A) DESCRIPTION

The DLESP Packer is a hydraulic set, mechanically held dual string production packer normally run above a single string hydraulic set or wireline set seal bore packer. Because no tubing manipulation is required to set this packer, the well head can be installed and flanged up before setting.

This packer is available with short string or long string setting capabilities and a variety of tubing connections. This packer is also adaptable for electrical submersible pump applications. This packer features a sequential upper slip release system designed to release each slip individually to reduce the pull required to release the packer. The angles on the upper slips and upper slip body result in the slips releasing smoothly from the casing.

B) SPECIFICATION GUIDE

CASING		
SIZE (INCHES)	**WEIGHT** (LBS/FT)	**RECOMMENDED HOLE SIZE** (INCHES)
5-1/2	14.0 – 20.0	4.778 – 5.012

TOOL			**PART NUMBER**
OD (INCHES)	**LONG STRING ID** (INCHES)	**FEED THRU HOLES ID** (INCHES)	
4.625	1.00	0.50	94855V-BBA-5

THREAD CONNECTION	
LONG STRING BOX UP / PIN DOWN	**FEED THRU HOLES** BOX UP / BOX DOWN
1.900 EUE / 1.315 NUE	3/8 NPT

DIFFERENTIAL PRESSURE (MAX)	**TENSILE LOAD THRU TOOL** (MAX)
5,000 PSI	8,325 LBS8

*with 15,000 lbs releasing shear segment.

SETTING				**RELEASING** (LBS)
SETTING AREA (SQ INCHES)	**INITIATION PRESSURE** (PSI)	**MINIMUM SETTING PRESSURE** (PSI)	**RECOMMENDED SETTING PRESSURE** (PSI)	
9.73	1,027	2,260	3,390	15,000

NOTE$_1$: Other shear value shear wire sets are available. Contact D&L for more information.

NOTE$_2$: D&L recommends a minimum 5,000 lbs difference between the releasing and setting shear segments to avoid prematurely releasing the tool when setting it.

C) 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.

NOTE3: Do not tighten the long string mandrel (2) into the flat top (1) with more than 200 ft-lbs torque.

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.

D) OPERATION

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

When tubing pressure is applied to the packer, the inlet port allows pressure differential to be present in the setting chamber. This differential forces the setting mandrel to separate from the setting cylinder, shearing the setting shear segment. The setting cylinder is forced down, which shears the lower slip body shear screws and sets the lower **slips. The setting mandrel is forced up, which shears the upper slip body shear screws, and sets the upper slips and packs** off the elements. Any relative motion between the setting cylinder and the setting mandrel is held in place by the locking nut, which will ratchet in only one direction. With a pressure differential from above, the force is transferred through the outer components of the packer and is supported by the lower slips. With the pressure differential from below, the force transfers through the outer components of the packer and is supported by the upper slips.

D-1) SETTING PROCEDURES

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.

D) OPERATION (cont'd)

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.

D-2) RELEASING PROCEDURES

The packer is released by a straight pick up on the long string.

A maximum of 23,325 lbs can be hung below the packer with the releasing shear segment in place. If the combined force from the releasing shear segment plus the weight below the tool exceeds 23,325 lbs, a telescoping union should be run directly below the packer to prevent damage to the packer when releasing.

E) ELASTOMER TRIM TEMPERATURE GUIDE

TEMPERATURE RANGE (F°)			
TEMPERATURE RANGE (F°)	DUROMETER		
	END	MIDDLE	END
40° - 125°	60	60	60
125° - 300°	80	70	80
300° +	Contact D&L Sales		

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

F) 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
- BOLTS, 1/4-20 X 1-1/4" LONG (4EA)
- SCREWDRIVER SET, FLAT-TIPPED
- SOCKET SETS
  - 3/8-INCH DRIVE
  - 1/2-INCH DRIVE
- HAMMERS
  - SLEDGE
  - BALL PEEN
  - DEAD BLOW

G) DISASSEMBLY

G-1) Clamp flat top (1) in vise.

G-1.1) From upper end of tool, unscrew and remove coupling (10) from pup joint (20).

G-1.2) Unscrew and remove pup joint (20) from flat top (1).

G-1.3) Moving to lower end of tool, unscrew and remove shear cap (21) from shear adapter (22).

G-1.4) Remove two halves of releasing shear segment (26) from long string mandrel (2).

G-1.5) Unscrew and remove set screw (5) from lower slip body cap (19).

G-1.6) Unscrew shear adapter (22) from lower slip body cap (19) and remove from long string mandrel (2).

