



ASI-X PACKER

13-3/8" X 4-1/2"

Manual No:
DL-603-13375-012

Revision: **G**

Revision Date:
03/02/2020

Authored by: S. White

Approved by: H. Bringham

A) DESCRIPTION

The D&L ASI-X Packer is the most versatile of the mechanically set retrievable packers and may be used in any production application. The ASI-X Packer is suited for treating, testing, injecting, pumping wells, and flowing wells, deep or shallow. The ASI-X 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, right-hand release.

B) RELATED TOOLS

B-1) 4-1/2" DT-2 On/Off Tool and Stinger—refer to technical manual *DL-512-4500-140*.

C) SPECIFICATION GUIDE

| CASING | | | TOOL OD (INCHES) | TOOL ID (INCHES) | THREAD CONNECTION BOX UP / PIN DOWN | PART NUMBER |
|------------------|--------------------|--------------------------------------|---------------------|---------------------|--|---|
| SIZE (INCHES) | WEIGHT (LBS/FT) | RECOMMENDED HOLE SIZE (INCHES) | | | | |
| 13-3/8 | 54.5 - 77.0 | 12.275 – 12.615 | 12.000 | 4.00 | 4-1/2 EUE | 60313 60313H ¹ 60313V ² |

¹HSN Option

²Viton Option

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

| DIFFERENTIAL PRESSURE (MAX) | TENSILE LOAD THRU TOOL (MAX) |
|-----------------------------------|------------------------------------|
| 6,000 PSI | 156,000 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. |

D & L OIL TOOLS
P.O. BOX 52220 TULSA, OK 74152
PHONE: (800) 441-350 www.dloilttools.com



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D) PRE-INSTALLATION INSPECTION PROCEDURES (cont'd)

| 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

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 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 enough weight to set the packer (26,000 lbs). 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.

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 (26,000 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 tubing 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.

CAUTION₃: High differential pressure below the ASI-X 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.



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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. Elastomers should be in a relaxed state—free from tension, compression or other 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 |
| 13-3/8 | 2.875 | 11.11 DOWN | -12.92 (UP) |
| | 3.500 | 7.98 DOWN | -10.56 (UP) |
| | 4.000 | 5.03 DOWN | -7.71 (UP) |
| | 4.500 | 1.70 DOWN | -5.04 (UP) |

Example: Consider a 13-3/8" X 4-1/2" ASI-X Packer set on 3.500" 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 10-3/4" X 4-1/2" ASI-X Packer run on 3.500" 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 7.98 in². Multiplying the differential pressure (3,000 PSI) by the pressure affected area (7.98 in²) results in a downward force of 23,940 lbs. 23,940 lbs is the force which needs to be neutralized when releasing the packer.

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 |



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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 | AT016110 |

K) DISASSEMBLY

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

K-1.1) Unscrew and remove J-pin bottom sub (23) from inner mandrel (2).

NOTE2: Drag block body assembly must be free to rotate.

K-1.1.1) Remove o-ring (40) from J-pin bottom sub (23).

K-1.2) Unscrew and remove set screws (35) from drag block body support (31).

K-1.3) Unscrew and remove J-body (20) from drag block body support (31) (**NOTE3:** Left-hand threads).

K-1.4) Unscrew and remove rubber mandrel cap (19) from rubber mandrel (11).

NOTE4: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

K-1.5) Remove drag block body assembly and disassemble:

K-1.5.1) Compress drag blocks (22) using drag block body assembly tool (T1)

K-1.5.2) Unscrew and remove set screws (36) from drag block body (18). Rotate drag block retainer (21) as needed to access set screws (36).

K-1.5.3) Unscrew and remove drag block body support (31) from drag block body (18) (**NOTE3:** Left-hand threads).

K-1.5.4) Remove drag block retainer (21) from drag block body (18).

K-1.5.5) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).

K-1.5.6) Unscrew and remove socket cap screws (37) from lower slip support (32).

K-1.5.7) Wedge lower slips (17) outward (if needed). Remove lower slip support (32) from drag block body (18).

K-1.5.8) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from drag block body (18).

K-1.6) Unscrew and remove lower cone (16) from rubber retainer (15).

K-1.7) Unscrew rubber mandrel (11) from center coupling (10).

K-1.8) Remove rubber mandrel assembly and disassemble:

K-1.8.1) Remove elements (13, 14), rubber spacers (12) and rubber retainer (15) from rubber mandrel sleeve (34).

K-1.8.2) Remove rubber mandrel sleeve (34) from rubber mandrel (11).



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K) DISASSEMBLY (cont'd)

K-1.8.3) Remove o-ring (39) from rubber mandrel (11).

