ASI-X HT PACKER

9-5/8" X 4-1/2" (32.3 – 43.5#), CARBIDE W/O SECONDARY RUBBER MANDREL

Manual No: **DL-603-9625-1213**
Revision: **A**
Revision Date: **02/21/2019**

Authored by: J.Anderson *Approved by: H.Bringham*

A) DESCRIPTION

The ASI-X HT Single String Double-Grip Production Packer is the most versatile of the mechanically set retrievable packers and may be used in any production application. This packer is suited for treating, testing, or injection applications, in pumping or flowing wells, either deep or shallow. This packer can be left in tension or compression depending on well conditions and the required application.

A large internal by-pass reduces swabbing when running and retrieving. The by-pass closes when the packer is set and opens prior to releasing the upper slips when retrieving to allow pressure equalization. The J-slot design allows easy setting and releasing; 1/4 turn right-hand set, 1/4 turn right-hand release.

The ASI-X HT Packer is designed for differential pressures up to 10,000 PSI (unless noted otherwise). The HT version allows this packer to be utilized in completions where high pressure treating operations are performed and it is desirable to leave the tool in the well for production.

B) RELATED TOOLS (sold separately)

B-1) 4-1/2" D&L On/Off Tool and Stinger—refer to technical manual *DL-515-4500-1095*.

C) SPECIFICATION GUIDE

CASING			TOOL		THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
SIZE (INCHES)	**WEIGHT** (LBS/FT)	**RECOMMENDED HOLE SIZE** (INCHES)	**OD** (INCHES)	**NOMINAL ID** (INCHES)		
9-5/8	32.3 - 43.5	8.755 – 9.001	8.500	4.00	4-1/2 EUE	60396HTC-5 60396HTHC-5[1] 60396HTVC-5[2]

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

NOTE1: Tools listed are right hand set / right hand release.

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
8,000 PSI	154,000 LBS

D) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION1: D&L ships tool connections made-up hand-tight—labeled with hand-tight tape on the tool—unless stated otherwise. Properly tighten connections before operating tool (Fig. 1).

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

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

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) COMPRESSION SET

Run the packer to setting depth. Pick up the tubing to allow for setting stroke (12-13") plus desired tubing load. Rotate the tubing 1/4 right-hand turn at the packer, and then lower the tubing while releasing torque. Slack off on the tubing with enough weight to set the packer (35,000 lbs). Pull tension to assure that the upper slips are set. The tubing can then be left in tension, compression or neutral. If insufficient weight is available to set the packer with compression, tension can be applied after slack-off to pack off the elements.

E-2) TENSION SET

Run to setting depth, pick up on the tubing and rotate 1/4 turn to the right at the packer then lower the tubing slacking off available weight to set the packer lower slips. Pull tension to set upper slips and pack off elements (35,000 lbs). After setting the packer, the tubing can be left in compression, tension or neutral.

F) RELEASING PROCEDURES

The releasing procedures are the same whether the packer has been tension or compression set. Set down weight on the packer to unseat the J-pin from the tension shoulder of the J-slot. Refer to the Pressure Affected Area Guide to determine necessary set down weight on the packer. Rotate the tubing 1/4 right-hand turn at the packer and pick up while holding right-hand torque. Weight in addition to pipe weight may be required to pick up on the packer - refer to Pressure Affected Area Guide. The internal by-pass will open, allowing pressure to equalize. After pressure is equalized, continue to pick up to release the upper slips, relax the elements and release the lower slips thus allowing the packer to be re-set or removed from the well.

CAUTION$_3$: High differential pressure below the ASI-X may cause the upper slips to wedge in tighter, requiring an extra amount of tension to release the upper slips.

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 or other 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) PRESSURE AFFECTED AREA GUIDE

PACKER SIZE (INCHES)	**TUBING SIZE** (INCHES)	**PRESSURE AFFECTED AREA** (SQ. INCHES)	
		ABOVE	**BELOW**
9-5/8	2.875	11.11 (DOWN)	-12.92 (UP)
	3.500	7.98 (DOWN)	-10.56 (UP)
	4.000	5.03 (DOWN)	-7.71 (UP)
	4.500	1.70 (DOWN)	-5.30 (UP)

Example: Consider a 9-5/8" X 4-1/2" ASI-X HT Packer run on 3.500" tubing with a differential pressure of 3,000 psi in the annulus around the tubing above the packer. What is the force acting on the seal area of the mandrel?