G-1.7) Unscrew and remove low head cap screws (23) from lower cone (16).

G-1.8) Unscrew and remove shear screws (4) from lower slip body (18).

G-1.9) Wedge lower slips (17) outwards. Remove lower slip body assembly and disassemble:

G-1.9.1) Remove wedges (if needed). Remove lower slips (17) from lower slip body (18).

G-1.9.1.1) Unscrew and remove button head cap screws (29) from lower slips (17) and remove slip springs (28).

G) DISASSEMBLY (cont’d)

G-1.9.2) Unscrew and remove lower slip body cap (19) from lower slip body (18).

G-1.9.2.1) Remove o-ring (30) from lower slip body cap (19).

G-1.10) Remove pick-up ring (25) from long string mandrel (2).

G-1.11) Remove setting mandrel assembly and disassemble:

G-1.11.1) Unscrew and remove lower cone (16) from setting chamber (24).

G-1.11.1.1) Remove o-rings (30, 32, 33) from lower cone (16).

G-1.11.2) Unscrew and remove lock ring (7) from lower end of setting mandrel (11).

G-1.11.3) Unscrew setting chamber (24) from shear ring cap (15) and remove from setting mandrel (11).

G-1.11.3.1) Remove o-rings (33) from setting chamber (24).

G-1.11.4) Remove two halves of setting shear segment (27) from setting mandrel (11).

G-1.11.5) Remove shear ring cap (15) from setting mandrel (11).

G-1.11.6) Remove o-rings (30, 32) from setting mandrel (11).

G-1.12) Remove elements (13, 14) and rubber spacers (12) from long string mandrel (2) and feed through tubes (3).

G-1.13) Unscrew and remove low head cap screws (23) from upper cone (9).

G-1.14) Unscrew and remove shear screws (4) from upper slip body (6).

G-1.15) Wedge upper slips (8) outwards (if needed). Remove upper cone (9) from upper slip body (6).

G-1.15.1) Remove o-rings (30, 32) from upper cone (9).

G-1.16) Unscrew upper slip body (6) from flat top (1).

G-1.17) Remove upper slip body assembly and disassemble:

G-1.17.1) Remove wedges (if needed). Remove upper slips (8) from upper slip body (6).

G-1.17.1.1) Unscrew and remove button head cap screws (29) from upper slips (8) and remove slip springs (28).

G-1.18) Unscrew and remove feed through tubes (3) and long string mandrel (2) from flat top (1).

CAUTION$_3$: Do NOT wrench or clamp on seal surfaces.

G-1.19) Remove o-rings (31, 32) from flat top (1).

G-2) Unclamp and remove flat top (1) from vise.

H) ASSEMBLY

NOTE$_4$: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

CAUTION$_4$: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread reliefs (Fig. 2).

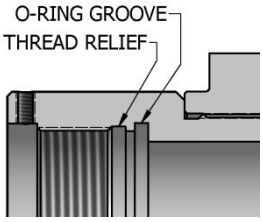


Fig. 2

H-1) Clamp flat top (1) in vise

H-1.1) Install o-rings (31, 32) in o-ring grooves in flat top (1).

H-1.2) Screw feed through tubes (3) and long string mandrel (2) into flat top (1).

CAUTION$_3$: Do NOT wrench or clamp on seal surfaces.

CAUTION$_6$: Do NOT rip or tear o-rings while installing.

H) ASSEMBLY (cont’d)

H-1.3) Assemble upper slip body assembly and install:

H-1.3.1) Place slip springs (28) onto upper slips (8) and screw button head cap screws (29) into upper slips (8) to secure slip springs (28).

NOTE5: Install two (2 ea) springs per slip (Fig. 3).

H-1.3.2) Install upper slips (8) into upper slip body (6). Wedge slips outwards.

CAUTION7: Slips must be fully extended to prevent hitting the mandrel and feed through tubes when installed.

H-1.3.3) Install upper slip body assembly onto long string mandrel (2) and feed through tubes (3).

H-1.3.4) Screw upper slip body (6) onto flat top (1).

CAUTION6: Do NOT rip or tear o-rings while installing.

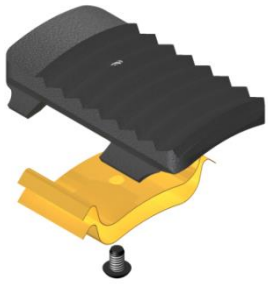


Fig. 3

H-1.4) Install o-rings (30, 32) in o-ring grooves in upper cone (9).

