A) DESCRIPTION

The Dual Bore Permapak Packer is a highly versatile packer which has a large upper sealbore to allow for a large bore through the packer. This packer may be set on wireline or hydraulically and can be used for single or multiple zone completions. This packer is designed for wells where high flow rates, high pressure, high temperatures and corrosive fluids are present. This packer is available in a variety of elastomers and seal bore materials to meet a wide range of hostile downhole environments. This packer is recommended for production, injection, stimulation and testing or can become a temporary plug when used with the Knock-Out or Pump-Out Bottom Assembly.

The Dual Bore Permapak Packer comes with a complete line of accessories and elastomers. Contact D&L sales for more information.

NOTE1: This packer requires at least a 30 second burn on the wireline setting tool to ensure a proper set. A burn time less than 30 seconds may shear the setting tool from the packer <u>before</u> fully setting the packer.

B) RELATED TOOLS (sold separately)

B-1) 5-1/2” X 4.000” X 3.000” Dual Bore Permapak Wireline Adapter Kit (WLAK) (P/N VARIES)—refer to applicable technical manual.

B-2) 4.000” Seal bore accessories—refer to technical manual *DL-581-4000-440*.

B-3) 3.000” Seal bore accessories— refer to technical manual *DL-581-3000-661*.

C) SPECIFICATION GUIDE

CASING			**MAX OD** (INCHES)	**MIN ID THRU SEALS** (INCHES)	**UPPER SEAL BORE ID** (INCHES)	**LOWER SEAL BORE ID** (INCHES)	**PART NUMBER**
SIZE (INCHES)	**WEIGHT** (LBS/FT)	**RECOMMENDED HOLE SIZE** (INCHES)					
5-1/2	17.0 – 23.0	4.670 – 4.892	4.422	3.000	4.000	3.000	67355 67355H[1] 67355V[2] 67355C[3] 67355HC[4] 67355VC[5]

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

DIFFERENTIAL PRESSURE (MAX)	**TENSILE LOAD THRU TOOL** (MAX)
10,000 PSI	74,000 LBS

D) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION$_1$: 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 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.

E) OPERATION PROCEDURES

CAUTION$_2$: Do not run the tool without properly tightening connections. Running the tool with loose connections may damage the tool and cause malfunction.

E-1) ON WIRELINE

In setting the Permapak, the setting forces are transferred from the gun to the packer through the wireline adapter kit (WLAK). The lock ring housing is backed up while the top connection (and thus the inner mandrel) is pulled up. This movement causes the shear pins in the lock ring housing and the cones to shear and the slips to separate and set. Further stroke expands the back-up rings against the casing, packs off the element, and shears the WLAK free of the packer.

The rubber pack-off is maintained by the slips and the inner mandrel movement is checked by the lock ring. When the packer is milled, there are two rotational locks; the lock ring and the key in the lower cone.

F) 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.

G) ELASTOMER TRIM TEMPERATURE GUIDE

RUBBER TYPE	TEMPERATURE RANGE
NITRILE	40° - 250°F
HSN (HNBR)	70° - 300°F
VITON	100° - 350°F

H) 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

I) DISASSEMBLY

I-1) Clamp upper bore (1) in vise.

I-1.1) Remove lower slip ring (5) from inner mandrel (2).

I-1.2) Unscrew and remove shear screws (13) from lower cone (11).

I-1.3) Remove lower cone (11) from inner mandrel (2).

I-1.4) Remove keys (14) from inner mandrel (2)

I-1.5) Remove female and male expansion rings (7, 8), rubber retainers (9), and element (11) from inner mandrel (2).

I-1.6) Unscrew and remove shear screws (13) from upper cone (6).

I-1.7) Remove upper cone (6) from inner mandrel (2).

I-1.8) Remove upper slip ring (5) from inner mandrel (2).

I-1.9) Unscrew and remove set screws (16) from upper bore (1).

I-1.10) Unscrew and remove shear screws (12, 15) from lock ring housing (3).

I-1.11) Unscrew lock ring housing (3) from upper bore (1).

I-1.12) Remove lock ring housing (3) from lower end of inner mandrel (2).

I-1.13) Unscrew and remove lock ring (4) from lock ring housing (3).

I-1.14) Remove inner mandrel (2) from upper bore (1).

I-1.15) Remove o-rings (17) from inner mandrel (2).

I-2) Unclamp and remove upper bore (1) from vise.