To calculate the force (lbs) acting on the seal area of the mandrel, refer to the Pressure Affected Area Guide for a 9-5/8" X 4-1/2" ASI-X HT Packer run on 3.500" tubing. In this example, the differential pressure from above the packer acts on the seal area of the packer mandrel across a pressure affected area of 7.98 in^2. Multiplying the differential pressure (3,000 psi) by the pressure affected area (7.98 in^2) results in a force of 23,940 lbs. The piston effect on the packer mandrel is a downward force of 23,940 lbs.

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 TOOLS

J-1) 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-2) SPECIAL TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT010110

K) DISASSEMBLY

K-1) Clamp top sub (1) in vise.

K-1.1) Unscrew and remove bottom nipple (28) from J-pin bottom sub (23).

K-1.2) Unscrew and remove J-pin bottom sub (23) from inner mandrel (2).

NOTE2: Drag block body assembly must be free to rotate.

K-1.2.1) Remove o-ring (43) from J-pin bottom sub (23).

K-1.3) Compress drag blocks (22) with drag block assembly tool (T1).

K-1.4) Unscrew and remove set screws (36) from drag block body (18). Rotate drag block retainer (21) as needed to access set screws (36).

K-1.5) Unscrew and remove J-body (20) from drag block body (18) (**NOTE3**: Left-hand threads).

K-1.5.1) Remove retaining ring (31) from J-body (20).

K-1.6) Remove drag block retainer (21) from drag block body (18).

K-1.7) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).

K-1.8) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

NOTE4: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

K-1.9) Wedge lower slips (17) outwards (if needed). Remove drag block body assembly and disassemble:

K-1.9.1) Unscrew and remove cap screw (41) from drag block body (18).

K-1.9.2) Remove lower slip support (32) from drag block body (18).

K-1.9.3) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from drag block body (18).

K-1.10) Unscrew and remove lower cone (16) from rubber retainer (15).

K-1.11) Unscrew rubber mandrel (11) from center coupling (10).

K-1.12) Remove rubber mandrel assembly from inner mandrel (2) and disassemble:

K-1.12.1) Remove elements (13, 14), rubber spacers (12), and rubber retainer (15) from rubber mandrel (11).

K-1.13) Unscrew and remove gage ring (29) from center coupling (10).

K-1.14) Unscrew and remove center coupling (10) from collet cone (9).

K-1.14.1) Remove bonded seal (24) and o-rings (42) from center coupling (10).

K-1.15) Remove collet cone (9) and bearing bushing (30) from inner mandrel (2).

K) DISASSEMBLY (cont'd)

K-2) Unclamp and remove top sub (1) from vise. Clamp inner mandrel (2) in vise.

CAUTION7: Do NOT wrench or clamp on seal surface.

K-2.1) Unscrew and remove spring cage cap (27) from spring cage (5).

CAUTION4: Compression spring (4) is compressed with spring tension against upper slip body assembly.

K-2.2) Unscrew and remove top sub (1) from inner mandrel (2).

K-2.3) Remove compression spring (4) from spring cage (5).

K-2.4) Unscrew and remove cap screws (41) from spring retainer (34).

K-2.5) Unscrew and remove spring cage (5) from upper slip support (33).

K-2.6) Remove spring retainer (34) from inner mandrel (2).

K-2.7) Wedge releasing slip (7) and upper slips (8) outwards (if needed). Remove upper slip body assembly and disassemble:

K-2.7.1) Unscrew and remove upper slip support (33) from upper slip body (6).

K-2.7.2) Remove wedges (if needed). Remove releasing slip (7), upper slips (8) and upper slip springs (26) from upper slip body (6).

