Tap setting chamber assembly upwards to rubber retainer (15).

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

L-18) Install snap ring (23) in groove in inner mandrel (2).

L-19) 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-20) Install o-rings (41, 44) in grooves in lower cone (16).

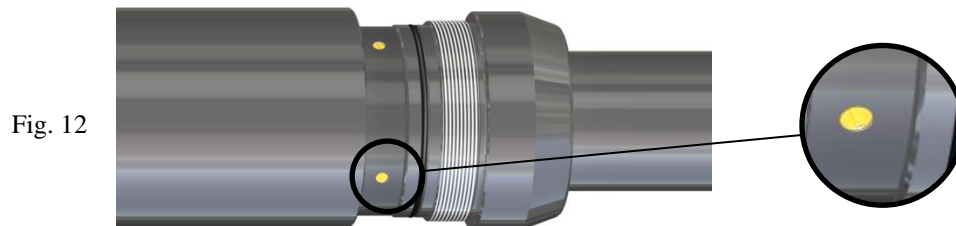


Fig. 12

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

CAUTION₃: Do not rip or tear o-ring during installation.

L-22) Screw shear screws (35) into setting piston (21). Tighten until shear screws (35) make contact with inner mandrel (2). Back shear screws (35) out 1/4 turn (Fig. 12).



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L) ASSEMBLY (cont'd)

Fig. 13



L-23) Slide setting chamber assembly down and tap assembly onto lower cone (16) over o-ring (44). Screw setting chamber (30) onto lower cone (16) (Fig. 13).

L-24) 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-25) Align threaded holes in setting sleeve (27) with pocket holes in rubber mandrel (11).

NOTE₁₄: Align large holes in setting sleeve (27) with large holes in rubber mandrel (11).

L-26) Screw shear screws (19) into upper end of setting sleeve (27). Tighten until shear screws (19) make contact with rubber mandrel (11). Back shear screws (19) out 1/4 turn (Fig. 13).

NOTE₁₅: Shear screws (19) **MUST** be below the OD surface of the setting sleeve (27). Adjust shear screws (19) as required.

Fig. 14



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

L-27.1) Install internal ring (31) in groove in lower slip body (18) (Fig. 14).

L-27.2) Install lower slip springs (25) and lower slips (17) into lower slip body (18).

NOTE₅: Install two (2ea) springs per slip.

L-27.3) Wedge lower slips (17) outward. Install lower slip support (32) into lower slip body (18).

L-27.4) Align holes in lower slip support (32) with threaded holes in lower slip body (18). Screw socket cap screws (38) into lower slip body (18).

L-27.5) Remove wedges from slips.

L-27.6) Install lower slip body assembly onto inner mandrel (2).

L-27.7) Align threaded holes in lower slip body (18) with recessed holes in inner mandrel (2). Screw shear screws (37) into lower slip body (18). Tighten until shear screws (37) make contact with inner mandrel (2). Back shear screws (37) out 1/4 turn (Fig. 14).

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

L-29) Unclamp top sub (1) from vise and remove assembled tool.

NOTE₁₆: If pressure testing of the packer is desired, refer to technical manual *DL-937-9625-1197*. Pressure testing of the packer is not mandatory.



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M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93595-WBAE	P/N 93596-WBAE
1	1	TOP SUB	DLMS80	93595610-WBAE	
2	1	INNER MANDREL	DLMS80	93595210	
3	1	LOCK RING	DLMS80	93595005	
4	1	BALANCE PISTON	DLMS35	93595918	
5	1	VALVE PISTON	DLMS80	93595960	
6	1	UPPER SLIP BODY	DLMS110 / DLMS80	60395320	
7	1	RELEASING SLIP	DLMS110	60095125	
8	2	UPPER SLIP	DLMS35	60095115	
9	1	UPPER CONE	DLMS80	93595410	
10	1	CENTER COUPLING	DLMS80	93595230	
11	1	RUBBER MANDREL	DLMS80	93595220	
12	2	RUBBER SPACER	DLMS35	60295840S	60296840S
13	1	ELEMENT	70 DURO NITRILE	60295511S	60296511S
14	2	ELEMENT	90 DURO NITRILE	60295513S	60296513S
15	1	RUBBER RETAINER	DLMS35	93595850	93596850
16	1	LOWER CONE	DLMS80	93595420	
17	4	LOWER SLIP	DLMS35	60095135	
18	1	LOWER SLIP BODY	DLMS80	93595325	
19	8	SHEAR SCREW (5500#) 1/2-13 UNC X 1/2	DLM360BRS	BSSSLT050C050	
20	1	BY-PASS HOUSING	DLMS80	93595311	
21	1	SETTING PISTON	DLMS80	93595751	
22	1	SETTING CHAMBER CAP	DLMS60	93595315	
23	1	SNAP RING	DLMS80	93595980	
24	1	BONDED SEAL	DLMS60 / 90 DURO NITRILE	93595520	
25	8	LOWER SLIP SPRING	-	7170901	
26	6	UPPER SLIP SPRING	-	7170902	
27	1	SETTING SLEEVE	DLMS80	93595752	
28	1	BOTTOM SUB	DLMS80	93595630-WBAE	
29	1	GAGE RING	DLMS35	93595830	93596830
30	1	SETTING CHAMBER	DLMS80	93595312	
31	1	SMALLEY MEDIUM HEAVY DUTY INTERNAL RING	DLMSC	WHT-525	



