



# ESP-X PACKER, HSN, CARBIDE

9-5/8" X 4-1/2" X (4) 3/8" NPT

Manual No:  
**DL-903-9625-1429**

Revision: **A**

Revision Date:  
**01/27/2021**

Authored by: *J.Anderson*

Approved by: *K.Plunkett*

## A) DESCRIPTION

The ESP-X Packer is a hydraulic set, mechanically held, Electric Submersible Pump (ESP) production packer, with secondary bores for ESP feed through cable and optional chemical feed through lines. Because no tubing manipulation is required to set this packer, the wellhead can be installed and flanged up before setting.

This packer is available with a variety of tubing connections. The packer features a sequential upper slip release system designed to release each slip individually to reduce the pull required to release it. 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)	API MINIMUM AND MAXIMUM HOLE SIZE (INCHES)
9-5/8	36.0 – 47.0	8.681 - 8.921

TOOL				
OD (INCHES)	LONG STRING ID (INCHES)	SHORT STRING ID (INCHES)	FEED-THROUGH TUBES ID (INCHES)	PART NUMBER
8.500	3.89	N/A	0.50	90395HC-BAG-4

THREAD CONNECTIONS		
LONG STRING BOX UP / PIN DOWN	SHORT STRING BOX UP / BOX DOWN	FEED THRU TUBES BOX UP / BOX DOWN
4-1/2 EUE	N/A	3/8 NPT

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)	TEMPERATURE RANGE
5,000 PSI	114,000 LBS*	70 - 300° F

\* Using all 10 releasing shear screws

SETTING				
SETTING AREA (IN <sup>2</sup> )	SHEAR VALUE (PSI/SCREW)	INITIATION PRESSURE (PSI)	MINIMUM SETTING PRESSURE (PSI)	RECOMMENDED SETTING PRESSURE (PSI)
28.60	83	1,329	1,850	2,019

RELEASING
Shear release is adjustable from 30,000 to 50,000 lbs (5,000 lbs/screw). Minimum of 6 shear screws required.

**D & L OIL TOOLS**  
P.O. BOX 52220 TULSA, OK 74152  
PHONE: (800) 441-3504 [www.dloiltools.com](http://www.dloiltools.com)



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### C) PRE-INSTALLATION INSPECTION PROCEDURES

**CAUTION<sub>1</sub>:** 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.

**NOTE<sub>9</sub>:** Do not tighten long string mandrel (5) into flat top (1) with more than 200 ft-lbs of 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

**CAUTION<sub>2</sub>:** If not running chemical feed through lines, make sure that the unused feed through bores in the top of the packer have plugs properly installed.

**CAUTION<sub>3</sub>:** 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. The pressure differential forces the setting mandrel to separate from the setting cylinder, shearing the setting shear screws. 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.



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## D) OPERATION (cont'd)

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.

Allow at least 30 minutes for the packer to equalize thermally before setting. Temporarily plug the long string below the packer and apply a minimum of 2,019 psi differential in the tubing at the packer and hold it for 30 minutes. The packer should now be fully set and can be pressure tested if desired.

### D-2) RELEASING PROCEDURES

The packer is released by a straight pick up on the long string or short string. The shear release value is adjustable from 30,000 lbs to 50,000 lbs (5,000 lbs/screw).

**NOTE4:** A minimum of three (3 qty) shear screws per mandrel must be used or the packer may release prematurely.

A maximum of 114,000 lbs can be hung below the packer. If the combined force required to shear the releasing shear screws plus the weight below the tool exceeds 114,000 lbs, a telescoping union should be run directly below the packer.

## E) 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.

## 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

**NOTE2:** Ensure vise is capable of handling weight of tool.

**NOTE6:** Support tool during disassembly and assembly with jack stands as necessary.

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

G-1.1) From upper end of tool, unscrew and remove top sub (16) from handling pup (15).

G-1.2) Remove o-rings and back-up rings (33,34) from top sub (16).

G-1.3) Unscrew and remove handling pup (15) from flat top (1).



