



ASI-X PACKER

5" X 2-3/8"

Manual No:
DL-603-5000-002

Revision: **K**

Revision Date:
05/03/2022

Authored by: S. White

Approved by: J. McArthur

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" On/Off Tool and Stinger—refer to technical manual *DL-515-2375-1028*.

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	11.5 – 15.0	4.408 - 4.560	4.125	1.94	2-3/8 EUE	60350 60350H ¹ 60350V ² 60350C ³ 60350HC ⁴ 60350VC ⁵
	15.0 – 18.0	4.276 – 4.408	4.063	1.94	2-3/8 EUE	60349 60349H ¹ 60349V ² 60349C ³ 60349HC ⁴ 60349VC ⁵
	18.0 - 20.8	4.156 - 4.276	4.000	1.94	2-3/8 EUE	60352 60352H ¹ 60352V ² 60352C ³ 60352HC ⁴ 60352VC ⁵

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

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

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C) SPECIFICATION GUIDE (cont'd)

NOTE₃: Tools listed are right-hand set / right-hand release.

NOTE₄: 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	30,000 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. Tighten/torque all connections properly before operating tool.



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 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

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 sufficient weight to set the packer (10,000 lbs minimum). 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.



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E) SETTING PROCEDURES (cont'd)

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 (10,000 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 and rotate the tubing 1/4 turn to the right at the packer and pick up while holding right-hand torque. 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.

In the event, the packer will not release in the normal manner, hard right-hand torque can be applied (800-1,000 Ft-lbs) which will break the tack weld on the J-pin ring. Continued rotation of approximately 15 turns will release the J-pin ring and allow the packer to be pulled. When released in this manner, the packer will reset when moved down the hole.

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

G) PRESSURE AFFECTED AREA GUIDE

When set downhole, the packer mandrel is subjected to a force created by differential pressure above or below the packer that acts on the pressure affected area (i.e., the piston effect). Depending on the tubing size and weight and the seal area of the packer the force created by differential pressure acts upwards or downwards on the packer mandrel. An upward force, designated as a negative (-) value, acts to push the packer mandrel up hole and must be accounted for when releasing the packer. A downward force, designated as a positive value, acts to push the packer mandrel down hole and must be accounted for when releasing the packer. Other factors (e.g., tubing movement due to temperature change) must be considered separately to determine all the forces acting on the packer.

PACKER SIZE (INCHES)	TUBING SIZE (INCHES)	PRESSURE AFFECTED AREA (IN ²)	
		ABOVE	BELOW
5	1.900	1.48 (DOWN)	-2.28 (UP)
	2.063	0.97 (DOWN)	-1.91 (UP)
	2.375	-0.11 (UP)	-1.19 (UP)

Example: Consider a 5" X 2-3/8" ASI-X 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 for a 5" X 2-3/8" ASI-X Packer run on 2.375". 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 -0.11 in². Multiplying the differential pressure (3,000 psi) by the pressure affected area (-0.11 in²) results in a force of -330 lbs. The piston effect on the packer mandrel is an upward force of 330 lbs.



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H) 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

I) RECOMMENDED TOOLS

I-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

I-2) OPTIONAL SPECIAL TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT055110

J) DISASSEMBLY

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

J-1.1) Unscrew and remove set screws (5) from J-pin bottom sub (23). Move J-body (20) as needed to access set screws (5).

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

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

J-1.3) Remove o-ring (29) from J-pin bottom sub (23).

J-1.4) Compress drag blocks (22) using drag block body assembly tool (T1).

J-1.5) Unscrew and remove set screws (5) from J-body (20)

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

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

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

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

J-1.9) Wedge lower slips (17) outward (if needed). Remove drag block body assembly from rubber mandrel (11) and disassemble:

J-1.9.1) Remove wedges. Remove lower slips (17) and lower slip springs (25) from drag block body (18).

