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) 2-7/8" DT-2 On/Off Tool - refer to technical manual *DL-512-2875-146*.

B-1) 2-7/8" Stinger—actual P/N varies depending on customer requirements.

C) SPECIFICATION GUIDE

CASING			TOOL		THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
SIZE (INCHES)	**WEIGHT** (LBS/FT)	**RECOMMENDED HOLE SIZE** (INCHES)	**GAGE OD** (INCHES)	**ID** (INCHES)		
8-5/8	24.0 – 40.0	7.725 – 8.097	7.500	2.50	2-7/8 EUE	60385HT 60385HTH[1] 60385HTV[2] 60385HTC[3] 60385HTHC[4] 60385HTVC[5]

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

NOTE$_1$: Tools listed are right-hand set / right-hand release.

NOTE$_2$: Use of a Double Hook J-slot Packer is recommended when running with a pumpjack to help prevent the packer from unsetting during well production.

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
8,000 PSI	153,000 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 first use, D&L recommends disassembly and inspection of the tools 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 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 work string to allow for setting stroke (12-13") plus desired work string load. Rotate the work string 1/4 right-hand turn at the packer, and then lower the work string while releasing torque. Slack off on the work string sufficient weight to set the packer (20,000 lbs minimum). Pull tension to assure that the upper slips are set. The work string 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 work string and rotate 1/4 turn to the right at the packer then lower the work string slacking off available weight to set the packer lower slips. Pull tension to set upper slips and pack off elements (20,000 lbs minimum). After setting the packer, the work string 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 work string 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 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 Packer may cause the upper slips to wedge in tighter, requiring an extra amount of tension to release the upper slips.

F-1) EMERGENCY RELEASE

As a last resort, if the packer will not release in the normal manner, a minimum straight pull of 90,000 lbs (may have to pull as high as 125,000 lbs) over work string weight can be applied – this will shear the J-pins on the J-pin bottom sub allowing the packer to be pulled. Tensile strength of tubing and connections should be considered. When released in this manner, the packer will reset when moved down the hole.

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) PRESSURE AFFECTED AREA GUIDE

PACKER SIZE (INCHES)	**TUBING SIZE** (INCHES)	**PRESSURE AFFECTED AREA** (SQ. INCHES)	
		ABOVE	**BELOW**
8-5/8	2.875	1.804 (DOWN)	-3.387 (UP)

Example: Consider an 8-5/8" X 2-7/8" ASI-X HT Packer set on 2.875" 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 an 8-5/8" X 2-7/8" ASI-X HT Packer set on 2.875" 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 1.804 in^2. Multiplying the differential pressure (3,000 psi) by the pressure affected area (1.804 in^2) results in a force of 5,412 lbs. The piston effect on the packer mandrel is a downward force of 5,412 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	AT095110

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 set screws (38) from J-pin bottom sub (23). Move J-body (20) as needed to access screws.

K-1.3) Unscrew and remove J-pin bottom sub (23) from inner mandrel (2).

NOTE$_3$: Drag block body assembly must be free to rotate.

K-1.3.1) Remove o-ring (43) from J-pin bottom sub (23).

K-1.4) Compress drag blocks (22) with drag block assembly tool (T1).

K-1.5) Unscrew and remove set screws (40) from drag block body (18). Rotate drag block retainer (21) as needed.

K-1.6) Unscrew and remove J-body (20) from drag block body (18) (**NOTE$_4$**: Left-hand threads).

K-1.7) Remove drag block retainer (21) from drag block body (18).

K-1.8) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).

K-1.9) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

NOTE$_5$: For added leverage, insert rod through rubber retainer (15) and rubber mandrel (11) as needed.

K-1.10) Remove drag block body assembly and disassemble:

K-1.10.1) Unscrew and remove socket cap screws (41) from drag block body (18).

K) DISASSEMBLY (cont'd)

K-1.10.2) Wedge lower slips (17) outward (if needed). Remove lower slip support (32) from drag block body (18).

K-1.10.3) Remove wedges. Remove lower slips (17) and lower slip springs (25) from drag block body (18).

K-1.11) Unscrew and remove lower cone (16) from rubber retainer (15).

K-1.12) Unscrew rubber mandrel (11) from center coupling (10).