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## G) DISASSEMBLY (cont'd)

- G-1.4) Moving to lower end of tool, unscrew and remove bottom sub (17) from long string mandrel (13).
- G-1.5) Remove o-rings and back-up rings (33,34) from bottom sub (17).
- G-1.6) Unscrew and remove couplings (30) from feed through mandrels (9).
- G-1.7) Remove shear screw (21) from shear rings (27).
- G-1.8) Unscrew and remove shear rings (27) from long string mandrel (13).
- G-1.9) Unscrew and remove set screws (25) from retainer ring (11).
- G-1.10) Unscrew and remove retainer ring (11) from lower slip body (12).
- G-1.11) Remove shear plate (28) from long string mandrel (13).
- G-1.12) Unscrew and remove cap screws (29) from lower cone (10).
- G-1.13) Unscrew and remove shear screws (22) from lower slip body (12).
- G-1.14) Wedge lower slips (20) outwards (if needed). Remove lower slip body assembly and disassemble:
  - G-1.14.1) Remove wedges (if needed). Remove lower slips (20) and slip springs (39) from lower slip body (12).
- G-1.15) Remove pick-up ring (14) from long string mandrel (13).
- G-1.16) Remove setting assembly and disassemble:
  - G-1.16.1) Unscrew and remove set screws (25) from retainer ring (11).
  - G-1.16.2) Remove lower cone (10) from chamber (8).
    - G-1.16.2.1) Remove o-rings and back-up rings (31, 32 & 33, 34 & 35, 36) from lower cone (10).
  - G-1.16.3) Unscrew and remove set screws (25) from lock ring carrier (7).
  - G-1.16.4) Unscrew and remove chamber (8) from lock ring carrier (7).
  - G-1.16.5) Unscrew and remove shear screws (22, 26) from lock ring carrier (7).
  - G-1.16.6) Unscrew lock ring carrier (7) from lock ring (6) and remove from piston (4).
  - G-1.16.7) Unscrew and remove lock ring (6) from lower end of piston (4).

**NOTE:** Using snap ring spreader pliers, lock ring (6) may be spread slightly to be removed.
  - G-1.16.8) Remove element (5) from upper end of piston (4).
  - G-1.16.9) Remove o-rings and back-up rings (31, 32 & 33, 34 & 35, 36) from piston (4).
- G-1.17) Unscrew and remove cap screws (29) from upper cone (3).
- G-1.18) Unscrew and remove shear screws (22) from upper slip body (2).
- G-1.19) Wedge upper and releasing slips (18, 19) outwards. Remove upper cone (3) from upper slip body (2).
- G-1.20) Unscrew and remove upper cone extension (23) from upper cone (3).
  - G-1.20.1) Remove o-ring and back-up rings (37, 38) from upper cone extension (23)
- G-1.21) Unscrew and remove upper slip body (2) from flat top (1).
  - G-1.21.1) Remove wedges. Remove upper and releasing slips (18, 19) from upper slip body (2).
  - G-1.21.2) Unscrew button head screws (41) and remove slip springs (41) from slips (18, 19).



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## G) DISASSEMBLY (cont'd)

G-1.22) Unscrew and remove long string mandrel (5) and feed through mandrels (9) from flat top (1).

**NOTE<sub>3</sub>**: Flats are provided on upper end of mandrels to wrench on.

**CAUTION<sub>4</sub>**: Do NOT wrench or clamp on seal surfaces.

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

G-2.1) Remove o-rings and back-up rings (33, 44) from flat top (1).

## H) ASSEMBLY

**NOTE<sub>5</sub>**: 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<sub>5</sub>**: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread reliefs (Fig. 2).

**NOTE<sub>2</sub>**: Ensure vise is capable of handling weight of tool.

**NOTE<sub>6</sub>**: Support tool during disassembly and assembly with jack stands as necessary.

H-1) Install o-rings and back-up rings (33, 44) in o-ring grooves in flat top (1).

H-2) Clamp flat top (1) in vise.

H-2.1) Screw long string mandrel (5) and feed through mandrels (9) into flat top (1).

**NOTE<sub>3</sub>**: Flats are provided on upper end of mandrels to wrench on.

**CAUTION<sub>4</sub>**: Do NOT wrench or clamp on seal surfaces.

**CAUTION<sub>6</sub>**: Do NOT rip or tear o-rings and/or back-up rings while installing.

H-2.2) Assemble upper slip body assembly and install:

H-2.2.1) Install slip springs (31) onto slips (18, 19). Align holes in springs (31) with threaded holes in slips (18, 19). Screw button head screws (41) into slips (18, 19).

**NOTE<sub>7</sub>**: Install two (2 ea) springs per slip (Fig. 3).

H-2.2.2) Install slips (18, 19) into windows in upper slip body (2). Wedge slips outwards.

H-2.2.3) Screw upper slip body (2) onto flat top (1).

H-2.3) Install o-ring and back-up rings (38, 37) in o-ring grooves in upper cone extension (23).

H-2.4) Screw upper cone (3) into upper cone extension (23).