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



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J) DISASSEMBLY (cont'd)

- J-1.11) Unscrew rubber mandrel (11) from center coupling (10).
- J-1.12) Remove rubber mandrel assembly from inner mandrel (2) and disassemble:
 - J-1.12.1) Remove elements (13, 14), rubber spacers (12) and rubber retainer (15) from rubber mandrel (11).
- J-1.13) Unscrew and remove center coupling (10) from upper cone (9).
 - J-1.13.1) Remove bonded seal (24) and o-ring (30) from center coupling (10).
 - J-1.13.1.1) Remove o-ring (28) from bonded seal (24).
- J-1.14) Remove upper cone (9) from inner mandrel (2).
- J-2) Remove top sub (1) from vise. Clamp lower part of inner mandrel (2) in vise.
NOTE₆: Do NOT wrench or clamp on seal surface.
 - J-2.1) Unscrew and remove spring cage cap (27) from top sub (1).
CAUTION₂: Compression spring (4) is compressed with spring tension against spring cage assembly.
 - J-2.2) Unscrew and remove top sub (1) from inner mandrel (2).
 - J-2.3) Remove compression spring (4) from spring cage (6).
 - J-2.4) Wedge releasing slip (7) and upper slips (8) outwards (if needed). Remove spring cage assembly from inner mandrel (2) and disassemble:
 - J-2.4.1) Remove spring retaining ring (21) from spring cage (6).
 - J-2.4.2) Remove wedges. Remove releasing slip (7), upper slips (8) and upper slip springs (26) from spring cage (6).
- J-3) Remove inner mandrel (2) from vise.

K) ASSEMBLY

NOTE₇: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order and orientation.

- K-1) Clamp inner mandrel (2) in vise.
NOTE₆: Do NOT wrench or clamp on seal surface.
 - K-1.1) Assemble spring cage assembly and install:
 - K-1.1.1) Install upper slips (8), releasing slip (7), and upper slip springs (26) into spring cage (6).
NOTE₈: Install one (1ea) spring per slip (Fig. 1).
 - K-1.1.2) Wedge releasing slip (7) and upper slips (8) outwards. Install spring cage assembly onto inner mandrel (2). Remove wedges.
 - K-1.2) Install spring retaining ring (21) and compression spring (4) onto inner mandrel (2).
 - K-1.3) Screw top sub (1) onto inner mandrel (2).
 - K-1.4) Screw spring cage cap (27) into spring cage (6).
CAUTION₂: Compression spring (4) will be compressed with spring tension against spring cage assembly.
- K-2) Remove inner mandrel (2) from vise. Clamp top sub (1) in vise.
 - K-2.1) Slide upper cone (9) onto inner mandrel (2).
 - K-2.2) Install o-ring (30) in groove in center coupling (10).
 - K-2.3) Install o-ring (28) in groove in bonded seal (24).
 - K-2.4) Install bonded seal (24) into center coupling (10).
CAUTION₃: Do not rip or tear o-ring during installation.
 - K-2.5) Screw center coupling (10) onto upper cone (9).

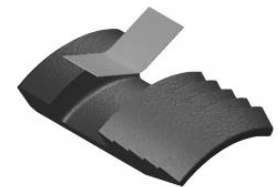


Fig. 1



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K) ASSEMBLY (cont'd)

K-2.6) Assemble rubber mandrel assembly and install:

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

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

K-2.6.3) Screw rubber mandrel (11) into center coupling (10).

CAUTION₃: Do not rip or tear o-ring during installation.

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

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

K-2.8.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge slips outward.

NOTE₈: Install one (1ea) spring per slip (Fig. 2).

K-2.8.2) Install drag block body assembly onto rubber mandrel (11).

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

K-2.10) Install drag blocks (22) and drag block springs (3) into drag block body (18).

NOTE₉: Install three (3ea) springs per drag block (Fig. 3).

K-2.11) Compress drag blocks (22) using drag block body assembly tool (T1).

K-2.12) Screw J-body (20) onto drag block body (18) capturing ends of drag blocks (22) (**NOTE₄**: Left-hand threads).

K-2.13) Screw set screws (5) into J-body (20). Release drag blocks (22).