K-2.8) Unscrew and remove swivel sleeve cap (37) from swivel sleeve (38).

K-2.9) Remove snap ring (39) from inner mandrel (2).

K-2.10) Remove swivel sleeve (38) and thrust ring (35) from inner mandrel (2).

K-3) Unclamp and remove inner mandrel (2) from vise.

L) ASSEMBLY

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

CAUTION5: To ensure tool operates properly, install o-rings in o-ring grooves, **NOT** thread reliefs unless stated otherwise (Fig. 2).

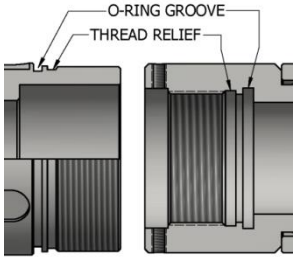


Fig. 2

L-1) Clamp lower end of inner mandrel (2) in vise.

CAUTION7: Do NOT wrench or clamp on seal surface.

L-1.1) Install thrust ring (35) and swivel sleeve (38) onto inner mandrel (2).

L-1.2) Install snap ring (39) in groove in inner mandrel (2).

L-1.3) Screw swivel sleeve cap (37) onto swivel sleeve (38).

L-1.4) Assemble upper slip body assembly and install:

L-1.4.1) Screw upper slip support (33) into upper slip body (6).

L-1.4.2) Install releasing slip (7), upper slips (8) and upper slip springs (26) into upper slip body (6).

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

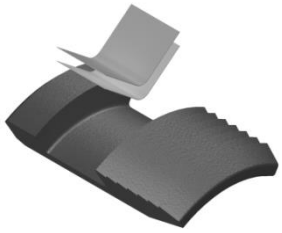


Fig. 3

L-1.4.3) Wedge slips outwards. Install upper slip body assembly onto inner mandrel (2).

L-1.5) Install spring retainer (34) into spring cage (5).

L-1.6) Align holes in spring cage (5) with threaded holes in spring retainer (34). Screw cap screws (41) into spring retainer (34).

L-1.7) Install spring retainer (34) and spring cage (5) onto inner mandrel (2). Screw spring cage (5) into upper slip support (33).

L-1.8) Install compression spring (4) onto inner mandrel (2) and into spring cage (5).

L) ASSEMBLY (cont'd)

L-1.9) Screw top sub (1) onto inner mandrel (2).

L-1.10) Screw spring cage cap (27) onto spring cage (5).

CAUTION4: Compression spring (4) is compressed with spring tension against spring cage assembly.

L-2) Unclamp and remove inner mandrel (2) from vise. Clamp top sub (1) in vise.

L-2.1) Install collet cone (9) and bearing bushing (30) onto inner mandrel (2).

L-2.2) Install o-rings (42) in grooves in center coupling (10).

L-2.3) Install bonded seal (24) into center coupling (10).

CAUTION6: Do not rip or tear o-rings during installation.

L-2.4) Screw center coupling (10) into collet cone (9).

L-2.5) Screw gage ring (29) onto center coupling (10).

L-2.6) Assemble rubber mandrel assembly and install:

L-2.6.1) Install rubber retainer (15), elements (13, 14), and rubber spacers (12) onto rubber mandrel (11).

L-2.6.2) Install rubber mandrel assembly onto inner mandrel (2).

L-2.7) Screw rubber mandrel (11) into center coupling (10).

L-2.8) Screw lower cone (16) into rubber retainer (15).

L-2.9) Assemble drag block body assembly and install:

L-2.9.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge slips outward.

NOTE5: Uses two (2 ea) springs per slip (Fig. 4).

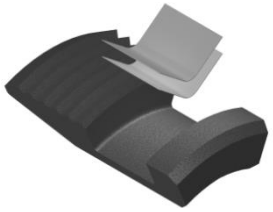


Fig. 4

L-2.9.2) Install lower slip support (32) into drag block body (18).

L-2.9.3) Align holes in drag block body (18) with threaded holes in lower slip support (32). Screw cap screws (41) into drag block body (18). Remove wedges.