H-1.5) Install upper cone (9) onto long string mandrel (2) and feed through tubes (3) and into upper slip body (6). Align threaded holes in upper cone (9) with slots in upper slip body (6).

H-1.6) Screw low head cap screws (23) into upper cone (9).

H-1.7) Screw shear screws (4) into upper slip body (6). Tighten until shear screws (4) make contact with upper cone (9). Back shear screws (4) out 1/4 turn. Remove wedges from upper slips (8).

H-1.8) Install elements (13, 14) and rubber spacers (12) onto feed through tubes (3) and long string mandrel (2).

H-1.9) Assemble setting mandrel assembly and install:

H-1.9.1) Install o-rings (30, 32) in o-ring grooves in setting mandrel (11).

H-1.9.2) Install o-rings (33) in o-ring grooves in setting chamber (24).

H-1.9.3) Install o-rings (30, 32, 33) in o-ring grooves in lower cone (16).

H-1.9.4) Install shear ring cap (15) onto setting mandrel (11).

H-1.9.5) Install two halves of setting shear segment (27) onto setting mandrel (11).

H-1.9.6) Install setting chamber (24) onto setting mandrel (11) and screw onto shear ring cap (15).

CAUTION6: Do NOT rip or tear o-rings while installing.

H-1.9.7) Install lock ring (7) into bottom end of setting chamber (24) and screw onto setting mandrel (11). Keep lock ring (7) in smooth part of setting chamber (24) to avoid premature setting.

NOTE6: Spread lock ring (7) to hold a gap of 1/4” to 3/8” before installing.

H-1.9.8) CAREFULLY screw lower cone (16) into setting chamber (24) until they shoulder.

CAUTION6: Do NOT rip or tear o-rings while installing.

H-1.9.9) Rotate setting chamber (24) and lower cone (16) in right-hand motion to align holes for long string mandrel (2) and feed through tubes (3).

H-1.9.10) Install setting mandrel assembly onto long string mandrel (2) and feed through tubes (3).

CAUTION6: Do NOT rip or tear o-rings while installing.

H-1.10) Install pick-up ring (25) in groove in long string mandrel (2).

H-1.11) Assemble lower slip body assembly and install:

H-1.11.1) Install o-ring (30) in o-ring groove in lower slip body cap (19).

H-1.11.2) Screw lower slip body cap (19) into lower slip body (18).

H) ASSEMBLY (cont’d)

H-1.11.3) Assemble lower slip assemblies and install:

H-1.11.3.1) Place slip springs (28) onto lower slips (17) and screw button head cap screws (29) into lower slips (17) to secure slip springs (28).

NOTE$_5$: Install two (2 ea) springs per slip (Fig. 4).

H-1.11.3.2) Install lower slip assemblies onto lower slip body (18). Wedge slips outwards.

Fig. 4

H-1.11.4) Install lower slip body assembly onto feed through tubes (3) and long string mandrel (2) and onto lower cone (16).

NOTE$_7$: Back off lower slip body cap (19) as needed to align feed through tubes (3) and long string mandrel (2).

CAUTION$_6$: Do NOT rip or tear o-rings while installing.

H-1.11.5) Align threaded holes in lower cone (16) with slots in lower slip body (18). Screw low head cap screws (23) into lower cone (16).

H-1.11.6) Screw shear screws (4) into lower slip body (18). Tighten until shear screws (4) make contact with lower cone (16). Back shear screws (4) out 1/4 turn. Remove wedges.

H-1.12) Install shear adapter (22) onto long string mandrel (2) and screw into lower slip body cap (19).

H-1.13) Screw set screw (5) into lower slip body cap (19).

H-1.14) Install two halves of releasing shear segment (26) in groove in long string mandrel (2)

H-1.15) Install shear cap (21) onto long string mandrel (2) and screw onto shear adapter (22) until shouldered.

H-1.16) Moving to upper end of tool, screw pup joint (20) into flat top (1).

H-1.17) Screw coupling (10) onto pup joint (20).

H-2) Unclamp flat top (1) from vise and remove assembled tool.

NOTE$_8$: If pressure testing of the packer is desired, refer to technical manual *DL- 945-5500-1192*. Pressure testing of the packer is not mandatory.