K-1.9) Unscrew and remove gage ring (29) from center coupling (10).

K-1.10) Unscrew and remove center coupling (10) from upper cone (9).

K-1.10.1) Remove o-rings (38) and bonded seal (24) from center coupling (10).

K-1.11) Remove upper cone (9) and bearing bushing (30) from inner mandrel (2).

K-2) Remove top sub (1) from vise. Clamp 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 inner mandrel (2).

K-2.4) Unscrew and remove spring cage (5) from upper slip support (33).

K-2.5) Remove upper slip body assembly and disassemble:

K-2.5.1) Remove spring retaining ring (28) from upper slip support (33).

K-2.5.2) Wedge releasing slip (7) and upper slips (8) outward (if needed). Unscrew and remove upper slip support (33) from upper slip body (6).

K-2.5.3) Remove wedges. 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

NOTE₅: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, and orientation and tighten/torque all connections properly.

CAUTION₁: To ensure tool operates properly, install o-rings in o-ring grooves, **NOT** thread reliefs unless stated otherwise (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).

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

L-1.1.2) Wedge releasing slip (7) and upper slips (8) outwards. Screw upper slip support body (6). Remove wedges.

L-1.1.3) Install upper slip body assembly onto inner mandrel (2).

L-1.2) Install spring retaining ring (28) into place in upper slip support (33).

L-1.3) Screw spring cage (5) into upper slip support (33).

L-1.4) Install compression spring (4) onto inner mandrel (2).

L-1.5) Screw top sub (1) onto inner mandrel (2).

L-1.6) Screw spring cage cap (27) onto spring cage (5).

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

L-2) Remove inner mandrel (2) from vise. Clamp top sub (1) in vise.

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

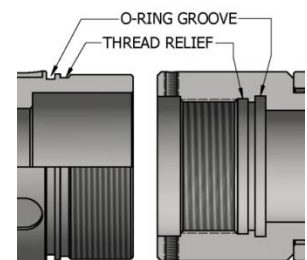


Fig. 2

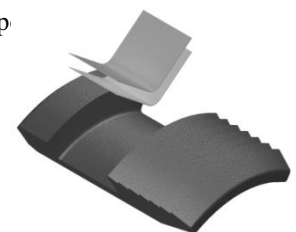


Fig. 3



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L) ASSEMBLY (cont'd)

L-2.2) Install o-rings (38) in grooves in center coupling (10).

L-2.3) Install bonded seal (24) into center coupling (10).

CAUTION₆: Do not rip or tear o-rings during installation.

L-2.4) Screw center coupling (10) onto upper cone (9).

L-2.5) Screw gage ring (29) onto center coupling (10).

L-2.6) Assemble rubber mandrel assembly and install:

L-2.6.1) Install o-ring (39) in groove in rubber mandrel (11).

L-2.6.2) Install rubber mandrel sleeve (34) onto rubber mandrel (11).

CAUTION₆: Do not rip or tear o-ring during installation.

L-2.6.3) Install rubber retainer (15), elements (13, 14) and rubber spacers (12) onto rubber mandrel sleeve (34).

L-2.6.4) Install rubber mandrel assembly onto inner mandrel (2).

L-2.7) Screw rubber mandrel (11) into center coupling (10).

CAUTION₆: Do not rip or tear o-ring during installation.

L-2.8) Screw lower cone (16) into rubber retainer (15).

L-2.9) Assemble drag block body assembly and install:

L-2.9.1) Install lower slips (17) and lower slip springs (25) into drag block body (18). Wedge slips outward.

NOTE₇: Install two (2ea) springs per slip (Fig. 4).

L-2.9.2) Install lower slip support (32) into drag block body (18).

L-2.9.3) Align holes in lower slip support (32) with threaded holes in drag block body (18). Screw socket cap screws (37) into drag block body (18). Remove wedges.

L-2.9.4) Install drag block body assembly onto rubber mandrel (11)

L-2.9.5) Install drag blocks (22) and drag block springs (3). Compress drag blocks (22) with drag block assembly tool (T1).

NOTE₈: Install six (6ea) springs per block (Fig. 5).

L-2.9.6) Install drag block retainer (21) capturing ends of drag blocks (22).

NOTE₆: Align holes in drag block retainer (21) to access threaded holes in drag block body (18).

L-2.9.7) Screw drag block body support (31) into drag block body (18) (**NOTE₃:** Left-hand threads).

L-2.9.8) Screw set screws (36) into drag block body (18). Release drag blocks (22).

L-2.10) Screw rubber mandrel cap (19) onto rubber mandrel (11).

NOTE₄: For added leverage, insert a rod through lower cone (16) and rubber mandrel (11) as needed.

