A) DESCRIPTION

The ASI-X 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-2) 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)	**NOMINAL ID** (INCHES)	**DRIFT ID** (INCHES)		
7-5/8	24.0 - 29.7#	6.875 – 7.025	6.672	2.50	2.347	2-7/8 EUE	60375HT 60375HTH[1] 60375HTV[2]
	33.7 – 39.0#	6.625 – 6.765	6.453	2.50	2.347	2-7/8 EUE	60376HT 60376HTH[1] 60376HTV[2]

[1]HSN Option [2]Viton Option

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)
10,000 PSI	137,000 LBS

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

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.

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.

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 (16,000 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 (16,000 lbs minimum). 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 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.

G) STORAGE PROCEDURES

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** (SQ. INCHES)	
		ABOVE	**BELOW**
7-5/8” X 2-7/8”	2.375	3.87 DOWN	5.17 UP
	2.875	1.80 DOWN	3.62 UP
	3.500	1.33 UP	1.26 UP

Example: Consider a 7-5/8” 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. How much force is 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 ASI-X HT Packer 7-5/8” X 2-7/8” set on 2.875” tubing. In this example, the differential pressure from above the packer acts down on the seal area of the mandrel area across a pressure affected area of 1.80 in^2. Multiplying the differential pressure (3,000 PSI) by the pressure affected area (1.80 in^2) results in a downward force of 5,400 lbs. 5,400 lbs is the amount of force which needs to be neutralized when releasing the packer.

I) ELEMENT SELECTION GUIDE

NITRILE (STD)			
TEMPERATURE RANGE (F°)	**DUROMETER**		
	END	**MIDDLE**	**END**
70° - 125°	80	70	80
125° - 250°	90	70	90
250° - 300°	90	80	90
300° +	Contact D&L Sales		

RUBBER TYPE	**TEMPERATURE RANGE**
NITRILE	70° - 300°F
HSN (HNBR)	70° - 325°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

NOTE$_{11}$: Ensure vise is capable of handling weight of tool.

NOTE$_{12}$: Support tool during disassembly and assembly with jack stands as necessary.

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

K-1.1) Unscrew and remove bottom nipple (36) from J-pin bottom sub (23).

K-1.2) Unscrew and remove set screws (37) 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 (44) 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 to access screws

K-1.6) Unscrew and remove J-body (20) from drag block body (18) (**NOTE$_{4}$**: Left-hand threads).

K-1.6.1) Remove retaining ring (31) from J-body (20).

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

K-1.10.1) Unscrew and remove socket cap screws (42) from lower slip support (32).

K-1.10.2) Remove lower slip support (32) from drag block body (18).

K-1.10.3) Remove wedges (if needed). 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) DISASSEMBLY (cont'd)

K-1.13.2) Unscrew and remove center coupling (10) from collet upper cone (9).

K-1.13.2.1) Remove o-ring (45) from center coupling (10).

K-1.13.3) Remove bonded seal (24) from center coupling (10).

K-1.13.3.1) Remove o-ring (43) from bonded seal (24).

K-1.14) Remove collet upper cone (9) and bearing bushing (30) 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.

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

K-2.5.1) Unscrew and remove upper slip support (33) from upper slip body (6).

K-2.5.2) Remove spring retainer ring (28) from upper slip support (33).

K-2.5.3) Remove wedges (if needed). Remove releasing slip (7), upper slips (8), and upper slip springs (26) from upper slip body (6).

K-2.6) Unscrew and remove set screws (41) from cover sleeve (34).

K-2.7) Remove cover sleeve (34) from inner mandrel (2).

K-2.8) Remove snap ring (39) from inner mandrel (2).

K-2.9) Remove swivel sleeve (38) and bearing rings (35) from inner mandrel (2).

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

L) ASSEMBLY

NOTE$_6$: 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).

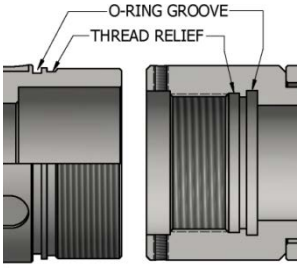


Fig. 2

NOTE$_{11}$: Ensure vise is capable of handling weight of tool.