I) PARTS LIST

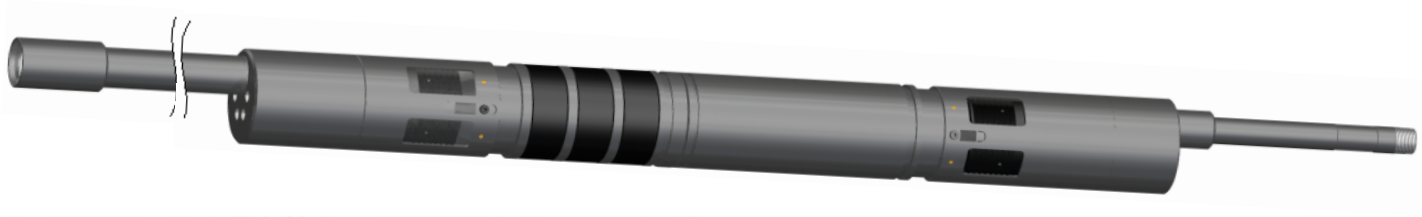
ITEM	QTY	DESCRIPTION	MATERIAL	PART NUMBER
1	1	FLAT TOP	DLMS80	94855600
2	1	LONG STRING MANDREL	DLMS110	94513200-45
3	4	FEED THROUGH TUBE	DLMS60	94837210-45
4	8	SHEAR SCREW (1200#) 1/4-20 UNC X 1/4	DLM360BRS	BSSSLT025C025
5	1	SET SCREW 1/4-20 UNC X 1/4	STEEL	SSS025C025
6	1	UPPER SLIP BODY	DLMS80	94555320
7	1	LOCK RING	DLMS80	94555720
8	4	UPPER SLIP	DLMS60	90855115-4
9	1	UPPER CONE	DLMS80	94855400
10	1	COUPLING	DLMS80	CP-BAA-BBA-B-1

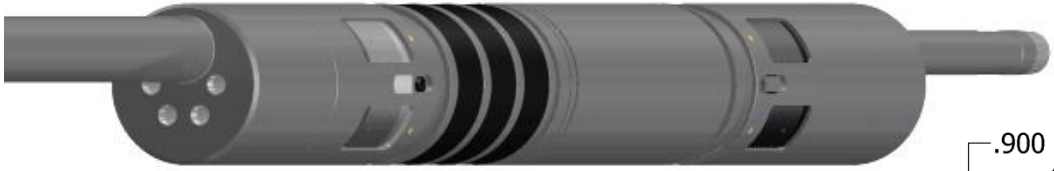
I) PARTS LIST (cont’d)

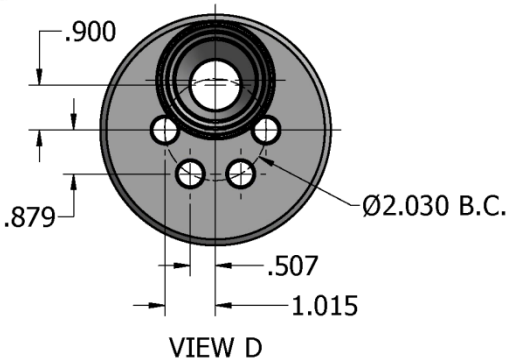
ITEM	QTY	DESCRIPTION	MATERIAL	PART NUMBER
11	1	SETTING MANDREL	DLMS80	94855750
12	2	RUBBER SPACER	DLMS80	94855840
13	1	ELEMENT	70 DURO VITON	94855511V
14	2	ELEMENT	80 DURO VITON	94855512V
15	1	SHEAR RING CAP	DLMS110	94555760
16	1	LOWER CONE	DLMS80	94855420
17	4	LOWER SLIP	DLMS60	90855135-4
18	1	LOWER SLIP BODY	DLMS80	94555310
19	1	LOWER SLIP BODY CAP	DLMS80	94855335
20	1	PUP JOINT	DLMS80	PJ-BBA-72-B
21	1	SHEAR CAP	DLMS110	94513980
22	1	SHEAR ADAPTER	DLMS110	94513961
23	4	LOW HEAD CAP SCREW 5/16-18 UNC X 3/8	STEEL	LHSC031C037
24	1	SETTING CHAMBER	DLMS110	94555755
25	1	PICK-UP RING	DLMS80	94513915
26	2	RELEASING SHEAR SEGMENT	DLM360BRS	94513250-75
27	2	SETTING SHEAR SEGMENT	DLM360BRS	94555900-50
28	16	SLIP SPRING		32045950
29	8	BUTTON HEAD CAP SCREW #8-32 UNC X 1/4	STEEL	BHSC832C025
30	24	115 O-RING	90 DURO VITON	90115V
31	8	117 O-RING	90 DURO VITON	90117V
32	7	125 O-RING	90 DURO VITON	90125V
33	4	155 O-RING	90 DURO VITON	90155V