K-1.13) Remove rubber mandrel assembly and disassemble:

K-1.13.1) Remove gage ring (29), elements (13, 14), rubber spacers (12), and rubber retainer (15) from rubber mandrel (11).

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

K-1.14.1) Remove o-ring (44) from center coupling (10).

K-1.14.2) Remove bonded seal (24) from center coupling (10).

K-1.14.2.1) Remove o-ring (42) from bonded seal (24).

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

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

CAUTION$_4$: Do NOT wrench or clamp on seal surface (see SEAL SURFACES).

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

CAUTION$_5$: Compression spring (4) may have 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 spring cage (5) from upper slip support (33).

K-2.5) Unscrew and remove set screws (39) from cover sleeve (34).

K-2.6) Remove cover sleeve (34) and snap ring (37) from inner mandrel (2).

K-2.7) Remove upper slip body assembly and disassemble:

K-2.7.1) Wedge releasing slip (7) and upper slips (8) outwards (if needed). 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) Remove swivel sleeve (36) and bearing rings (35) from inner mandrel (2)..

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

NOTE$_6$: To redress tool assembly, follow disassembly instructions. It is recommended by D&L Oil Tools to replace bonded seals, elements, o-rings, shear screws, etc. when redressing tool.

L) ASSEMBLY

NOTE$_7$: 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$_6$: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread relief (Fig. 2).

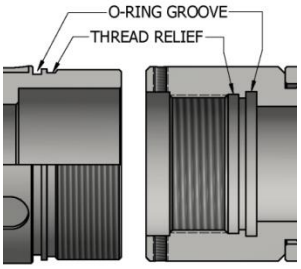


Fig. 2

NOTE$_8$: Ensure vise is capable of handling weight of tool.

NOTE$_9$: Support tool during disassembly and assembly with jack stands as necessary.

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

CAUTION$_4$: Do NOT wrench or clamp on seal surface (see SEAL SURFACES).

L-1.1) Install bearing rings (35) and swivel sleeve (36) onto inner mandrel (2).

L) ASSEMBLY (cont'd)

L-1.2) Install snap ring (37) into groove in inner mandrel (2)

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

L-1.3.1) Install upper slips (8), releasing slip (7), and upper slip springs (26) into upper slip body (6). Wedge slips outwards.

NOTE$_{10}$: Install two (2ea) springs per slip (Fig. 3)

Fig. 3

L-1.3.2) Screw upper slip body (6) onto upper slip support (33). Remove wedges.

L-1.3.3) Install upper slip body assembly onto inner mandrel (2) and onto swivel sleeve (36).

L-1.4) Install cover sleeve (34) onto inner mandrel (2).

L-1.5) Align threaded holes in cover sleeve (34) with groove in inner mandrel (2). Screw set screws (39) in cover sleeve (34).

L-1.6) Screw spring cage (5) into upper slip support (33).

L-1.7) Install compression spring (4) into spring cage (5).

L-1.8) Screw top sub (1) onto inner mandrel (2).

L-1.9) Screw spring cage cap (27) onto spring cage (5).

CAUTION$_5$: Compression spring (4) may have tension against upper slip body assembly.

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

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

L-2.2) Install o-ring (44) into o-ring groove in center coupling (10).

L-2.3) Install o-ring (42) into o-ring groove in bonded seal (24).

L-2.4) Install bonded seal (24) into center coupling (10).

CAUTION$_7$: Do not rip or tear o-ring during installation.

L-2.5) Screw center coupling (10) onto collet upper cone (9).

L-2.6) Assemble rubber mandrel assembly and install:

L-2.6.1) Install rubber retainer (15), elements (13, 14), rubber spacers (12), and gage ring (29) onto rubber mandrel (11).

L-2.6.2) Install rubber mandrel assembly onto inner mandrel (2). Screw rubber mandrel (11) into center coupling (10).

CAUTION$_7$: Do not rip or tear o-ring during installation.

CAUTION$_4$: Do <u>NOT</u> wrench or clamp on seal surface (see SEAL SURFACES).

L-2.7) Screw lower cone (16) into rubber retainer (15).

L-2.8) Assemble drag block body assembly and install:

L-2.8.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge slips outward.
NOTE$_{10}$: Install two (2ea) springs per slip (Fig. 4).

