A) DESCRIPTION

The Hydroset IV Packer is a hydraulic set single string retrievable packer. Tubing pump pressure is used to set the packer and the setting force is locked into the packer by a body lock ring. Its design allows for multiple zone completions. It can be run with other hydraulic packers or mechanical set packers.

This packer is ideal to run as a tandem packer with double grip packers that will lock the tubing in place. This packer is released with a straight pull to shear releasing screws.

This packer features a three element packing arrangement, a lock ring mechanism to lock in setting force, and field adjustable shear screws to allow adjustment of setting initiation and releasing force required to release the packer.

B) SPECIFICATION GUIDE

CASING			TOOL		THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
SIZE (INCHES)	**WEIGHT** (LBS/FT)	**RECOMMENDED HOLE SIZE** (INCHES)	**GAGE OD** (INCHES)	**NOMINAL ID** (INCHES)		
3-1/2	7.7 – 10.2	2.922 – 3.068	2.781	1.25	1.900 NUE	65435 65435H[1] 65435V[2]

Elastomer Trim Options: [1]HSN, [2]Viton

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
7,000 PSI	30,000 LBS

C) 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.

Before first use, D&L recommends disassembly and inspection of the tool unless stated otherwise. Ensure parts have not been damaged during shipping. Replace damaged parts with D&L replacement parts. Contact D&L sales for replacement part information.

Re-assemble the tool after inspection. Install parts in the correct order and orientation. Properly tighten connections.

Before re-using the tool, D&L recommends disassembly and inspection of the tool. Clean parts and ensure parts are in good working condition. Replace worn or damaged parts with D&L replacement parts.

When redressing the tool, D&L recommends replacement of all seals, elements, o-rings, shear screws, etc. Contact D&L sales for redress kit and/or other replacement part information.

D) SETTING 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.

D-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 makeup torque through the packer should be avoided. Run the packer to the desired setting depth at the recommended speed and taking precautions listed above.

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.

D-2) SETTING SEQUENCE

Internal tubing pressure enters the setting chamber through the setting port and acts upward on the setting sleeve. When the applied load acting on the piston exceeds the value of the setting initiation shear screws, they will shear and allow the setting process to proceed and pack off the 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.

NOTE$_1$: 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.

E) RELEASING PROCEDURES

To release, pull 19,000 lbs at the packer to shear the shear screws (2,375 lbs / screw) and allow the elements to relax.

F) SETTING AREA GUIDE

PACKER SIZE (INCHES)	**SETTING AREA** (SQ INCHES)	**SHEAR VALUE** (PSI/SCREW)	**SETTING INITIATION** (PSI)	**RECOMMENDED SETTING** (PSI)
3-1/2	1.625	738	2,952	3,800

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) 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

I) 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

J) DISASSEMBLY

NOTE$_6$: Tool is shipped with two (2 qty) socket cap screws to prevent damage to brass setting shear screws during shipment. Before first use, replace cap screws with provided shear screws.

J-1) Clamp upper end of mandrel (1) in vise.

J-1.1) Unscrew and remove shear screws (6) from lock ring housing (8).

J-1.2) Unscrew lock ring housing (8) from lock ring (9) (**NOTE$_2$**: Left-hand threads) and remove from bottom sub (11).

J-1.3) Unscrew and remove bottom sub (11) from mandrel (1).

J-1.3.1) Remove o-ring (14) from bottom sub (11).

J-1.4) Remove setting piston seal (10) from mandrel (1).

J-1.4.1) Remove o-rings (13, 14) from setting piston seal (10).

J-1.5) Unscrew and remove lock ring (9) from setting piston (7).

NOTE$_3$: Using snap ring spreader pliers, lock ring (9) may be spread slightly to be removed from setting piston (7).

J-1.6) Unscrew and remove shear screws (12) from setting piston (7).

J-1.7) Remove elements (3, 5) and rubber spacers (4) from mandrel (1).

J-1.8) Unscrew and remove gage ring (2) from mandrel (1).

J-2) Unclamp and remove mandrel (1) from vise.

K) ASSEMBLY

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

K-1) Clamp mandrel (1) in vise.

K-1.1) Screw gage ring (2) onto mandrel (1).

K-1.2) Install elements (3, 5) and rubber spacers (4) onto mandrel (1).

K-1.3) Install setting piston (7) onto mandrel (1). Align threaded holes in setting piston (7) with grooves in mandrel (1).

K-1.4) Screw shear screws (12) into setting piston (7). Tighten until shear screws (12) contact mandrel (1). Back out 1/4 turn.

K-1.5) Screw and/or slide lock ring (9) onto the setting piston (7).

NOTE5: Threads on lock ring (3) are directional—it MUST be in installed in correct direction for tool to work properly.

K-1.6) Install o-rings (13, 14) in o-ring grooves in setting piston seal (7).

K-1.7) Install setting piston seal (7) onto mandrel (1).

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

K-1.8) Install o-ring (14) in o-ring groove in bottom sub (11).

K-1.9) Screw bottom sub (11) onto mandrel (1).