H-2.5) Install upper cone (3) onto mandrels (13, 9) and into upper slip body (2). Align threaded holes in upper cone (3) with slots in upper slip body (2)

H-2.6) Screw cap screws (29) into upper cone (3). Remove wedges from slips.

H-2.7) Align pocket holes in upper cone (3) with threaded holes in upper slip body (2). Screw shear screws (22) into upper slip body (2). Tighten until shear screws (22) contact upper cone (3). Back off 1/4 turn.

H-2.8) Assemble setting assembly and install:

H-2.8.1) Install o-rings and back-up rings (31, 32 & 33, 34 & 35,36) in o-ring grooves in piston (4).

H-2.8.2) Install element (5) onto upper end of piston (4)

H-2.8.3) Install lock ring (6) onto piston (4). Position lock ring (6) in smooth area of piston (4) to avoid premature setting.

H-2.8.4) Install lock ring carrier (7) onto piston (4) and carefully screw onto lock ring (6). Ensure lock ring (6) stays in smooth area of piston (4).

H-2.8.5) Align threaded hole in lock ring carrier (7) for shear screw (26) with gap in lock ring (6). Screw shear screw (26) into lock ring carrier (7). Tighten until screw (26) contacts piston (4). Back off 1/4 turn.

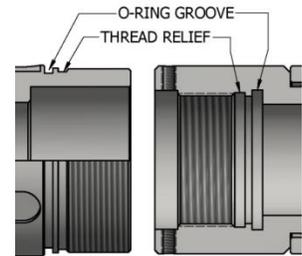


Fig. 2



Fig. 3



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## H) ASSEMBLY (cont'd)

H-2.8.6) Install chamber (8) onto piston (4) and screw carefully into lock ring carrier (7). Ensure lock ring (6) stays in smooth area of piston (4).

**CAUTION<sub>6</sub>:** Do NOT rip or tear o-rings and/or back-up rings while installing.

H-2.8.7) Screw set screws (25) into lock ring carrier (7)

H-2.8.8) Align threaded holes in lock ring carrier (7) for shear screws (22) with shear screw groove in piston (4). Screw shear screws (22) into lock ring carrier (7). Tighten until screws (22) contact piston (4). Back off 1/4 turn.

H-2.8.9) Install o-rings and back-up rings (31 & 32, 33 & 34, 35 & 36) in o-ring grooves in lower cone (10).

H-2.8.10) Install lower cone (10) into chamber (8)

H-2.8.11) Rotate lower cone (10) as needed to align mandrel holes in lower cone (10) with mandrel holes in piston (4).

H-2.8.12) Screw retainer ring (11) onto chamber (8).

H-2.8.13) Screw set screws (25) into retainer ring (11).

H-2.8.14) Install setting assembly onto mandrels (13, 9).

**CAUTION<sub>6</sub>:** Do NOT rip or tear o-rings and/or back-up rings while installing.

H-2.8.15) Align pocket holes in upper end of piston (4) with threaded holes in chamber (8). Screw shear screws (22) into chamber (8). Tighten until screws (22) contact piston (4). Back off 1/4 turn.

H-2.9) Install pick-up ring (14) in pick-up ring groove in long string mandrels (15).

H-2.10) Assemble lower slip body assembly and install:

H-2.10.1) Install slip springs (41) in place in lower slips (20). Align holes in springs (27) with threaded holes in slips (19). Screw button head screws (41) into slips (19).

**NOTE<sub>7</sub>:** Install three (3ea) springs per slip (Fig. 4).

H-2.10.2) Install lower slips (20) into windows in lower slip body (12). Wedge slips outwards.

H-2.10.3) Install lower slip body assembly onto mandrels (13, 9) and onto lower cone (10).

H-2.11) Align slots in lower slip body (12) with threaded holes in lower cone (10). Screw cap screws (29) into lower cone (10). Remove wedges slips.

H-2.12) Align threaded holes lower slip body (12) with pocket holes in lower cone (10). Screw shear screws (22) into lower slip body (12). Tighten until screws (22) contact lower cone (10). Back off 1/4 turn.

H-2.13) Install shear plate (28) onto mandrels (13, 9).

H-2.14) Install retainer ring (11) onto shear plate (28) and screw onto lower slip body (12).

H-2.15) Screw set screws (25) into retainer ring (11).

H-2.16) Install shear ring (27) onto long string mandrel (13). Align threaded holes in shear rings (27) with groove in mandrel (13).

H-2.17) Screw shear screws (21) into shear rings (27). Tighten until shear screws (21) contact mandrel (13). Back off 1/4 turn.

**NOTE<sub>10</sub>:** Install a minimum of three (3 qty) shear screws (21). Install additional shear screws (21) as needed to achieve desired shear value.