DLH PACKER

9-5/8" X 3-1/2"

Manual No:
DL-935-9625-037

Revision: **E**

Revision Date:
10/12/2021

Authored by: *B.Mathis*

Approved by: *B.Oligschlaeger*

M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93595-WBAE	P/N 93596-WBAE
32	1	LOWER SLIP SUPPORT	DLMS35		93595912
33	1	UPPER SLIP SUPPORT	DLMS80		93595810
34	2	SET SCREW 1/4-20 UNC X 3/8	STEEL		SSS025C037
35	4	SHEAR SCREW (5500#) 1/2-13 UNC X 1"	DLM360BRS		BSSSLT050C100
36	2	SHEAR SCREW (5000#) 5/8-18	DLM360BRS		32045910
37	8	SHEAR SCREW (6000#)	DLM360BRS		DL60442
38	2	SOCKET CAP SCREW 1/2-13 UNC X 1"	STEEL		SCS050C100
39	1	162 O-RING	90 DURO NITRILE		90162
40	1	259 O-RING	90 DURO NITRILE		90259
41	2	350 O-RING	90 DURO NITRILE		90350
42	1	351 O-RING	90 DURO NITRILE		90351
43	1	356 O-RING	90 DURO NITRILE		90356
44	4	364 O-RING	90 DURO NITRILE		90364
45	1	1/4-20 UNC X 1/2 SLOTTED SHEAR SCREW (1200#)	DLM360BRS		BSSSLT025C050

REDRESS KIT (RDK)		93595050	93596050
ASSEMBLED WEIGHT		638 LBS	644 LBS

M-1) ELASTOMER TRIM OPTIONS

NOTE18: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93595H-WBAE	P/N 93596H-WBAE
13	1	ELEMENT	70 DURO HSN	60295511SH	60296511SH
14	2	ELEMENT	90 DURO HSN	60295513SH	60296513SH
24	1	BONDED SEAL	90 DURO HSN	93595520H	
39	1	162 O-RING	90 DURO HSN		90162H
40	1	259 O-RING	90 DURO HSN		90259H
41	2	350 O-RING	90 DURO HSN		90350H
42	1	351 O-RING	90 DURO HSN		90351H
43	1	356 O-RING	90 DURO HSN		90356H
44	4	364 O-RING	90 DURO HSN		90364H

REDRESS KIT (RDK)		93595050H	93596050H
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DLH PACKER

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M) PARTS LIST (cont'd)

M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93595V-WBAE	P/N 93596V-WBAE
13	1	ELEMENT	70 DURO VITON	60295511SV	60296511SV
14	2	ELEMENT	90 DURO VITON	60295513SV	60296513SV
24	1	BONDED SEAL	90 DURO VITON	93595520V	
39	1	162V O-RING	90 DURO VITON	90162V	
40	1	259V O-RING	90 DURO VITON	90259V	
41	2	350V O-RING	90 DURO VITON	90350V	
42	1	351V O-RING	90 DURO VITON	90351V	
43	1	356V O-RING	90 DURO VITON	90356V	
44	4	364V O-RING	90 DURO VITON	90364V	

REDRESS KIT (RDK)		93595050V	93596050V
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M-2) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 93595C-WBAE	P/N 93596C-WBAE
8	2	CARBIDE UPPER SLIP	DLMS110	60095115C	
17	4	CARBIDE LOWER SLIP	DLMS110	60095135C	



