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 standard ASI-X Packer is designed for differential pressures up to 7,000 PSI (unless noted otherwise). This packer is also available in an HT version which 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) 2-3/8" DT-2 On/Off Tool—refer to technical manual DL-515-2375-1028.

B-2) 2-3/8" 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)		
5-3/4	15.0 – 16.1	5.201 – 5.240	5.000	2.00	2-3/8 EUE	60357X 60357XH[1] 60357XV[2]
	17.6 – 19.4	5.083 – 5.146	4.875	2.00	2-3/8 EUE	60357Y 60357YH[1] 60357YV[2]

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

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)
7,000 PSI	64,000 LBS

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

D) PRE-INSTALLATION INSPECTION PROCEDURES

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 (12,000 lbs). 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 (12,000 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 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

If the packer will not release in the normal manner, apply hard right-hand torque (800-1,000 ft-lbs) to break the tack weld on the J-pin ring. Rotate the work string to the right approximately 15 turns to release the J-pin ring and retrieve the packer. 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**
5-3/4	2.375	0.916 (DOWN)	-2.220 (UP)
	2.875	-1.146 (UP)	-0.666 (UP)
	3.500	-4.275 (UP)	1.685 (DOWN)

Example$_1$: Consider a 5-3/4" X 2-3/8" 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 for a 5-3/4" X 2-3/8" set on 2.375 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 0.916 in^2. Multiplying the differential pressure (3,000 psi) by the pressure affected area (0.916 in^2) results in a force of 2,748 lbs. The piston effect on the packer mandrel is a downward force of 2,748 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	AT055110

K) DISASSEMBLY

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

K-1.1) Unscrew and remove set screws (28) from J-pin bottom sub (23). Move J-body (20) as needed to access screws.

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

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

K-1.2.1) Remove o-ring (32) 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 (30) from J-body (20).

K-1.5) Unscrew and remove J-body (20) from drag block body (18) (**NOTE4**: Left-hand threads).

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).

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

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

K-1.9.1) 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) DISASSEMBLY (cont'd)

K-1.12) Remove rubber mandrel assembly and disassemble:

K-1.12.1) Remove gage ring (29), elements (13, 14), rubber spacers (12), and rubber retainer (15) from rubber mandrel (11).

K-1.13) Unscrew and remove center coupling (10) from upper cone (9).

K-1.13.1) Remove bonded seal (24) and o-ring (33) from center coupling (10).

K-1.13.1.1) Remove o-ring (31) from bonded seal (24).

K-1.14) Remove 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.

CAUTION4: Do NOT wrench or clamp on seal surface.

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

CAUTION5: 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 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 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.

L) ASSEMBLY

NOTE6: 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 reliefs (Fig. 2).

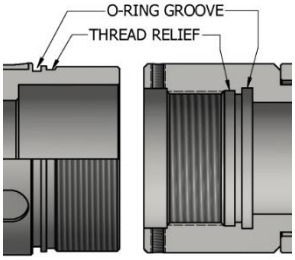


Fig. 2

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

CAUTION4: Do NOT wrench or clamp on seal surface.

L-1.1) Assemble upper slip body assembly and install:

L-1.1.1) Install upper slips (8), releasing slip (7), and upper slip springs (26) into upper slip body (6). Wedge slips outwards.

NOTE7: Install two (2ea) springs per slip (Fig. 3).

L-1.1.2) Install upper slip body (6) onto inner mandrel (2). Remove wedges.

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

L-1.3) Install compression spring (4) into spring cage (5).

L-1.4) Screw top sub (1) onto inner mandrel (2).

L-1.5) Screw spring cage cap (27) onto spring cage (5).

CAUTION5: Compression spring (4) will be compressed with spring tension against upper slip body assembly.

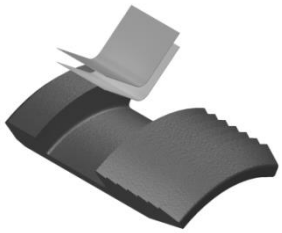


Fig. 3

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

L-2.1) Install upper cone (9) onto inner mandrel (2).

L-2.2) Install o-ring (33) into o-ring groove in center coupling (10).

L-2.3) Install o-ring (31) into o-ring groove in bonded seal (24).

L) ASSEMBLY (cont'd)

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) into 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.

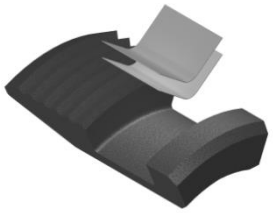


Fig. 4

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$_8$: Install two (2ea) springs per slip (Fig. 4).

L-2.8.2) 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 four (4ea) springs per drag block (Fig. 5).

Fig. 5

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

L-2.12) Screw J-body (20) onto drag block body (18) (**NOTE$_4$**: Left-hand threads).

L-2.13) Screw set screws (30) into J-body (20). Release drag blocks (22).