L-2.9.4) Install drag block body assembly onto rubber mandrel (11).

L-2.10) Screw rubber mandrel cap (19) onto rubber mandrel (11).

NOTE4: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

L-2.10.1) Install drag blocks (22) and drag block springs (3) in drag block body (18). Compress drag blocks (22) with drag block assembly tool (T1).

NOTE7: Uses six (6 ea) springs per drag block (Fig. 5).

Fig. 5

L-2.10.2) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22).

L-2.11) Install retaining ring (31) onto J-body (20).

L-2.12) Screw J-body (20) onto drag block body (18) (**NOTE3**: Left-hand threads).

L-2.13) Align holes in drag block retainer (21) with threaded holes in drag block body (18). Screw set screws (36) into drag block body (18). Release drag blocks (22).

L-2.14) Install o-ring (43) in groove in J-pin bottom sub (23).

L-2.15) Screw J-pin bottom sub (23) onto inner mandrel (2).

NOTE2: Drag block body assembly must be free to rotate.

CAUTION6: Do not rip or tear o-ring during installation.

L-2.16) Screw bottom nipple (28) into J-pin bottom sub (23).

L-3) Unclamp top sub (1) from vise and remove assembled tool.

M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60396HTC-5
1	1	TOP SUB	DLMS110	60195610HT
2	1	INNER MANDREL	DLMS110	60395210HT
3	36	DRAG BLOCK SPRING	-	9101900
4	1	COMPRESSION SPRING	DLMCRSP	60395920HT
5	1	SPRING CAGE	DLMS60	60195311
6	1	UPPER SLIP BODY	DLMS110	60395320
7	1	RELEASING SLIP	DLMS110	60095125
8	2	UPPER SLIP W/ CARBIDE	DLMS110	60095115C
9	1	COLLET CONE	DLMS110	60395414
10	1	CENTER COUPLING	DLMS80	60095620HT
11	1	RUBBER MANDREL	DLMS110	60313220HT
12	2	RUBBER SPACER	DLMS110	60296840
13	1	ELEMENT	80 DURO NITRILE	60296512
14	2	ELEMENT	90 DURO NITRILE	60296513
15	1	RUBBER RETAINER	DLMS110	61596851
16	1	LOWER CONE	DLMS110	60395420HT
17	4	LOWER SLIP W/ CARBIDE	DLMS110	60095135C
18	1	DRAG BLOCK BODY	DLMS35	60395335
19	1	RUBBER MANDREL CAP	DLMS60	60195230
20	1	J-BODY	DLMS60	60195340
21	1	DRAG BLOCK RETAINER	DLMS60	60395910
22	6	DRAG BLOCK W/ CARBIDE	DLMSDB4	9080900C
23	1	J-PIN BOTTOM SUB	DLMS110	60395634HT
24	1	BONDED SEAL	90 DURO NITRILE	60095520
25	8	LOWER SLIP SPRING	-	7170901
26	6	UPPER SLIP SPRING	-	7170902
27	1	SPRING CAGE CAP	DLMS35	60095810
28	1	BOTTOM NIPPLE	DLMS110	60395636
29	1	GAGE RING	DLMS110	60296830HT
30	1	BEARING BUSHING	DLMS35	60097104
31	1	RETAINING RING	DLMS35	60095911
32	1	LOWER SLIP SUPPORT	DLMS110	60395912HT
33	1	UPPER SLIP SUPPORT	DLMS110	60395880HT
34	1	SPRING RETAINER	DLMS35	60395107

M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60396HTC-5
35	1	THRUST RING	DLMS110	60395103
36	3	SOCKET SET SCREW 3/8-16 UNC X 5/8	STEEL	SSS037C062
37	1	SWIVEL SLEEVE CAP	DLMS110	60395106
38	1	SWIVEL SLEEVE	DLMS110	60395100
39	1	SNAP RING	DLMS60	60097102
40	1	SOCKET CAP SCREW 1/2-13 UNC X 3/4	STEEL	SCS050C075
41	6	SOCKET CAP SCREW 3/8-16 UNC X 3/4	STEEL	SCS037C075
42	2	160 O-RING	90 DURO NITRILE	90160
43	1	348 O-RING	90 DURO NITRILE	90348