H-2.18) Install o-rings and back-up rings (33, 34) in o-ring grooves in bottom sub (17).

H-2.19) Screw bottom sub (17) onto long string mandrel (13).

**CAUTION<sub>6</sub>:** Do NOT rip or tear o-rings and/or back-up rings while installing.



Fig. 4



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## H) ASSEMBLY (cont'd)

H-2.20) Screw couplings (30) onto feed through mandrels (9).

H-2.21) Screw handling pup (15) in flat top (1).

**CAUTION:** Do NOT rip or tear o-rings and/or back-up rings while installing.

H-2.22) Install o-rings and back-up rings (33,34) in o-ring grooves in top sub (16)

H-2.23) Screw top sub (16) onto pup joint (2).

**CAUTION:** Do NOT rip or tear o-rings and/or back-up rings while installing.

H-3) Unclamp flat top (1) from vise and remove assembled tool.

**NOTE:** If pressure testing of the packer is desired, refer to technical manual *DL-945-9625-1206*. Pressure testing of the packer is not mandatory.

## D) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	PART NUMBER
1	1	FLAT TOP	DLMS41X80	94396600G-4
2	1	UPPER SLIP CAGE	DLMS110	94495325
3	1	UPPER CONE	DLMS41X80	90395400G-4
4	1	PISTON	DLMS41X80	90396700G-4
5	1	ECNER ARRAY	80 DURO HSN	OEM95BH-RMESP
6	1	LOCK RING	DLMS125	90395725-T
7	1	CARRIER SUB	DLMS125	90395740-T
8	1	CHAMBER	DLMS41X80	90395750-B1
9	4	1/2" NPT ACME FEED THROUGH TUBE	DLMS41X80	90350210-B1-S
10	1	LOWER CONE	DLMS41X80	90395410G-4
11	2	RETAINER RING	DLMS41X80	90395946
12	1	LOWER SLIP BODY	DLMS41X80	90395310
13	1	4-1/2" LONG STRING MANDREL	DLMS41X80	94345212-S
14	1	PICK UP RING	DLMS41X80	90345916
15	1	4-1/2" ACME HANDLING PUP	DLMS41X80	90345221-B1-4
16	1	4-1/2" TOP SUB	DLMS41X80	90345611-B1
17	1	BOTTOM SUB	DLMS41X80	90345661-B1
18	2	CARBIDE UPPER SLIP	DLMS110	94495115C
19	2	RELEASING SLIP	DLMS110	94495125
20	4	CARBIDE LOWER SLIP	DLMS41X80	94595131C-B1
21	10	SHEAR SCREW (5000#)	DLM464BRS	65050902
22	24	SHEAR SCREW (2375#)	DLM360BRS	60100990
23	1	UPPER CONE EXTENSION	DLMS41X80	90395405
24	3	#10-24 UNC X 3/16 SOCKET SET SCREW	STEEL	SSS1024C018



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### I) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	PART NUMBER
25	9	#10-24 UNC X 1/4 SOCKET SET SCREW	STEEL	SSS1024C025
26	1	#10-32 UNF X 5/16 BRASS SLOTTED SHEAR SCREW (750# EA)	DLM360BRS	BSSSLT1032F031
27	1	SHEAR RING	DLMS41X80	90345951-50
28	1	SHEAR PLATE	DLMS41X80	90395955G-4
29	4	3/8-16 UNC X 3/8 SOCKET CAP SCREW	STEEL	SCS037C037
30	4	1/2" X 3/8" NPT COUPLING	DLMS41X80	CP-50NPT-37NPT
31	2	264-90 O-RING	90 DURO HSN	90264H
32	4	BACK-UP RING	ARLON 1000	90300264E
33	12	BACK-UP RING	ARLON 1000	90300246
34	6	246-90 O-RING	90 DURO HSN	90246H
35	8	212-90 O-RING	90 DURO HSN	90212H
36	16	BACK-UP RING	ARLON 1000	90300212
37	1	263-90 O-RING	90 DURO HSN	90263H
38	2	BACK-UP RING	ARLON 1000	90300263
39	12	TAPERED SLIP SPRING	DLMINC750	DL94829
40	8	SLIP SPRING	DLMINC750	102137
41	4	#10-24 UNC X 3/8 BUTTON HEAD SOCKET CAP SCREW	STEEL	BHSC1024C037

