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)3-1/2” DT-2 On/Off Tool - refer to technical manual *DL-512-3500-131*.

B-2)3-1/2” 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)	NOMINAL ID (INCHES)		
7	17.0 – 26.0	6.276 – 6.538	6.000 6.125**	3.00	3-1/2 EUE	60374HT 60374HTH[1] 60374HTV[2] 60374HTC[3] 60374HTHC[4] 60374HTCV[5]
	26.0 – 32.0	6.094 – 6.276	5.875 5.936**	3.00	3-1/2 EUE	60373HT 60373HTH[1] 60373HTV[2] 60373HT[3] 60373HTHC[4] 60373HTVC[5]
	35.0	6.004	5.812 5.936**	3.00	3-1/2 EUE	60373HT-35 60373HTH-35[1] 60373HTV-35[2] 60373HTC-35[3] 60373HTHC-35[4] 60373HTVC-35[5]

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

** Max OD measured across retracted drag blocks.

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

NOTE2: 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.

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

C) SPECIFICATION GUIDE (cont’d)

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
10,000 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 (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

CAUTION2: 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 (15,000 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 (15,000 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**
7	2.375	6.43 (DOWN)	-7.74 (UP)
	2.875	4.37 (DOWN)	-6.19 (UP)
	3.500	1.24 (DOWN)	-3.83 (UP)

Example: Consider a 7” ASI-X HT Packer set on 2.375” 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. 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 6.43 in^2. Multiplying the differential pressure (3,000 psi) by the pressure affected area (6.43 in^2) results in a force of 19,290 lbs. The piston effect on the packer mandrel is a downward force of 19,290 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** (F°)
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	AT070110

K) DISASSEMBLY

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

K-1.1) Unscrew and remove bottom nipple (31) from J-pin bottom sub (23).

K-1.2) Unscrew and remove set screws (32) 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).

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

K-1.3.1) Remove o-ring (35) 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 (33) from J-body (20).

K-1.6) Unscrew and remove J-body (20) from drag block body (18) (**NOTE4**: 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).

NOTE5: For added leverage, insert rod through rubber retainer (15) and rubber mandrel (11) as needed.

K-1.10) Wedge lower slips (17) outward (if needed). Remove drag block body assembly and disassemble:

K-1.10.1) Remove wedges. Remove lower slips (17) and lower slip springs (25) from drag block body (18).

K) DISASSEMBLY (cont’d)

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

K-1.13.1.1) Unscrew and remove gage ring (29) from rubber retainer (15).

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

K-1.14.1) Remove o-ring (36) from center coupling (10).

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

K-1.14.2.1) Remove o-ring (34) from bonded seal (24).

K-1.15) Remove upper cone (9) from inner mandrel (2).

K-1.15.1) Remove bearing bushing (30) from upper cone (9).

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.

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 body (6).

K-2.5) Wedge releasing slip (7) and upper slips (8) outwards (if needed). Remove upper slip body assembly and disassemble:

K-2.5.1) Remove spring retaining ring (28) from upper slip body (6).

K-2.5.2) Remove wedges (if needed). Remove releasing slip (7), upper slips (8), and upper slip springs (26) from upper slip body (6).

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

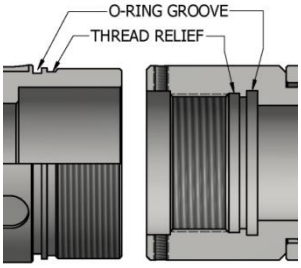


Fig. 2

NOTE7: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

CAUTION6: To ensure tool operates properly, install o-rings in o-ring grooves **NOT** thread relief (Fig. 2).

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

CAUTION4: Do NOT wrench or clamp on seal surface.

L-1.1) Install spring retaining ring (28) into upper slip body (6).

L-1.2) Screw spring cage (5) into upper slip body (6).

L-1.3) Install upper slips (8), releasing slip (7), and upper slip springs (26) into upper slip body (6). Wedge slips outwards.

NOTE8: Install two (2ea) springs per slip (Fig. 3)


Fig. 3

L-1.4) Install upper slip body assembly onto inner mandrel (2). Remove wedges.

L-1.5) Install compression spring (4) into spring cage (5).

L-1.6) Screw top sub (1) onto inner mandrel (2).

L-1.7) Screw spring cage cap (27) onto spring cage (5).

CAUTION5: 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 bearing bushing (30) into upper cone (9).

L-2.2) Install upper cone (9) onto inner mandrel (2).