NOTE$_{12}$: 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.

L-1.1) Install bearing rings (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) Install cover sleeve (34) onto inner mandrel (2).

L-1.4) Screw set screws (41) into cover sleeve (34).

L-1.5) Assemble upper slip body assembly and install:

L-1.5.1) Install upper slips (8), releasing slip (7), and upper slip springs (26) into upper slip body (6). Wedge slips outwards.

NOTE$_7$: Install two (2ea) springs per slip (Fig. 3).


Fig. 3

L-1.5.2) Screw upper slip support (33) into upper slip body (6). Remove wedges.

L) ASSEMBLY (cont'd)

L-1.5.3) Install spring retainer ring (28) into upper slip support (33).

L-1.5.4) Screw spring cage (5) into upper slip support (33).

L-1.5.5) Install upper slip body assembly onto inner mandrel (2).

L-1.6) Install compression spring (4) into spring cage (5).

L-1.7) Screw top sub (1) onto inner mandrel (2).

L-1.8) 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 (45) in o-ring groove in center coupling (10).

L-2.3) Install o-ring (43) in 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) and screw into center coupling (10).

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

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.

Fig. 4

NOTE$_8$: Install two (2ea) springs per slip (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 (42) into lower slip support (32). 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-2.10) Install drag blocks (22) and drag block springs (3) into drag block body (18). Compress blocks with drag block assembly tool (T1).

NOTE$_9$: 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).

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

L-2.13) Screw J-body (20) into drag block body (18) (**NOTE$_4$**: Left-hand threads).

L-2.14) Screw set screws (40) into drag block body (18). Release drag blocks (22).

L-2.15) Install o-ring (44) into o-ring groove in J-pin bottom sub (23).

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

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

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

Fig. 5

L) ASSEMBLY (cont’d)

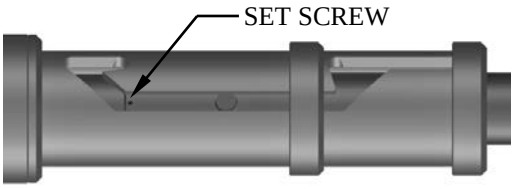


Fig. 6

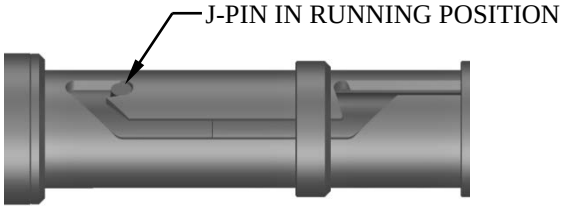


Fig. 7

L-2.17) Screw set screws (37) into J-pin bottom sub (23). Move J-body (20) as needed (Fig. 6).

L-2.18) Screw bottom nipple (36) 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 60375HT (24.0 - 29.7#)	P/N 60376HT (33.7 – 39.0#)
1	1	TOP SUB	P-110	60170610HT (60370610HT*)	
2	1	INNER MANDREL	P-110	60370211HT	
3	36	DRAG BLOCK SPRING	-	9101900	
4	1	COMPRESSION SPRING	CHROME VANADIUM	60373920	
5	1	SPRING CAGE	1026	60173310 (60373310*)	
6	1	UPPER SLIP BODY	P-110/1026	60377320HT	
7	1	RELEASING SLIP	P-110	60075125	
8	2	UPPER SLIP	1026	60075115	
9	1	COLLET UPPER CONE	P-110	60375410HT	
10	1	CENTER COUPLING	1026	60070620	
11	1	RUBBER MANDREL	1026	60370220	
12	2	RUBBER SPACER	1026	60275840	60276840
13	1	ELEMENT	80 DURO NITRILE	60275512	60276512
14	2	ELEMENT	90 DURO NITRILE	60275513	60276513
15	1	RUBBER RETAINER	1026	60275850	60276850
16	1	LOWER CONE	P-110	60375421HT	
17	4	LOWER SLIP	1026	60075135	
18	1	DRAG BLOCK BODY	1026	60075335	
19	1	RUBBER MANDREL CAP	1026	60170230 (60070230*)	