DLH PACKER

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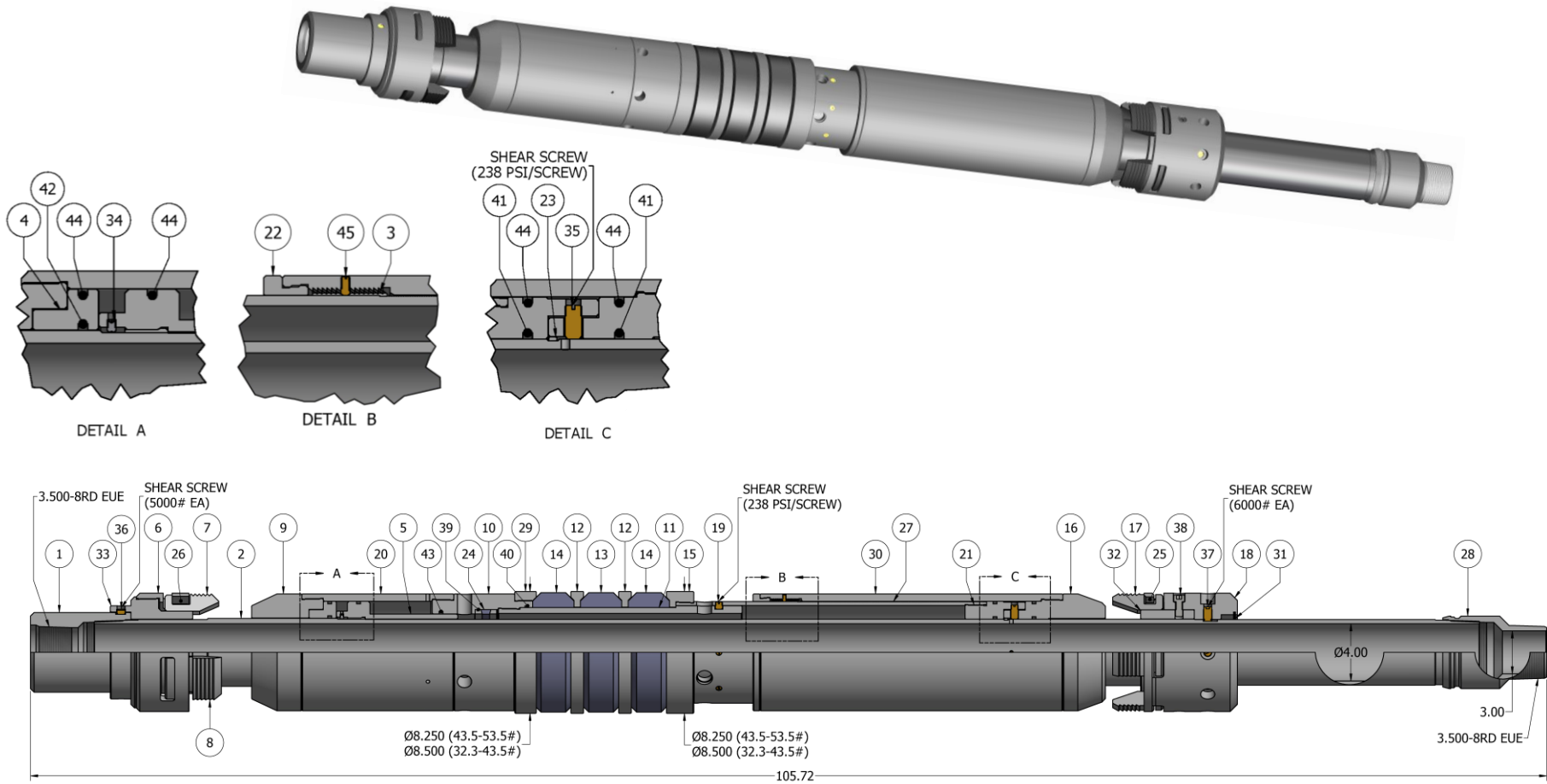
Revision: **E**


Revision Date:
10/12/2021

Authored by: *B.Mathis*

Approved by: *B.Oligschlaeger*

N) TECHNICAL ILLUSTRATION



	DLH PACKER 9-5/8" X 3-1/2"	Manual No: DL-935-9625-037
		Revision: E
		Revision Date: 10/12/2021
<i>Authored by: B.Mathis</i>		<i>Approved by: B.Oligschlaeger</i>

O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
10/12/2021	E	Added carbide options, BSSSLT025C050	J.Anderson	E.Visaez
01/13/2020	D	Added General Screw Torque Recommendations; Revised Elastomer Trim Temp. Guide, Removed Pressure Test	J.Anderson	N.Banker
04/08/14	C	Revised PN 32045910 was DL51775, tech illustration to show mandrel ID; Added related tools, pre-installation inspection and storage procedures	J.Anderson	J.McArthur
01/30/13	B	Revised P/N WHT-525 was RRT-525, P/N 93595005 was 93595011, P/N 93595312 was 93595314, shear screw pressure 238 psi was 275 psi, P/N 60095125 material P-110 was 1026, technical illustration; Added redress kit to parts list, HSN and Viton options (P/N 93595H-WBAE, 93595V-WBAE, 93596H-WBAE, 93596V-WBAE), element selection guide, recommended hand tools, pressure test and revision history sections; Rewrote disassembly and assembly instructions.	J.Anderson	K.Plunkett