L-2.3) Install o-ring (36) into o-ring groove in center coupling (10).

L-2.4) Install o-ring (34) into o-ring groove in bonded seal (24).

L-2.5) Install bonded seal (24) into center coupling (10).

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


Fig. 4

L-2.6) Screw center coupling (10) into upper cone (9).

L-2.7) Screw gage ring (29) onto center coupling (10).

L-2.8) Assemble rubber mandrel assembly and install:

L-2.8.1) Screw gage ring (29) onto rubber retainer (15).

L-2.8.2) Install rubber retainer (15), elements (13, 14), and rubber spacers (12) onto rubber mandrel (11).

L-2.8.3) Install rubber mandrel assembly onto inner mandrel (2). Screw rubber mandrel (11) into center coupling (10).

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

L-2.9) Screw lower cone (16) into rubber retainer (15).

L-2.10) Assemble drag block body assembly and install:

L-2.10.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge slips outward.

NOTE9: Install two (2ea) springs per slip (Fig. 4).

L-2.10.2) Install drag block body assembly onto rubber mandrel (11).

L-2.11) Screw rubber mandrel cap (19) onto rubber mandrel (11).

NOTE5: For added leverage, insert rod through rubber retainer (15) and rubber mandrel (11) as needed.

L) ASSEMBLY (cont’d)

L-2.12) Install drag blocks (22) and drag block springs (3) into drag block body (18). Compress blocks with drag block assembly tool (T1).

NOTE10: Install six (6ea) springs per drag block (Fig. 5).

Fig. 5

L-2.13) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22).

L-2.14) Screw J-body (20) onto drag block body (18) (**NOTE4**: Left-hand threads).

L-2.15) Screw set screws (33) into J-body (20). Release drag blocks (22).

L-2.16) Install o-ring (35) into o-ring groove in J-pin bottom sub (23).

L-2.17) 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.

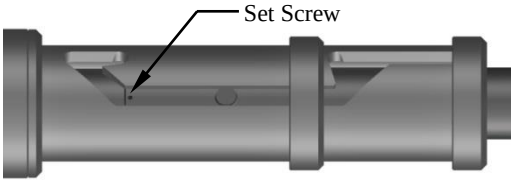


Fig. 6

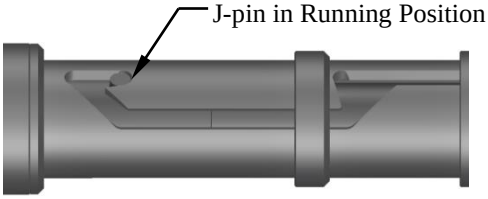


Fig. 7

L-2.18) Screw set screws (32) into J-pin bottom sub (23). Move J-body (20) as needed (Fig. 6).

L-2.19) Screw bottom nipple (31) into J-pin bottom sub (23).

L-2.20) 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 60374HT	P/N 60373HT	P/N 60373HT-35
1	1	TOP SUB *	DLMS110	60173610HT (60073610HT*)	60173610HT (60073610HT*)	60173610HT
2	1	INNER MANDREL	DLMS110	60373210HT	60373210HT	60373210HT-35
3	24	DRAG BLOCK SPRING	-	9101900		
4	1	COMPRESSION SPRING	DLMCRSP	60373920		
5	1	SPRING CAGE *	DLMS60	60174310 (60373310*)	60174310 (60373310*)	60174310
6	1	UPPER SLIP BODY	DLMS110	60073320HT	60073320HT	60073320HT-35
7	1	RELEASING SLIP	DLMS110	60073125		
8	2	UPPER SLIP	DLMS35	60073115		
9	1	UPPER CONE	DLMS110	60373410HT		
10	1	CENTER COUPLING	DLMS80	60273620		
11	1	RUBBER MANDREL	DLMS60	60073220		
12	2	RUBBER SPACER	DLMS35	60274840	60273840	60273840-35
13	1	ELEMENT	80 DURO NITRILE	60274512	60273512	
14	2	ELEMENT	90 DURO NITRILE	60274513	60273513	
15	1	RUBBER RETAINER	DLMS60	60273850		
16	1	LOWER CONE	DLMS110	60073420HT		

* **NOTE11**: P/N may be substituted.