L-2.14) Install o-ring (32) into o-ring groove in J-pin bottom sub (23).

L-2.15) 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.

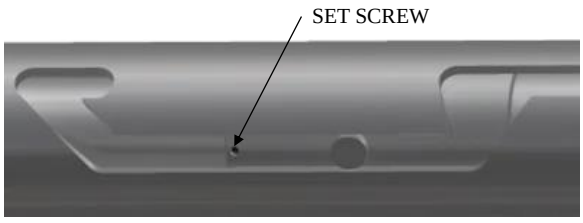


Fig. 6

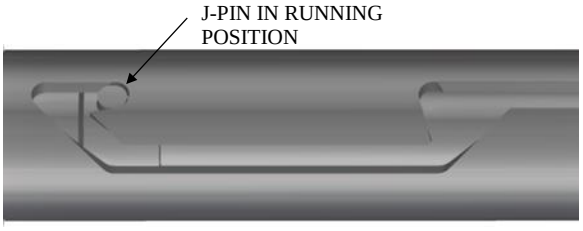


Fig. 7

L-2.16) Rotate J-body (20) as needed to position J-pin of J-pin bottom sub (23) along J-slot to access threaded holes (Fig. 6). Screw set screws (28) into J-pin bottom sub (23).

L-2.17) Position J-pin of J-pin bottom sub (23) 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	15.0-16.1# P/N 60357X	17.6-19.4# P/N 60357Y
1	1	TOP SUB	-	60155610	60055610
2	1	INNER MANDREL	DLMS80	60357210	
3	16	DRAG BLOCK SPRING	-	9100900	
4	1	COMPRESSION SPRING	DLMCRSP	60355920	
5	1	SPRING CAGE	DLMS60	60155310	60355310
6	1	UPPER SLIP BODY	-	60057X320	60055320
7	1	RELEASING SLIP	DLMS110	60057X125	60057Y125
8	2	UPPER SLIP	DLMS35	60057X115	60057Y115
9	1	UPPER CONE	DLMS60	60357X410	60355410
10	1	CENTER COUPLING	-	60357X620	60355620
11	1	RUBBER MANDREL	DLMS60	60057220	
12	2	RUBBER SPACER	DLMS35	60257X840	60257Y840
13	1	ELEMENT	70 DURO NITRILE	60257X511	60257Y511
14	2	ELEMENT	90 DURO NITRILE	60257X513	60257Y513
15	1	RUBBER RETAINER	DLMS60	60257X850	60257Y850
16	1	LOWER CONE	-	60057X420	60055420
17	4	LOWER SLIP	DLMS35	60057X135	60057Y135
18	1	DRAG BLOCK BODY	DLMS35	60057X335	60057Y335
19	1	RUBBER MANDREL CAP	DLMS60	60155230	60055230
20	1	J-BODY	DLMS80	60155340	60355340
21	1	DRAG BLOCK RETAINER	DLMS60	60057X910	60057Y910
22	4	DRAG BLOCK	DLMSDB8	9057900	9056900
23	1	J-PIN BOTTOM SUB	DLMS110 / DLMS60	60355650	
24	1	BONDED SEAL	DLMS60 / 90 DURO NITRILE	60055520	

M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	15.0-16.1# P/N 60357X	17.6-19.4# P/N 60357Y
25	8	LOWER SLIP SPRING	-	7155901	
26	6	UPPER SLIP SPRING	-	7155902	
27	1	SPRING CAGE CAP	1026	60157X810	60057Y810
28	2	SET SCREW 1/4-20 UNC X 3/8	STEEL	SSS025C037	
29	1	GAGE RING	1026	60257X830	60257Y830
30	4	SET SCREW 5/16-18 UNC X 1/2	STEEL	SSS031C050	
31	1	149 O-RING	90 DURO NITRILE	90149	
32	1	228 O-RING	90 DURO NITRILE	90228	
33	1	234 O-RING	90 DURO NITRILE	90234	

REDRESS KIT (RDK)		60357X050	60357Y050
ASSEMBLED WEIGHT		220 LBS	197 LBS

M-1) ELASTOMER TRIM OPTIONS

NOTE$_{10}$: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	15.0-16.1# P/N 60357XH	17.6-19.4# P/N 60357YH
13	1	ELEMENT	70 DURO HSN	60257X511H	60257Y511H
14	2	ELEMENT	90 DURO HSN	60257X513H	60257Y513H
24	1	BONDED SEAL	90 DURO HSN	60055520H	
31	1	149 O-RING	90 DURO HSN	90149H	
32	1	228 O-RING	90 DURO HSN	90228H	
33	1	234 O-RING	90 DURO HSN	90234H	