L-2.11) Screw J-body (20) into drag block body (18) (**NOTE₃:** Left-hand threads).

L-2.12) Screw set screws (35) into drag block body support (31).

L-2.13) Install o-ring (40) into groove in J-pin bottom sub (23).

L-2.14) Screw J-pin bottom sub (23) onto inner mandrel (2).

NOTE₂: Drag block body assembly must be free to rotate.

CAUTION₆: Do not rip or tear o-ring during installation.

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

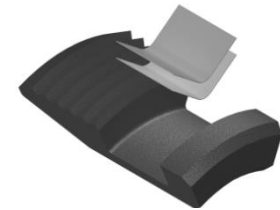


Fig. 4



Fig. 5



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M) PARTS LIST

| ITEM | QTY | DESCRIPTION | MATERIAL | P/N 60313 |
|------|-----|---------------------|-----------------|-----------|
| 1 | 1 | TOP SUB | DLMS60 | 60195610 |
| 2 | 1 | INNER MANDREL | DLMS80 | 60395210 |
| 3 | 48 | DRAG BLOCK SPRING | - | 9101900 |
| 4 | 1 | COMPRESSION SPRING | DLMCRSP | 60395920 |
| 5 | 1 | SPRING CAGE | DLMS60 | 60195310 |
| 6 | 1 | UPPER SLIP BODY | DLMS80 | 60313320 |
| 7 | 2 | RELEASING SLIP | DLMS110 | 60013125 |
| 8 | 3 | UPPER SLIP | DLMS35 | 60013115 |
| 9 | 1 | UPPER CONE | DLMS80 | 60313410 |
| 10 | 1 | CENTER COUPLING | DLMS35 | 60313620 |
| 11 | 1 | RUBBER MANDREL | DLMS60 | 60313220 |
| 12 | 2 | RUBBER SPACER | DLMS35 | 60313840 |
| 13 | 1 | ELEMENT | 70 DURO NITRILE | 60213511 |
| 14 | 2 | ELEMENT | 90 DURO NITRILE | 60213513 |
| 15 | 1 | RUBBER RETAINER | DLMS35 | 60313850 |
| 16 | 1 | LOWER CONE | DLMS35 | 60313420 |
| 17 | 6 | LOWER SLIP | DLMS35 | 60013135 |
| 18 | 1 | DRAG BLOCK BODY | DLMS60 | 60313335 |
| 19 | 1 | RUBBER MANDREL CAP | DLMS60 | 60195230 |
| 20 | 1 | J-BODY | DLMS60 | 60113340 |
| 21 | 1 | DRAG BLOCK RETAINER | DLMS35 | 60313910 |
| 22 | 8 | DRAG BLOCK | DLMSDB8 | 9080900 |
| 23 | 1 | J-PIN BOTTOM SUB | DLMS80 | 60395650 |
| 24 | 1 | SEAL | 90 DURO NITRILE | 60095520 |
| 25 | 12 | LOWER SLIP SPRING | - | 7170901 |



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M) PARTS LIST (cont'd)

| ITEM | QTY | DESCRIPTION | MATERIAL | P/N 60313 |
|------|-----|-----------------------------------|-----------------|------------|
| 26 | 10 | UPPER SLIP SPRING | | 7170902 |
| 27 | 1 | SPRING CAGE CAP | DLMS35 | 60095810 |
| 28 | 1 | SPRING RETAINING RING | DLMS35 | 60313820 |
| 29 | 1 | GAGE RING | DLMS35 | 60313830 |
| 30 | 1 | BEARING BUSHING | DLMS35 | 60313224 |
| 31 | 1 | DRAG BLOCK BODY SUPPORT | DLMS35 | 60313330 |
| 32 | 1 | LOWER SLIP SUPPORT | DLMS60 / DLMS35 | 60313912 |
| 33 | 1 | UPPER SLIP SUPPORT | DLMS35 | 60313880 |
| 34 | 1 | RUBBER MANDREL SLEEVE | DLMS35 | 60314221 |
| 35 | 2 | SET SCREW 3/8-16 UNC X 1/2 | STEEL | SSS037C050 |
| 36 | 2 | SET SCREW 3/8-16 UNC X 3/4 | STEEL | SSS037C075 |
| 37 | 2 | SOCKET CAP SCREW 1/2-13 UNC X 3/4 | STEEL | SCS050C075 |
| 38 | 2 | 160 O-RING | 90 DURO NITRILE | 90160 |
| 39 | 1 | 254 O-RING | 90 DURO NITRILE | 90254 |
| 40 | 1 | 348 O-RING | 90 DURO NITRILE | 90348 |

| | | |
|-------------------|--|----------|
| REDRESS KIT (RDK) | | 60313050 |
| ASSEMBLED WEIGHT | | 989 LBS |



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M) PARTS LIST (cont'd)