J) ASSEMBLY

NOTE$_3$: 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 upper bore (1) n vise.

J-1.1) Install o-rings (17) in grooves in inner mandrel (2).

J-1.2) Install inner mandrel (2) into upper bore (1).

CAUTION$_3$: Do not rip or tear o-rings during installation.

J-1.3) Install lock ring housing (3) onto inner mandrel (2) and screw lock ring housing (3) into upper bore (1).

J-1.4) Screw set screws (16) into upper bore (1).

J-1.5) Install lock ring (4) onto inner mandrel (2) and screw lock ring (4) into lock ring housing (3).

NOTE$_4$: Threads on lock ring (4) are directional. Lock ring (4) MUST be in installed in correct direction for tool to work properly.

NOTE$_5$: Using snap ring spreader pliers, lock ring (4) may be spread slightly to be installed onto inner mandrel (2).

J-1.6) Align gap in lock ring (4) with threaded hole in lock ring housing (3). Screw shear screw (15) into lock ring housing (3). Tighten until shear screw (15) contacts inner mandrel (2). Back out 1/4 turn.

J-1.7) Align threaded holes in lock ring housing (3) with counterbores in inner mandrel (2). Screw shear screws (12) into lock ring housing (3). Tighten until screws (12) contact inner mandrel (2). Back out 1/4 turn.

J-1.8) Install upper slip ring (5) onto inner mandrel (2).

J-1.9) Install upper cone (6) onto inner mandrel (2).

J-1.10) Align threaded holes in upper cone (6) with counterbores in inner mandrel (2). Screw shear screw (13) into upper cone (6). Tighten until shear screw (13) contact inner mandrel (2). Back out 1/4 turn.

J-1.11) Install male and female expansion rings (8, 7), rubber retainers (9) and element (10) onto inner mandrel (2).

J-1.12) Slide lower cone (11) onto inner mandrel (2). Align grooves in lower cone (11) with slots in inner mandrel (2). Install keys (14) onto inner mandrel (2) and slide lower cone (11) onto keys (14).

J-1.13) Align threaded holes in lower cone (11) with counterbores in inner mandrel (2). Screw shear screw (13) into lower cone (11). Tighten until shear screw (13) contact inner mandrel (2). Back out 1/4 turn.

J-1.14) Install lower slip ring (5) onto inner mandrel (2).

J-2) Unclamp upper bore (1) from vise and remove assembled tool.

K) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 67355
1	1	UPPER BORE	DLMS110	67355215
2	1	INNER MANDREL	DLMS110	67355210
3	1	LOCK RING HOUSING	DLMS80	67355012
4	1	LOCK RING	DLMS80	67255011
5	2	SLIP	DLMCIG2	67255110
6	1	UPPER CONE	DLMCIG2	67256014
7	2	FEMALE EXPANSION RING	DLM660BRZ	67255013
8	2	MALE EXPANSION RING	DLM660BRZ	67255020
9	2	RUBBER RETAINER	DLMCIG2	67256015
10	1	ELEMENT	80 DURO NITRILE	67255512
11	1	LOWER CONE	DLMCIG2	67256023
12	6	#10-32 UNF X 1/2 SLOTTED SHEAR SCREW (750#)	DLM360BRS	BSSSLT1032F050
13	8	1/4-20 UNC X 3/8 SLOTTED SHEAR SCREW (1200#)	DLM360BRS	BSSSLT025C037
14	2	KEY	DLMSKS	KS018X018X100
15	1	#10-32 UNF X 3/8 SLOTTED SHEAR SCREW (750#)	DLM360BRS	BSSSLT1032F037
16	4	1/4-20 UNC X 1/4 SOCKET SET SCREW	STEEL	SSS025C025
17	3	342 O-RING	90 DURO NITRILE	90342
18	10	5/16 X 5/8 DRIV-LOK PIN (4800#)	4140	DLP031062*

ASSEMBLED WEIGHT		103 LBS

*Refer to WLAK tech manual for placement.