M) PARTS LIST (cont’d)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374HT	P/N 60373HT	P/N 60373HT-35
17	4	LOWER SLIP	DLMS35	60073135		
18	1	DRAG BLOCK BODY	DLMS35	60073335	60073335	60073335-35
19	1	RUBBER MANDREL CAP *	DLMS60	60173230 (60073230*)	60173230 (60073230*)	60173230
20	1	J-BODY *	DLMS60	60173340HT (60373340HT*)	60173340HT (60373340HT*)	60173340HT
21	1	DRAG BLOCK RETAINER	DLMS60	60073910	60073910	60073910-35
22	4	DRAG BLOCK	DLMSDB8	9080900	9070900	
23	1	J-PIN BOTTOM SUB	DLMS110	60373634HT		
24	1	BONDED SEAL	DLMS60 / 90 DURO NITRILE	60073520		
25	8	LOWER SLIP SPRING	-	7170901		
26	6	UPPER SLIP SPRING	-	7170902		
27	1	SPRING CAGE CAP *	DLMS60	60174810 (60073810*)	60174810 (60073810*)	60174810-35
28	1	SPRING RETAINING RING	DLMS60	60073820		
29	2	GAGE RING	DLMS60	60274830	60273830	60273830-35
30	1	BEARING BUSHING	DLMS35	60373224		
31	1	BOTTOM NIPPLE	DLMS80	60373636	60373636	60373636HT
32	2	SET SCREW 1/4-20 UNC	STEEL	SSS025C043 (7/16" LONG)		SSS025C037 (3/8" LONG)

* **NOTE$_{11}$**: P/N may be substituted.

M) PARTS LIST (cont’d)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374HT	P/N 60373HT	P/N 60373HT-35
33	3	SET SCREW 3/8-16 UNC X 3/8	STEEL	SSS037C037		
34	1	155 O-RING	90 DURO NITRILE	90155		
35	1	237 O-RING	90 DURO NITRILE	90237		
36	1	243 O-RING	90 DURO NITRILE	90243		

* **NOTE11**: P/N may be substituted.

REDRESS KIT (RDK)		60374050HT	60373050HT	60373050HT
ASSEMBLED WEIGHT		317 LBS	318 LBS	313 LBS

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 60374HTH	P/N 60373HTH	P/N 60373HTH-35
13	1	ELEMENT	80 DURO HSN	60274512H	60273512H	
14	2	ELEMENT	90 DURO HSN	60274513H	60273513H	
24	1	BONDED SEAL	90 DURO HSN	60073520H		
34	1	155 O-RING	90 DURO HSN	90155H		
35	1	237 O-RING	90 DURO HSN	90237H		
36	1	243 O-RING	90 DURO HSN	90243H		

REDRESS KIT (RDK)		60374050HTH	60373050HTH	60373050HTH

M) PARTS LIST (cont’d)