Fig. 4

L-2.8.2) Install lower slip support (32) into drag block body (18).

L-2.8.3) Align threaded holes in drag block body (18) with holes in lower slip support (32). Screw socket cap screws (41) into drag block body (18). Remove wedges.

L-2.8.4) Install drag block body assembly onto rubber mandrel (11).

L-2.9) Screw rubber mandrel cap (19) onto rubber mandrel (11).

NOTE$_5$: For added leverage, insert rod through rubber retainer (15) and rubber mandrel (11) as needed.

L) ASSEMBLY (cont'd)

L-2.10) Install drag blocks (22) and drag block springs (3) into drag block body (18). Compress blocks with drag block assembly tool (T1). **NOTE11**: Install six (6ea) springs per drag block (Fig. 5).

L-2.11) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22).

Fig. 5

L-2.12) Install retaining ring (31) onto J-body (20).

L-2.13) Screw J-body (20) into drag block body (18) (**NOTE4**: Left-hand threads).

L-2.14) Align holes in drag block retainer (21) with threaded holes in drag block body (18). Screw set screws (40) into drag block body (18). Release drag blocks (22).

L-2.15) Install o-ring (43) into o-ring groove in J-pin bottom sub (23).

L-2.16) Screw J-pin bottom sub (23) onto inner mandrel (2).

CAUTION7: Do not rip or tear o-ring during installation.

NOTE3: Drag block body assembly must be free to rotate.

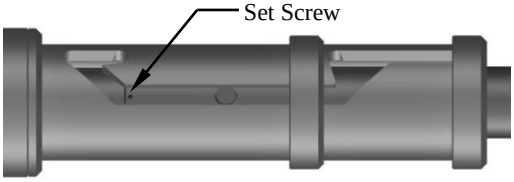


Fig. 6

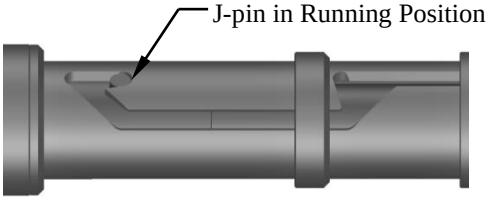


Fig. 7

L-2.17) Screw set screws (38) into J-pin bottom sub (23). Move J-body (20) as needed (Fig. 6).

L-2.18) Screw bottom nipple (28) into J-pin bottom sub (23).

L-2.19) Position J-pin in running position in J-slot of J-body (20) (Fig. 7).

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

M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60385HT
1	1	TOP SUB	DLMS110	60170610HT
2	1	INNER MANDREL	DLMS110	60370211HT
3	36	DRAG BLOCK SPRING	-	9101900
4	1	COMPRESSION SPRING	DLMCRSP	60373920
5	1	SPRING CAGE	DLMS110	60185310HT
6	1	UPPER SLIP BODY	DLMS35	60385320HP
7	1	RELEASING SLIP	DLMS110	60085125
8	2	UPPER SLIP	DLMS35	60085115
9	1	COLLET UPPER CONE	DLMS110	60385411HT
10	1	CENTER COUPLING	DLMS35	60370620
11	1	RUBBER MANDREL	DLMS35 / DLMS60	60385220
12	2	RUBBER SPACER	DLMS35	60285840
13	1	ELEMENT	80 DURO NITRILE	60285512
14	2	ELEMENT	90 DURO NITRILE	60285513
15	1	RUBBER RETAINER	DLMS35	60285850
16	1	LOWER CONE	DLMS110	60385421HT
17	4	LOWER SLIP	DLMS35	60085135
18	1	DRAG BLOCK BODY	DLMS35	60085335
19	1	RUBBER MANDREL CAP	DLMS60	60170230
20	1	J-BODY	DLMS60	60170340HT
21	1	DRAG BLOCK RETAINER	DLMS60	60085910
22	6	DRAG BLOCK	DLMSDB8	9070900
23	1	J-PIN BOTTOM SUB	DLMS110	60370634HT
24	1	BONDED SEAL	90 DURO NITRILE	60070520
25	8	LOWER SLIP SPRING	-	7170901
26	6	UPPER SLIP SPRING	-	7170902
27	1	SPRING CAGE CAP	DLMS35	60173810