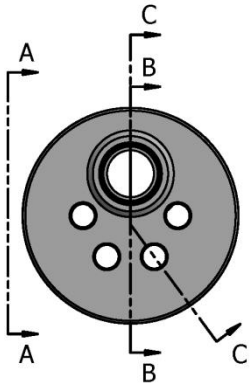
REDRESS KIT (RDK)		94855V-A-5-050
ASSEMBLED WEIGHT		205 LBS

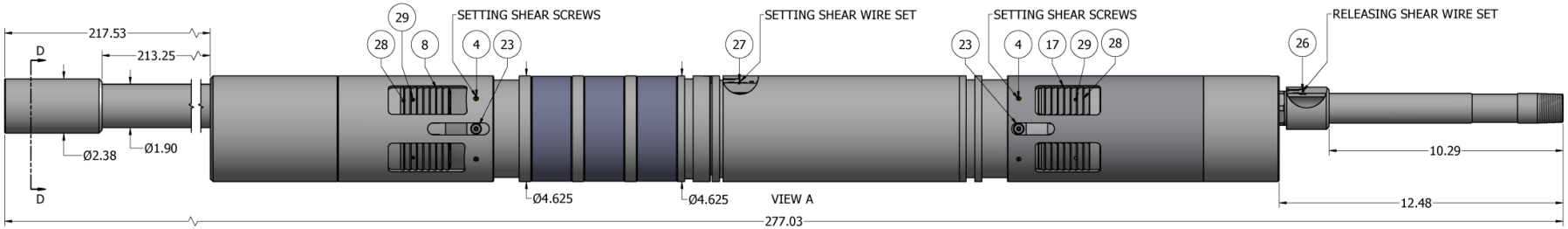
J) TECHNICAL ILLUSTRATION



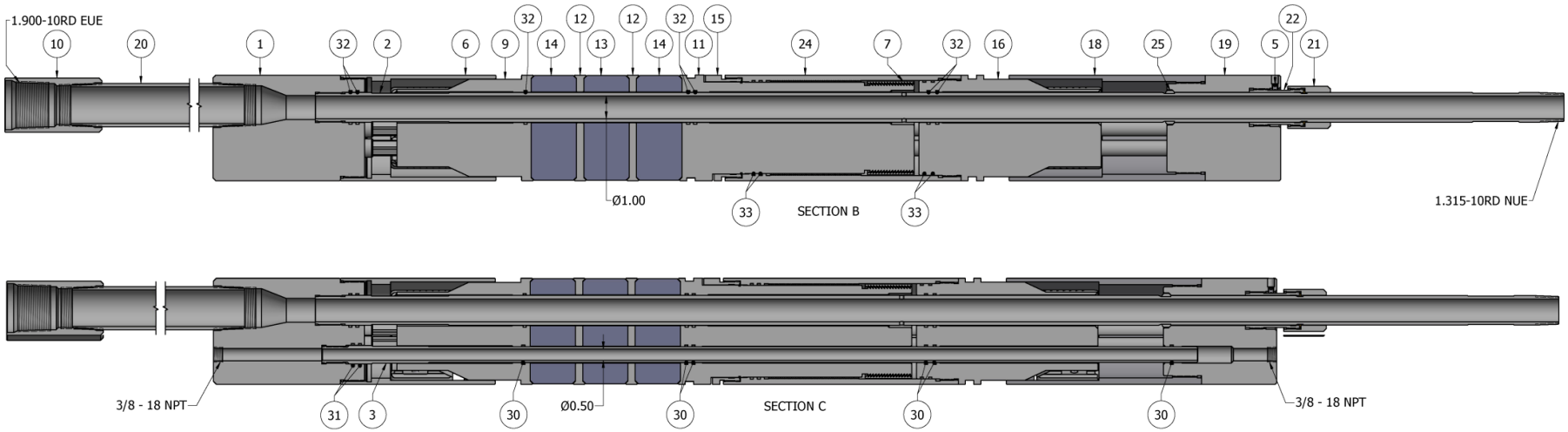








J) TECHNICAL ILLUSTRATION (cont’d)



K) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
05/28/2021	C	Revised Setting table, Releasing Procedures, PJ-BBA-72-B was PJ-BBA-216-B; Added General Screw Torque Recommendations; Replaced Pressure Testing section with note8	J.Anderson	E.Visaez
04/05/2016	B	Revised tensile load thru tool with releasing shear segment, setting initiation pressure, releasing, P/N 94513250-75 was 94513250-60, 94555900-50 was 94555900-35, Added note2	J.Anderson	R.Dyer
03/22/2016	A	Created new manual	-	-