REDRESS KIT (RDK)		60357X050H	60357Y050H

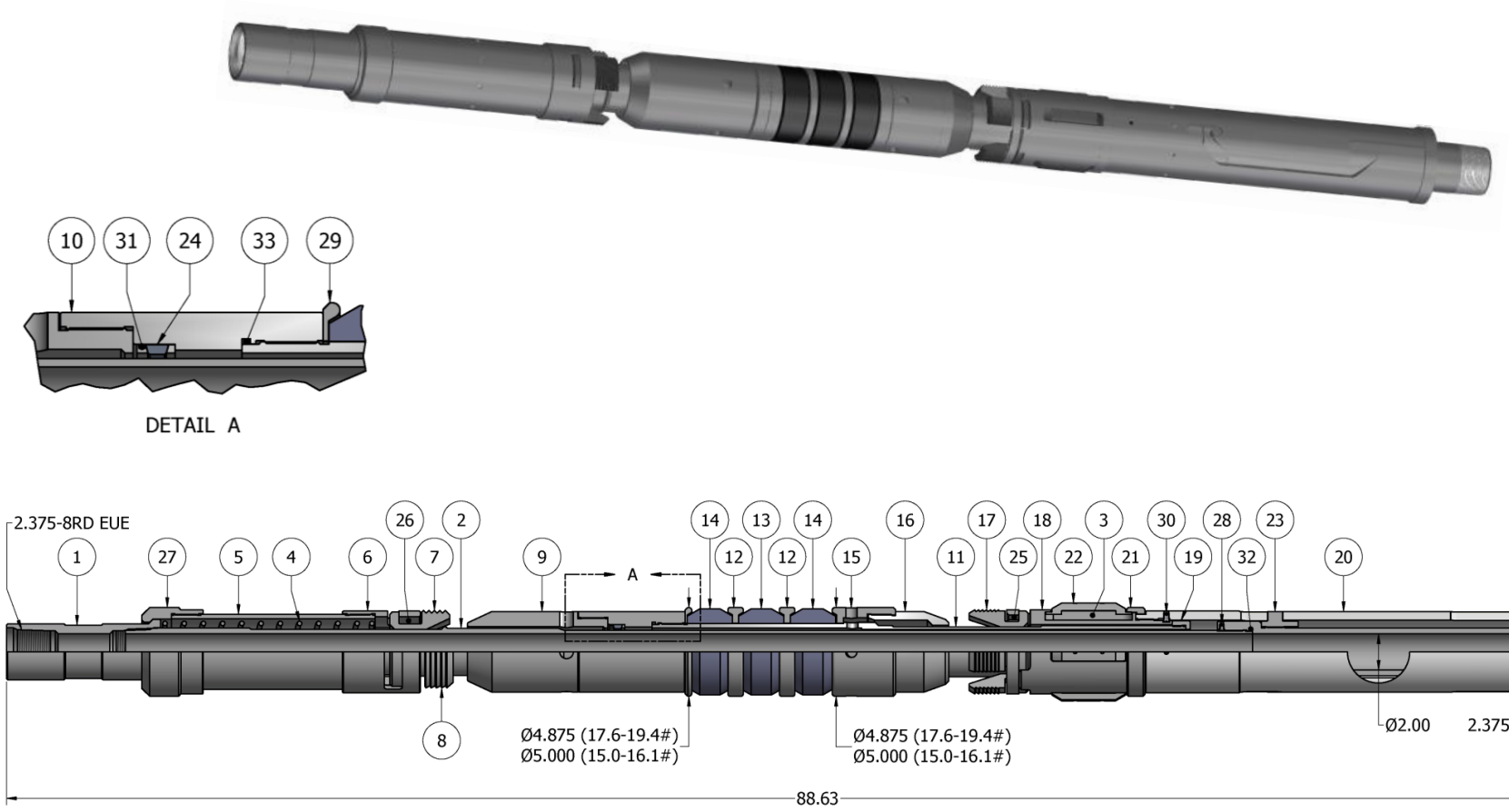
M) PARTS LIST (cont’d)

M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	15.0-16.1# P/N 60357XV	17.6-19.4# P/N 60357YV
13	1	ELEMENT	70 DURO VITON	60257X511V	60257Y511V
14	2	ELEMENT	90 DURO VITON	60257X513V	60257Y513V
24	1	BONDED SEAL	90 DURO VITON	60055520V	
31	1	149 O-RING	90 DURO VITON	90149V	
32	1	228 O-RING	90 DURO VITON	90228V	
33	1	234 O-RING	90 DURO VITON	90234V	

REDRESS KIT (RDK)		60357X050V	60357Y050V

N) TECHNICAL ILLUSTRATION



O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
04/26/2019	C	Removed tool drift ID; Revised Elastomer Trim Temp. Guide	J.Anderson	Z.Speer
10/10/14	B	Added P/N’s 60357X, 60357XH and 60357XV to manual.	D.Barlow	K.Plunkett
09/18/14	A	Created new manual	-	-