M-1) ELASTOMER TRIM OPTIONS

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

M-1.1) HSN

| ITEM | QTY | DESCRIPTION | MATERIAL | P/N 60313H |
|------|-----|-------------|-------------|------------|
| 13 | 1 | ELEMENT | 70 DURO HSN | 60213511H |
| 14 | 2 | ELEMENT | 90 DURO HSN | 60213513H |
| 38 | 2 | 160 O-RING | 90 DURO HSN | 90160H |
| 39 | 1 | 254 O-RING | 90 DURO HSN | 90254H |
| 40 | 1 | 348 O-RING | 90 DURO HSN | 90348H |

| | | |
|-------------------|--|-----------|
| REDRESS KIT (RDK) | | 60313050H |
|-------------------|--|-----------|

M-1.2) VITON

| ITEM | QTY | DESCRIPTION | MATERIAL | P/N 60313V |
|------|-----|-------------|---------------|------------|
| 13 | 1 | ELEMENT | 70 DURO VITON | 60213511V |
| 14 | 2 | ELEMENT | 90 DURO VITON | 60213513V |
| 38 | 2 | 160 O-RING | 90 DURO VITON | 90160V |
| 39 | 1 | 254 O-RING | 90 DURO VITON | 90254V |
| 40 | 1 | 348 O-RING | 90 DURO VITON | 90348V |

| | | |
|-------------------|--|-----------|
| REDRESS KIT (RDK) | | 60313050V |
|-------------------|--|-----------|



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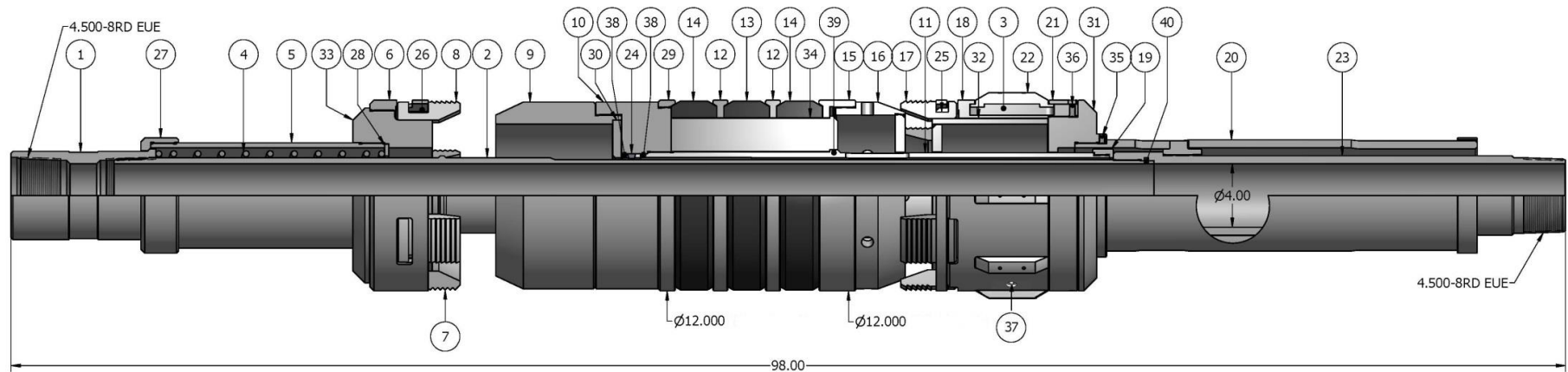
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N) TECHNICAL ILLUSTRATION



| | | |
|--|---|---------------------------------------|
|  | <h1>ASI-X PACKER</h1> <h2>13-3/8" X 4-1/2"</h2> | Manual No: DL-603-13375-012 |
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O) REVISION HISTORY

| DATE | REVISION | DESCRIPTION OF CHANGES | REVISED BY | APPROVED BY |
|------------|----------|---|------------|-------------|
| 03/02/2020 | G | Removed tool drift ID; Revised 60314221 was 60313225, 60195610 was 60095610, 60195310 was 60395310, 60195230 was 60095230, 60113340 was 60313340, Elastomer Trim Temperature Guide | J.Anderson | E.Visaez |
| 03/13/14 | F | Revised releasing procedures, assembled weight was 970 lbs; Added related tools, tool drift diameter, pre-installation inspection and storage procedures, HSN and Viton options, max. tensile load, recommended hand tools, revision history | J.Anderson | K.Riggs |