*P/N may be substituted

M) PARTS LIST (cont’d)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60375HT (24.0 - 29.7#)	P/N 60376HT (33.7 – 39.0#)
20	1	J-BODY	1026	60170340HT (60370340HT*)	
21	1	DRAG BLOCK RETAINER	1026	60075910	
22	6	DRAG BLOCK	8620	9070900	9060900
23	1	J-PIN BOTTOM SUB	P-110	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	1026	60173810	
28	1	SPRING RETAINING RING	1026	60073820	
29	1	GAGE RING	1026	60275830	60276830
30	1	BEARING BUSHING	1026	60370224	
31	1	RETAINING RING	1026	60075911	
32	1	LOWER SLIP SUPPORT	1026	60075912	
33	1	UPPER SLIP SUPPORT	1026	60377880	
34	1	COVER SLEEVE	1026	60370106	
35	2	BEARING RING	P-110	60370103	
36	1	BOTTOM NIPPLE	L-80	60370636	
37	2	SET SCREW 1/4-20 UNC X 3/8	STEEL	SSS025C037	
38	1	SWIVEL SLEEVE	P-110	60370100	
39	1	SNAP RING	P-110	60370102	
40	3	SET SCREW 5/16-18 UNC X 1/2	STEEL	SSS031C050	
41	3	SET SCREW 5/16-18 UNC X 5/16	STEEL	SSS031C031	
42	2	SOCKET CAP SCREW 1/2-13 UNC X 3/4	STEEL	SCS050C075	
43	1	153 O-RING	90 DURO NITRILE	90153	
44	1	233 O-RING	90 DURO NITRILE	90233	
45	1	242 O-RING	90 DURO NITRILE	90242	

*P/N may be substituted

REDRESS KIT (RDK)		60375050HT	60376050HT
ASSEMBLED WEIGHT		342 LBS	337 LBS

N) OPTIONS PARTS LIST

N-1) HSN

NOTE$_{10}$: For temperature range, refer to Element Selection Guide.

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60375HTH (24.0 – 29.7#)	P/N 60376HTH (33.7 – 39.0#)
13	2	ELEMENT	90 DURO HSN	60275513H	60276513H
14	1	ELEMENT	80 DURO HSN	60275512H	60276512H
24	1	BONDED SEAL	90 DURO HSN	60070520H	
43	1	153 O-RING	90 DURO HSN	90153H	
44	1	233 O-RING	90 DURO HSN	90233H	
45	1	242 O-RING	90 DURO HSN	90242H	