K-1) ELASTOMER TRIM OPTIONS

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

K-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 67355H
10	1	ELEMENT	80 DURO HSN	67255512H
17	3	342 O-RING	90 DURO HSN	90342H

K-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 67355V
10	1	ELEMENT	80 DURO VITON	67255512V
17	3	342 O-RING	90 DURO VITON	90342V

K) PARTS LIST (cont’d)

K-2) CARBIDE OPTION

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 67355C
5	2	CARBIDE SLIP	DLMCIG2	67255110C

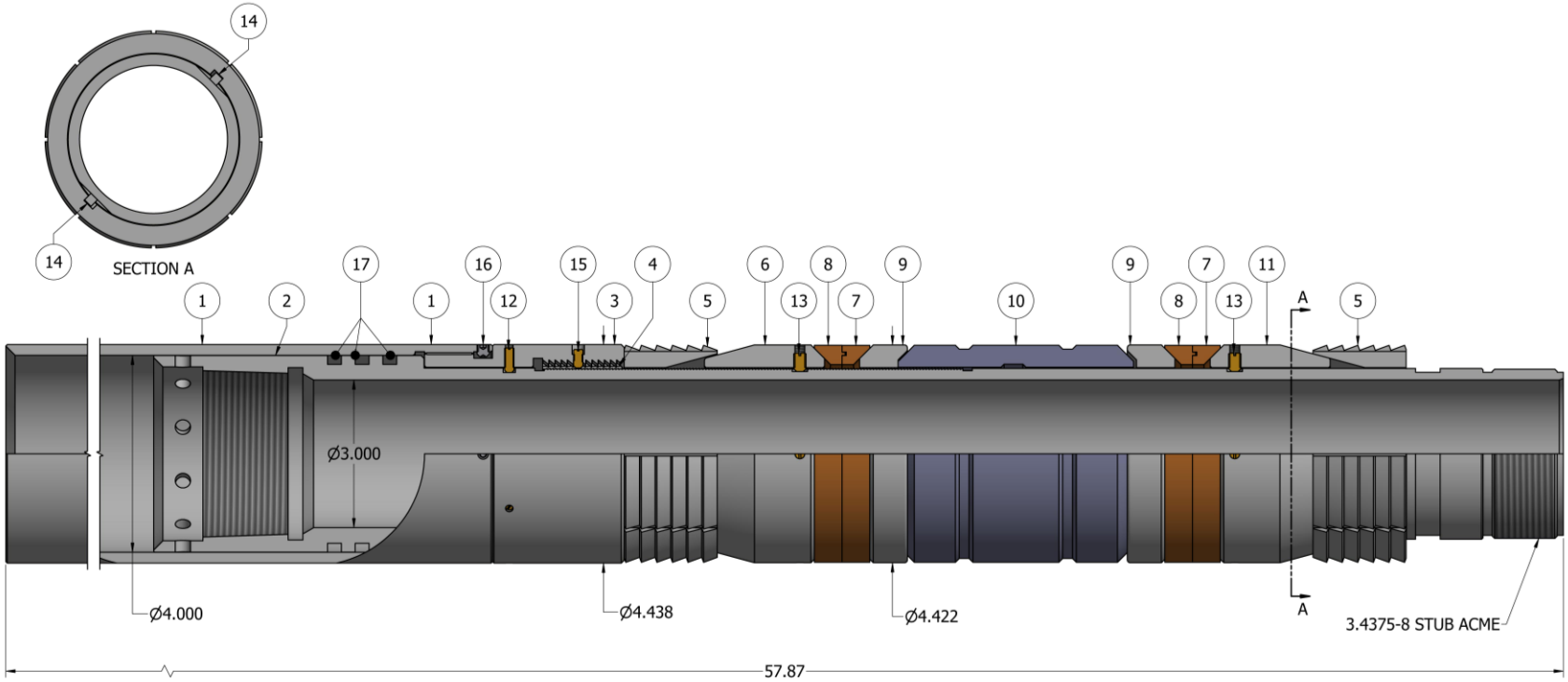
L) ACCESSORIES - BOTTOM SUBS

NOTE6: Standard bottom subs are listed. Other tubing sizes/configurations and threads are available. Sold separately.

NOTE7: O-rings and set screws required for installation of bottom subs. Sold separately.

DESCRIPTION	MATERIAL	THREAD CONNECTION	PART NUMBER
PLAIN BOTTOM	DLMS60	-	67255018
CONCENTRIC BOTTOM	DLMS110	-	67255610
BOX TUBING BOTTOM	DLMS80	2-7/8 EUE	67255620
PIN TUBING BOTTOM	DLMS80	2-7/8 EUE	67255630

M) TECHNICAL ILLUSTRATION



N) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
06/28/2022	A	Created manual	-	-