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

K-1.10) Install lock ring housing (8) onto bottom sub (11) and screw onto lock ring (9) (**NOTE2**: Left-hand threads). Align threaded holes in lock ring housing (8) with groove in bottom sub (11).

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

K-1.11) Screw shear screws (6) into lock ring housing (8). Tighten until shear screws (6) contact bottom sub (11). Back out 1/4 turn.

K-2) Unclamp mandrel (1) and remove tool assembly from vise.

L) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 65435
1	1	MANDREL	DLMS80	65435210
2	1	GAGE RING	DLMS60	65435830
3	2	ELEMENT (OUTER)	90 DURO NITRILE	72035513
4	2	RUBBER SPACER	1026	72535840
5	1	ELEMENT (CENTER)	70 DURO NITRILE	72035511
6	8	SHEAR SCREW (2375#)	BRASS	60100990
7	1	SETTING PISTON	DLMS80	65435750
8	1	LOCK RING HOUSING	DLMS80	65435725
9	1	LOCK RING	DLMS41X80	65435720
10	1	SETTING PISTON SEAL	DLMS80	65435751
11	1	BOTTOM SUB	DLMS80	65435630
12	4	1/4-20 UNC X 1/2 SLOTTED SHEAR SCREW (1200#)	DLM360BRS	BSSSLT025C050
13	1	224 O-RING	90 DURO NITRILE	90224
14	2	225 O-RING	90 DURO NITRILE	90225

REDRESS KIT (RDK)		65435050
ASSEMBLED WEIGHT		19 LBS

L-1) ELASTOMER TRIM OPTIONS

NOTE6: For temperature range, refer to Elastomer Trim Temperature Guide.

L-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 65435H
3	2	ELEMENT (OUTER)	90 DURO HSN	72035513H
5	1	ELEMENT (CENTER)	70 DURO HSN	72035511H
13	1	224 O-RING	90 DURO HSN	90224H
14	2	225 O-RING	90 DURO HSN	90225H

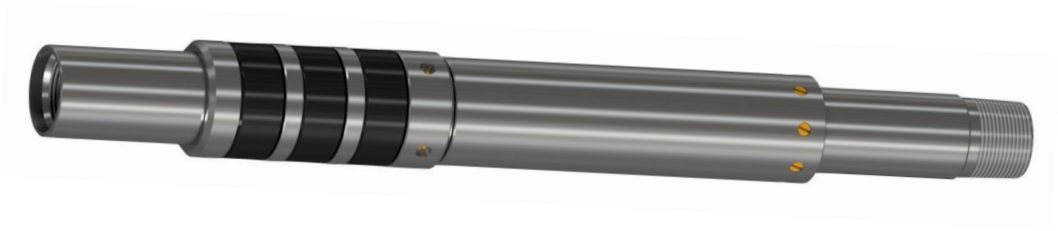
REDRESS KIT (RDK)		65435050H

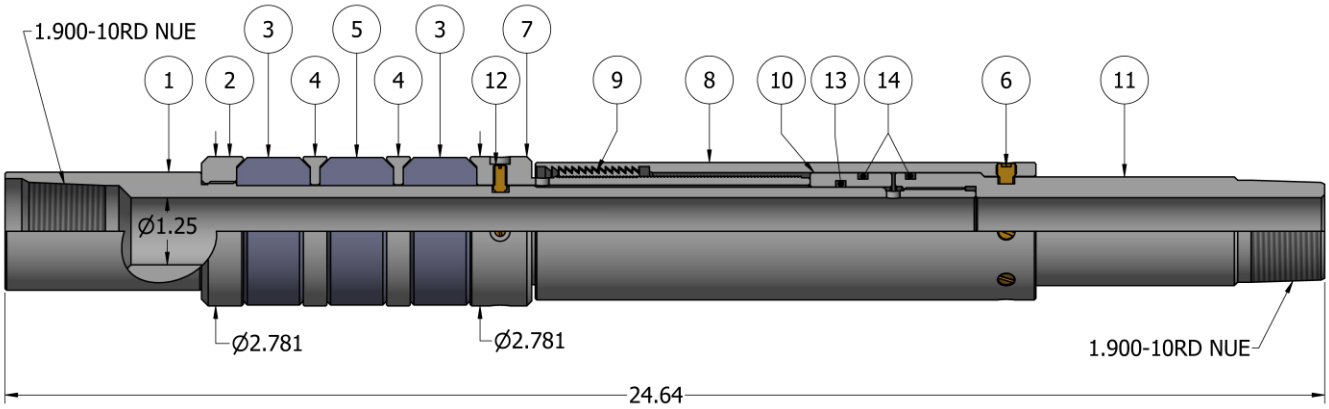
L-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 65435V
3	2	ELEMENT (OUTER)	90 DURO VITON	72035513V
5	1	ELEMENT (CENTER)	70 DURO VITON	72035511V
13	1	224 O-RING	90 DURO VITON	90224V
14	2	225 O-RING	90 DURO VITON	90225V

REDRESS KIT (RDK)		65435050V

M) TECHNICAL ILLUSTRATION





N) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
09/23/2022	B	Revised entire manual	J.Anderson	E.Visaez