REDRESS KIT (RDK)		60375050HTH	60376050HTH

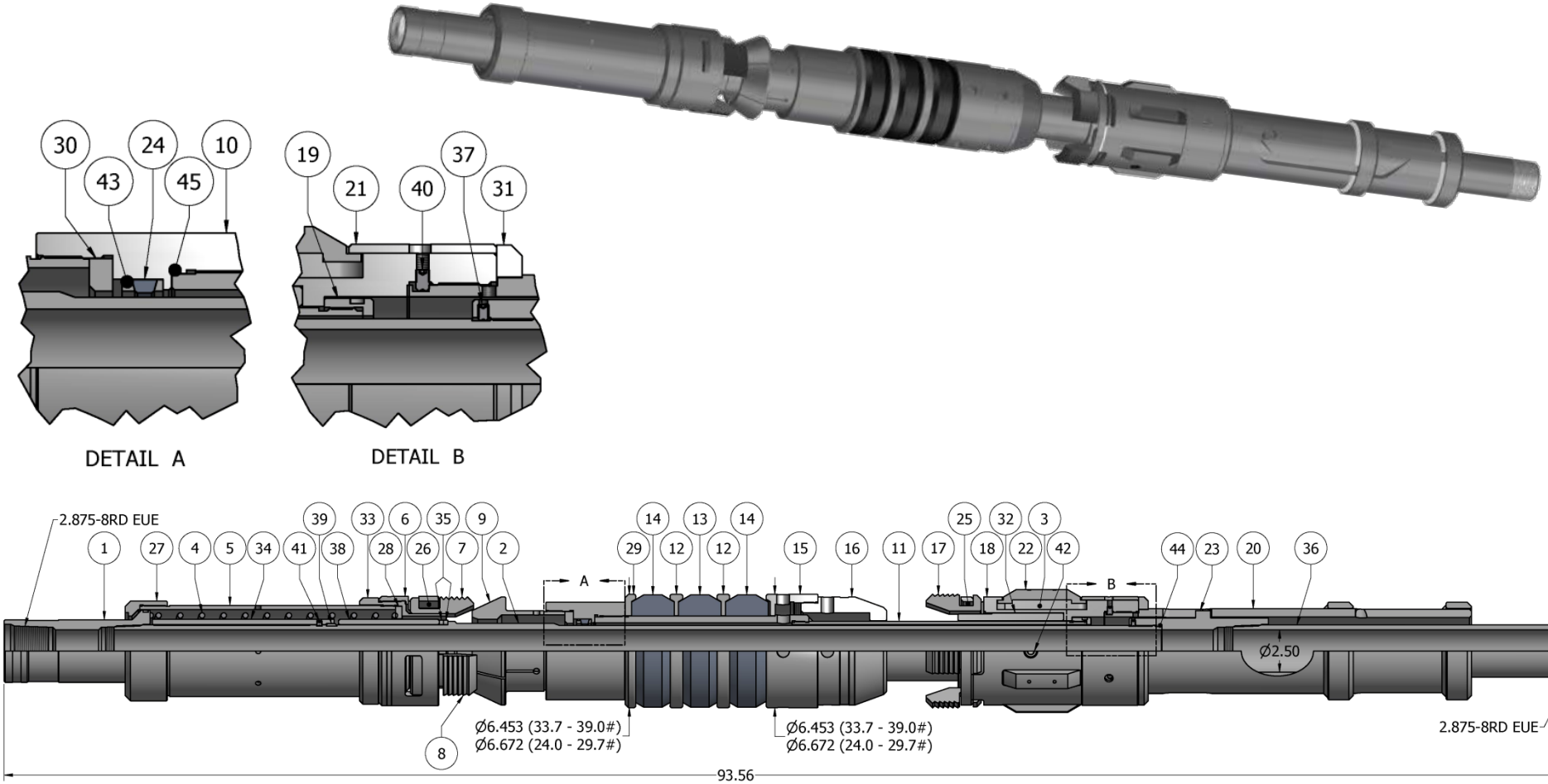
N-2) VITON

NOTE$_{10}$: For temperature range, refer to Element Selection Guide.

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60375HTV (24.0 – 29.7#)	P/N 60376HTV (33.7 – 39.0#)
13	2	ELEMENT	90 DURO VITON	60275513V	60276513V
14	1	ELEMENT	80 DURO VITON	60275512V	60276512V
24	1	BONDED SEAL	90 DURO VITON	60070520V	
43	1	153 O-RING	90 DURO VITON	90153V	
44	1	233 O-RING	90 DURO VITON	90233V	
45	1	242 O-RING	90 DURO VITON	90242V	

REDRESS KIT (RDK)		60375050HTV	60376050HTV

O) TECHNICAL ILLUSTRATION



P) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
12/09/14	C	Added: Related Tools, Drift ID (to Specification Guide), Note2, Pre-Installation Inspection Procedures, Fig. 1, Storage Procedures, Caution6, Fig. 2, Fig. 6, Fig. 7, Note11, Note12, L-2.19; Revised: Note6, P/N 60370103 was Qty 1;	B.Mathis	K.Riggs
08/13/13	B	Revised Pressure Affected Area Guide Example, Drag Block Assembly Tool P/N AT070110 was AT010110, P/N 60170610HT was 60370610HT, 60173310 was 60373310, 60170230 was 60070230, 60170340HT was 60370340HT, 60173810 was 60073810; Added HSN and Viton options (P/N, 60375HTH, 60375HTV, 60376HTH, 60376HTV), max tensile load, Recommended Hand Tools, Note for substitute parts; Options Parts List, Revision History; Removed Aflas from Element Selection Guide, Item T2 from Special Tools.	S.McEntire	D.Hushbeck