M-1.2) VITON

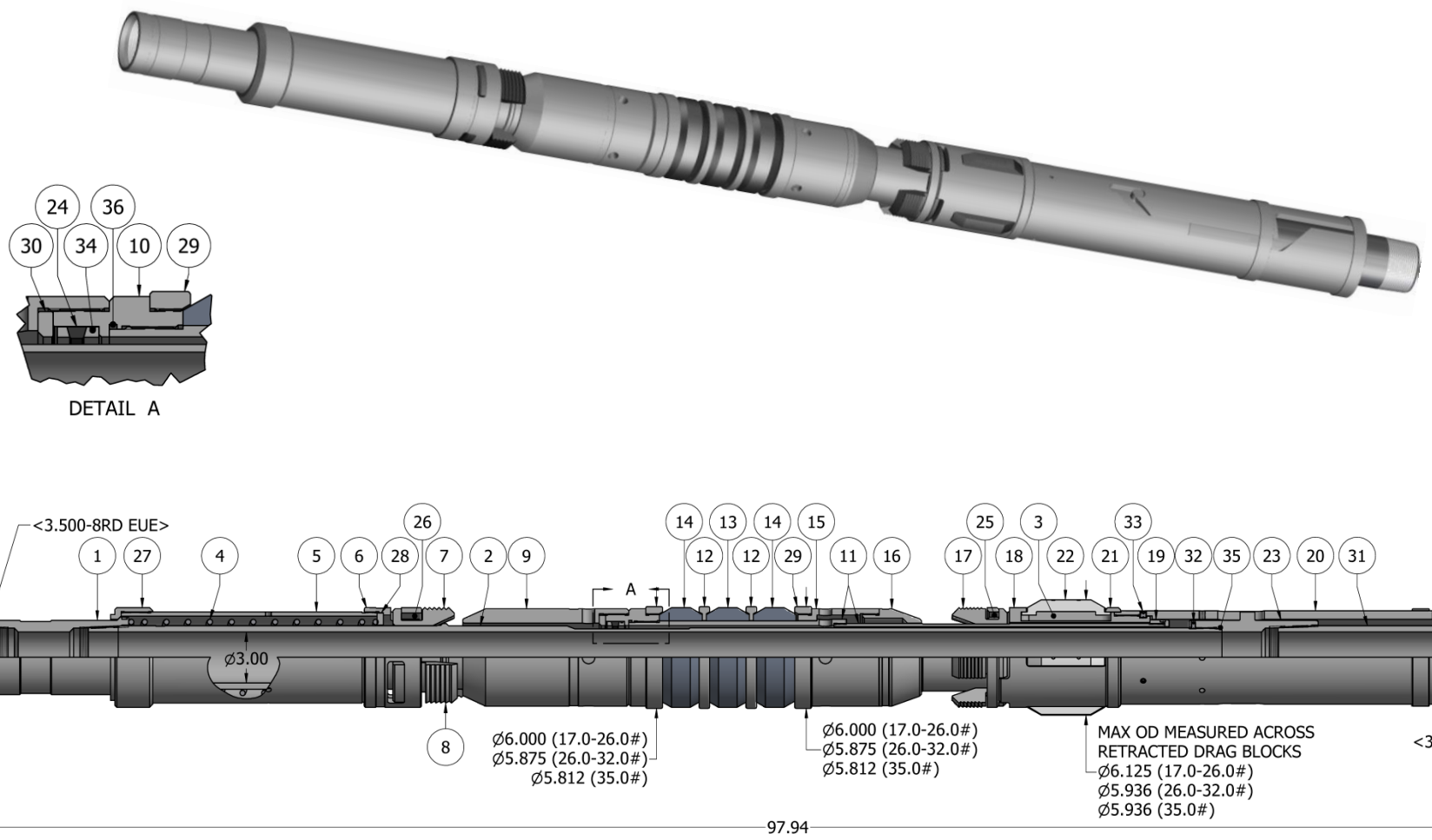
ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374HTV	26.0 – 32.0# P/N 60373HTV	35.0# P/N 60373HTV-35
13	1	ELEMENT	80 DURO VITON	60274512V	60273512V	
14	2	ELEMENT	90 DURO VITON	60274513V	60273513V	
24	1	BONDED SEAL	90 DURO VITON	60073520V		
34	1	155 O-RING	90 DURO VITON	90155V		
35	1	237 O-RING	90 DURO VITON	90237V		
36	1	243 O-RING	90 DURO VITON	90243V		

REDRESS KIT (RDK)		60374050HTV	60373050HTV	60373050HTV

M-2) CARBIDE OPTION

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60374HTC	P/N 60373HTC	P/N 60373HTC-35
8	2	CARBIDE UPPER SLIP	1026	60073115C		
17	4	CARBIDE LOWER SLIP	1026	60073135C		
22	4	CARBIDE DRAG BLOCK	8620	9080900C	9070900C	

N) TECHNICAL ILLUSTRATION



O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
11/06/2020	F	Added carbide options; Revised elastomer trim temp. ratings	J.Anderson	D.Hushbeck
04/22/2015	E	Added – Related Tools, Drift ID, P/N 60373HT-35 & Data, Max OD Measured Across Retracted Drag Blocks, Note2, Pre-Installation Inspection Procedures, Fig. 1, Caution2, Storage Procedures, Caution6, Note6, Fig. 2, Fig, 6, Fig. 7, Parts List - P/N 60373HT-35 & Data, P/N’s that may be substituted for STANDARDIZATION REDESIGN, Note11, Technical Illustration - Max OD Measured Across Retracted Drag Blocks for all weights, Gage OD for all weights; Revised – Description, ELASTOMER TRIM TEMPERATURE GUIDE was ELEMENT SELECTION GUIDE, Note7, Fig. 3, Material was 1026 (P/N 60373636);	B.Mathis	K.Riggs
07/01/2013	D	Revised - P/N 60173610HT was 60073610HT, P/N 60174310 was 60373310, P/N 60173230 was 60073230, P/N 60174810 was 60073810, Redress Kit P/N 60373050HT was 60365050HT, Redress Kit P/N 60374050HT was 60367050HT, P/N 60373HT assembled weight was 275 lbs, P/N 60374HT assembled weight was 292 lbs; Added - HSN and Viton options (60373HTH, 60373HTV, 60374HTH, 60374HTV); Removed - AFLAS from element selection guide	J.Anderson	K.Plunkett