K-2.14) Install o-ring (29) in groove in J-pin bottom sub (23).

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

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

CAUTION₃: Do not rip or tear o-ring during installation.

K-2.16) Screw set screws (5) into J-pin bottom sub (23). Move J-body (20) as needed to access threaded holes.

K-3) Unclamp top sub (1) from vise and remove tool assembly.

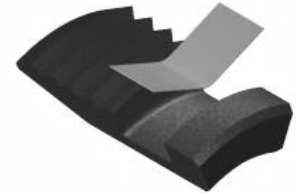


Fig. 2

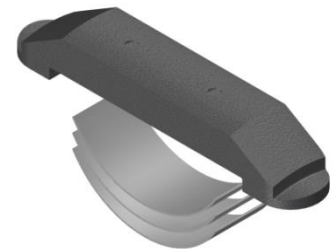




Fig. 3

	<h1>ASI-X PACKER</h1> <h2>5" X 2-3/8"</h2>	Manual No: DL-603-5000-002
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L) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60350	P/N 60349	P/N 60352
1	1	TOP SUB	DLMS80	60145610 (STD) (60045610*)		
2	1	INNER MANDREL	DLMS41X80	60045210		
3	12	DRAG BLOCK SPRING	INCONEL	9100900		
4	1	COMPRESSION SPRING	DLMCRSP	60345920		
5	6	SET SCREW 1/4-20 UNC X 3/8	STEEL	SSS025C037		
6	1	SPRING CAGE	DLMS60	60150325 (STD) (60050325*)		
7	1	RELEASING SLIP	DLMS110	60050125		
8	2	UPPER SLIP	DLMS35	60050115		
9	1	UPPER CONE	DLMS60	60045410		
10	1	CENTER COUPLING	DLMS60	60250620	60249620	60252620
11	1	RUBBER MANDREL	DLMS110	60045220		
12	2	RUBBER SPACER	DLMS35	60250840	60249840	60252840
13	1	ELEMENT	70 DURO NITRILE	60250511		60252511
14	2	ELEMENT	90 DURO NITRILE	60250513		60252513
15	1	RUBBER RETAINER	DLMS60	60250850	60249850	60252850
16	1	LOWER CONE	DLMS60	60045420		
17	4	LOWER SLIP	DLMS35	60050135		
18	1	DRAG BLOCK BODY	DLMS60	60050335		
19	1	RUBBER MANDREL CAP	DLMS60	60145230 (STD) (60045230*)		
20	1	J-BODY	DLMS60	60145340 (STD) (60045340*)		
21	1	SPRING RETAINING RING	DLMS60	60045820		

* P/N may be substituted

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L) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60350	P/N 60349	P/N 60352
22	4	DRAG BLOCK	DLMSDB8	9057900	9056900	
23	1	J-PIN BOTTOM SUB	DLMS110 / DLMS80	60045650		
24	1	BONDED SEAL	90 DURO NITRILE	60045520		
25	4	LOWER SLIP SPRING	ELGILOY	7145901		
26	3	UPPER SLIP SPRING	ELGILOY	7145902		
27	1	SPRING CAGE CAP	DLMS60	60145810 (STD) (60045810*)		
28	1	145-90 O-RING	90 DURO NITRILE	90145		
29	1	228-90 O-RING	90 DURO NITRILE	90228		
30	1	232-90 O-RING	90 DURO NITRILE	90232		

* P/N may be substituted.

REDRESS KIT (RDK)		60350050		60352050
ASSEMBLED WEIGHT		117 LBS	116 LBS	115 LBS


L-1) ELASTOMER TRIM OPTIONS

NOTE₁₀: For temperature range, refer to Elastomer Trim Temperature Guides.