M) PARTS LIST (cont’d)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60385HT
28	1	BOTTOM NIPPLE	DLMS80	60370636
29	1	GAGE RING	DLMS35	60285830
30	1	BEARING BUSHING	DLMS60	60370224
31	1	RETAINING RING	DLMS35	60085911
32	1	LOWER SLIP SUPPORT	DLMS60	60385912
33	1	UPPER SLIP SUPPORT	DLMS35	60085880HP
34	1	COVER SLEEVE	DLMS60	60370106
35	2	BEARING RING	DLMS110	60370103
36	1	SWIVEL SLEEVE	DLMS110	60370100
37	1	SNAP RING	DLMS110	60370102
38	2	SET SCREW 1/4-20 UNC X 3/8	STEEL	SSS025C037
39	3	SET SCREW 5/16-18 UNC X 1/4	STEEL	SSS031C025
40	3	SET SCREW 5/16-18 UNC X 1/2	STEEL	SSS031C050
41	3	CAP SCREW 5/8-11 UNC X 1"	STEEL	SCS062C100
42	1	153 O-RING	90 DURO NITRILE	90153
43	1	233 O-RING	90 DURO NITRILE	90233
44	1	242 O-RING	90 DURO NITRILE	90242

REDRESS KIT (RDK)		60385050HT
ASSEMBLED WEIGHT		414 LBS

M) PARTS LIST (cont'd)

M-1) ELASTOMER TRIM OPTIONS

NOTE12: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60385HTH
13	1	ELEMENT	80 DURO HSN	60285512H
14	2	ELEMENT	90 DURO HSN	60285513H
24	1	BONDED SEAL	90 DURO HSN	60070520H
42	1	153 O-RING	90 DURO HSN	90153H
43	1	233 O-RING	90 DURO HSN	90233H
44	1	242 O-RING	90 DURO HSN	90242H

REDRESS KIT (RDK)		60385050HTH

M-1.2) VITON

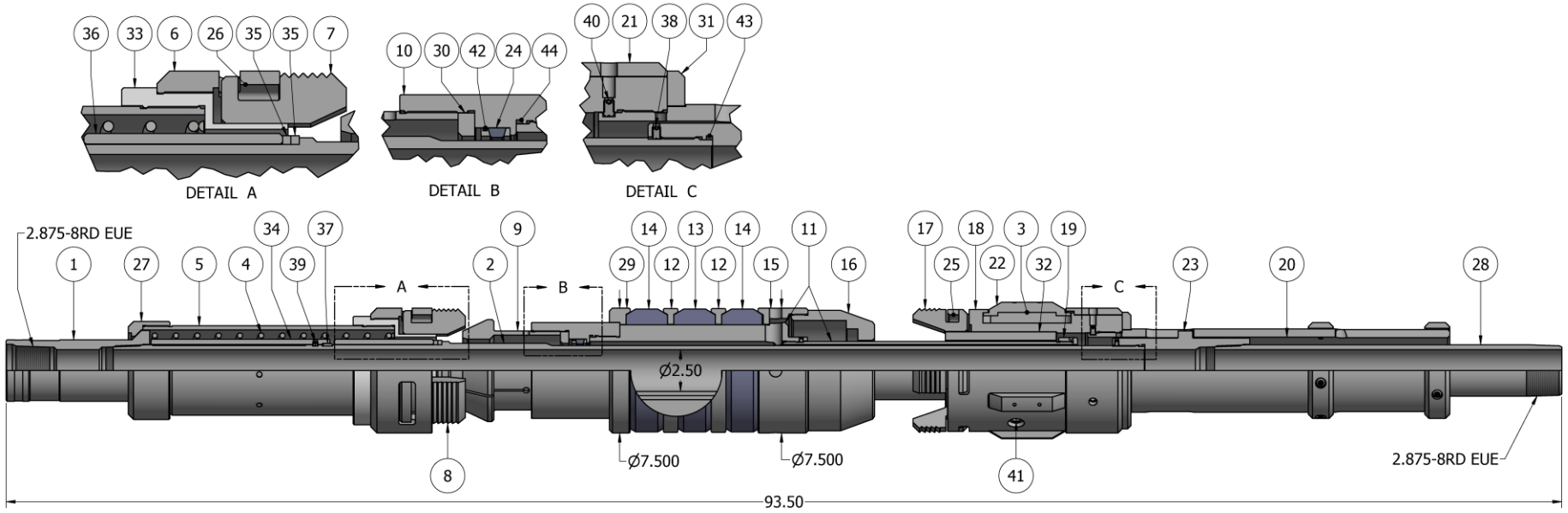
ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60385HTV
13	1	ELEMENT	80 DURO VITON	60285512V
14	2	ELEMENT	90 DURO VITON	60285513V
24	1	BONDED SEAL	90 DURO VITON	60070520V
42	1	153 O-RING	90 DURO VITON	90153V
43	1	233 O-RING	90 DURO VITON	90233V
44	1	242 O-RING	90 DURO VITON	90242V