REDRESS KIT (RDK)		60396050HT-5
ASSEMBLED WEIGHT		553 LBS

M-1) ELASTOMER TRIM OPTIONS

NOTE$_8$: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60396HTHC-5
13	1	ELEMENT	80 DURO HSN	60296512H
14	2	ELEMENT	90 DURO HSN	60296513H
24	1	BONDED SEAL	90 DURO HSN	60095520H
42	2	160 O-RING	90 DURO HSN	90160H
43	1	348 O-RING	90 DURO HSN	90348H

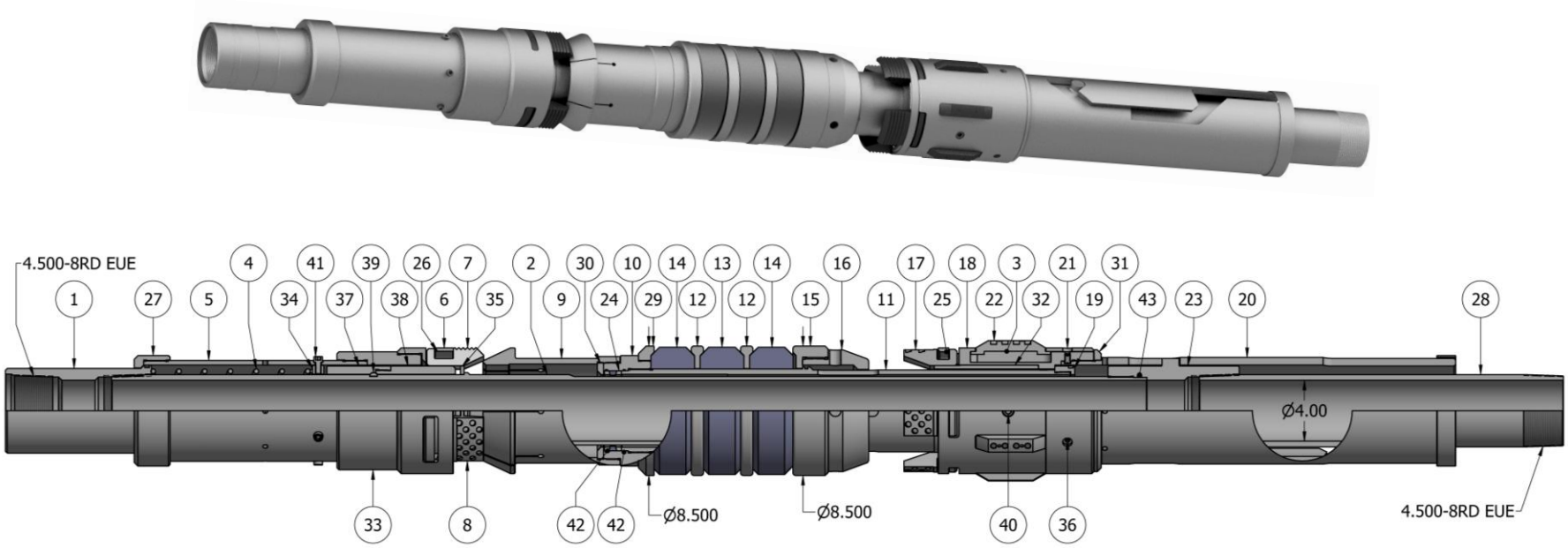
REDRESS KIT (RDK)		60396050HTH-5

M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60396HTVC-5
13	1	ELEMENT	80 DURO VITON	60296512V
14	2	ELEMENT	90 DURO VITON	60296513V
24	1	BONDED SEAL	90 DURO VITON	60095520V
42	2	160 O-RING	90 DURO VITON	90160V
43	1	348 O-RING	90 DURO VITON	90348V

REDRESS KIT (RDK)		60396050HTV-5

N) TECHNICAL ILLUSTRATION



O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
02/21/2019	A	Created new manual	-	-