L-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60350H	P/N 60349H	P/N 60352H
13	1	ELEMENT	70 DURO HSN	60250511H		60252511H
14	2	ELEMENT	90 DURO HSN	60250513H		60252513H
24	1	BONDED SEAL	90 DURO HSN	60045520H		
28	1	145-90 O-RING	90 DURO HSN	90145H		
29	1	228-90 O-RING	90 DURO HSN	90228H		
30	1	232-90 O-RING	90 DURO HSN	90232H		

REDRESS KIT (RDK)		60350050H		60352050H
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L) PARTS LIST (cont'd)

L-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60350V	P/N 60349V	P/N 60352V
13	1	ELEMENT	70 DURO VITON	60250511V		60252511V
14	2	ELEMENT	90 DURO VITON	60250513V		60252513V
24	1	BONDED SEAL	90 DURO VITON	60045520V		
28	1	145-90 O-RING	90 DURO VITON	90145V		
29	1	228-90 O-RING	90 DURO VITON	90228V		
30	1	232-90 O-RING	90 DURO VITON	90232V		

REDRESS KIT (RDK)		60350050V	60352050V
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L-2) CARBIDE OPTIONS

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 60350C	P/N 60349C	P/N 60352C
8	2	UPPER SLIP	DLMS110	60050115C		
17	4	LOWER SLIP	DLMS110	60050135C		
22	4	DRAG BLOCK	DLMSDB4	9057900C	9056900C	



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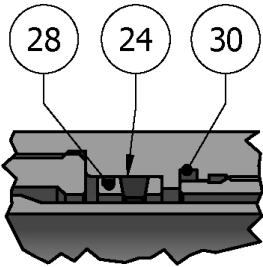
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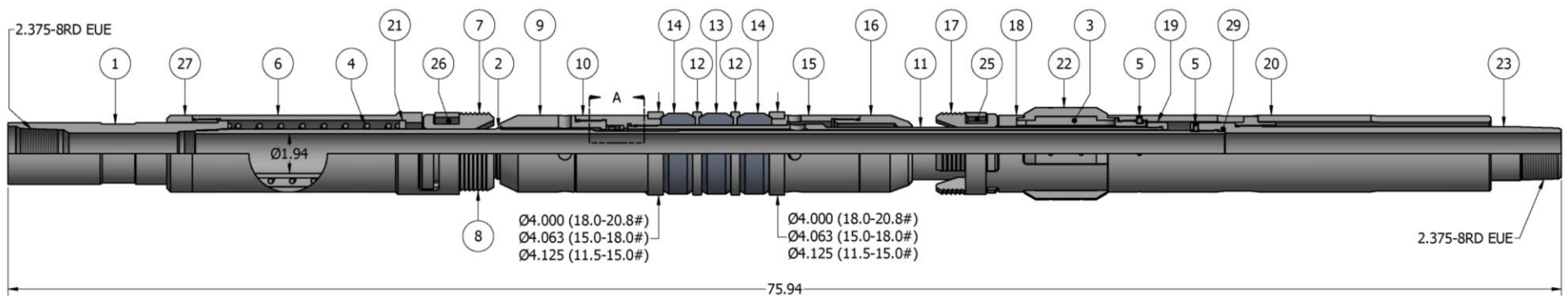
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M) TECHNICAL ILLUSTRATION



DETAIL A



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N) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
05/02/2022	K	Revised tensile load rating was 40K	J.Anderson	E.Visaez
09/21/2021	J	Added carbide options, Revised tensile load, trim temp. ratings,	J.Anderson	E.Visaez
09/16/13	H	Revised standard P/N 60145610 was 60045610, P/N 60150325 was 60050325, P/N 60145230 was 60045230, P/N 60145340 was 60045340, P/N 60145810 was 60045810	J.Anderson	H.Bringham
05/14/13	G	Revised P/N 60352 assembled weight was 142 lbs, P/N 60349 assembled weight was 117 lbs; Added maximum torque and tensile load thru tool, note for use of double hook J-slot packers	J.Anderson	K.Plunkett
02/22/13	F	Added P/N 60349, recommended hand tools, HSN and Viton options (60350H, 60350V, 60349H, 60349V, 60352H, 60352V), revision history; Removed AFLAS from element selection guide, T2 from special tools and disassembly and assembly sections;	J.Anderson	H.Bringham