REDRESS KIT (RDK)		60385050HTV

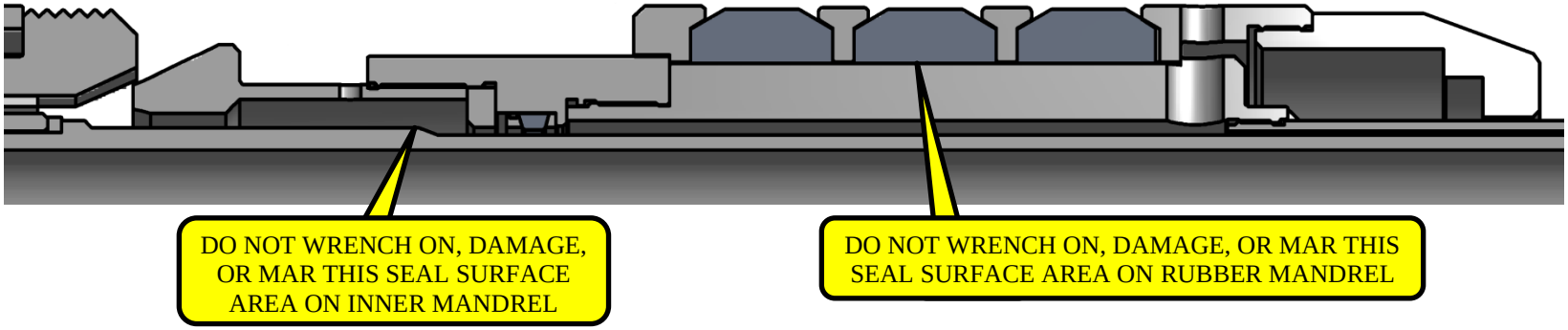
M-2) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60385HTC
8	2	CARBIDE UPPER SLIP	DLMS35	60085115C
17	4	CARBIDE LOWER SLIP	DLMS35	60085135C
22	6	CARBIDE DRAG BLOCK	DLMSDB8	9070900C

N) TECHNICAL ILLUSTRATION



O) SEAL SURFACES



P) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
01/04/2021	D	Removed tool drift ID; Revised Elastomer Trim Temp. Guide temp. ratings, P/N 60370103 qty was 1, 60170610HT was 60370610HT, 60185310HT was 60385310HT, 60170230 was 60070230, 60170340HT was 60370340HT, 60173810 was 60073810; Added carbide options, General Screw Torque Recommendations	J.Anderson	D.Hushbeck
04/24/2015	C	Added – Emergency Release, Related Tools, Drift ID, P/N’s for Elastomer Trim Options (HSN - P/N 60387HTH, Viton - 60385HTV), Max Tensile Load, Pre-Installation Inspection Procedures, Storage Procedures, Recommended Hand Tools, Caution6, Note 2, 6, 7, 8, 10, Fig. 2 - 7, L-2.19, Elastomer Trim Options Parts List to Parts List, Technical Illustration – Detail A, Section to identify SEAL SURFACES, Revision History; Revised – Description, Differential Pressure was 10,000 PSI, ELASTOMER TRIM TEMPERATURE GUIDE was ELEMENT SELECTION GUIDE, Tools P/N AT095110 was P/N AT010110, Note7, Caution4, Material was 1026 (P/N 60370620), Material was blank (P/N 60385220, P/N 60370340HT), P/N 90153 was 90152, Assembled Weight was 342 Lbs; Removed – AFLAS from Element Selection Guide, Item T2 from Tools;	B.Mathis	J.McArthur