REDRESS KIT (RDK)		_____
ASSEMBLED WEIGHT		618 LBS



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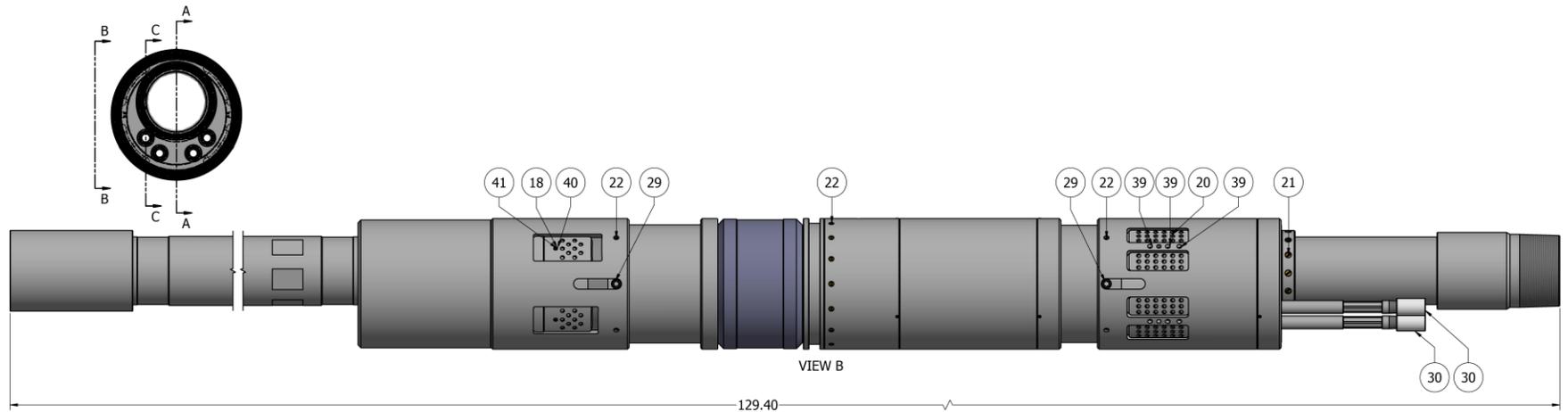
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## J) TECHNICAL ILLUSTRATION





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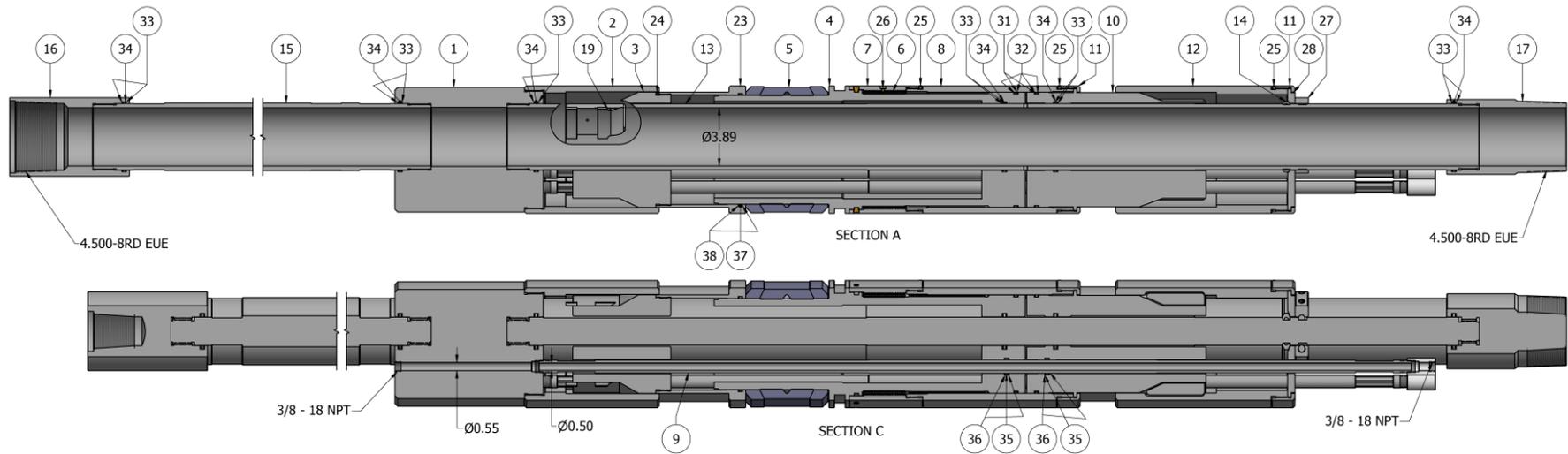
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## J) TECHNICAL ILLUSTRATION (cont'd)



## K) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
01/27/2021	A	Created new manual	-	-