A) DESCRIPTION

The AS Retrievable Bridge Plug is a high pressure plug for multiple zone and selective single zone operations such as acidizing, fracturing, cementing and testing. It features a large internal by-pass to reduce swabbing when running and retrieving. The by-pass closes during the setting of the plug and opens prior to releasing the upper slips to equalize pressure when unsetting. The by-pass is located directly below the upper slips to help wash debris when the by-pass is open.

This tool can be set in tension or compression. It can be set shallow in unsupported casing to contain pressure while working on wellhead equipment. It can be set in tension making it ideal for setting shallow to test wellhead equipment and also deep, high-pressure wells.

CAUTION$_1$: When running this tool with a packer, make sure the J-slots in the plug, running/ retrieving tool, and packer are all compatible.

B) RELATED TOOLS (sold separately)

B-1) 2-38" X 1.315" NUE Spring Loaded Retrieving Tool (P/N 57723-075SR) – refer to Technical Manual *DL-577-2375-1524*.

C) SPECIFICATION GUIDE

CASING			TOOL OD (INCHES)	THREAD CONNECTION PIN DOWN	PART NUMBER
SIZE (INCHES)	WEIGHT (LBS/FT)	RECOMMENDED HOLE SIZE (INCHES)			
2-3/8	4.6 – 4.7	1.930 – 2.046	1.850	3/4" SUCKER ROD	72523RR-075SR 72523RRH-075SR[1] 72523RRV-075SR[2]

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

NOTE$_2$: Tool listed is right-hand set / right-hand release. Additional J-slot designs are available.

DIFFERENTIAL PRESSURE (MAX)	HANGING WEIGHT ON SET TOOL (MAX)	TENSILE LOAD THRU TOOL (MAX)	TORQUE THRU TOOL (MAX)
10,000 PSI	6,500 LBS[†]	20,000 LBS	250 FT-LBS

[†]Casing must be cemented for this load rating.

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

D) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION$_2$: 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 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

CAUTION$_3$: Do not run the tool without properly tightening connections. Running the tool with loose connections may damage the tool and cause malfunction.

CAUTION$_4$: Lift the AS Retrievable Bridge Plug by placing the sling or chain just below the pulling head. **DO NOT** lift the bridge plug by the upper slip body assembly (Fig. 2).

Fig. 2

E-1) TENSION SET

Run to setting depth while latched to its spring loaded retrieving tool. Pick up, rotate 1/4 turn to the right at the plug, and lower tubing to set lower slips. Pull tension to pack-off elements, slack off, and then pick up again to assure plug setting (4,750 lbs). After setting plug, slack off tubing weight, hold left-hand torque and pick up to free tubing from plug.

E-2) COMPRESSION SET

Run to setting depth while latched to its spring-loaded retrieving tool. Pick up, rotate 1/4 turn to the right at the plug, and lower tubing to set lower slips. Slack off sufficient weight to pack-off elements, then pick up to firmly set upper slips and slack off again (4,750 lbs). After setting plug, slack off tubing weight, hold left-hand torque and pick up the free tubing from plug.

F) RELEASING PROCEDURES

Lower tubing until the retrieving tool automatically latches to the AS Retrievable Bridge Plug. Sand may be washed from the upper slip by circulating through the upper portion of the plug. Slack off weight, hold right-hand torque pick up to open the by-pass valve, and wait until differential pressure has equalized. Continue upward movement to release upper slips, relax packing elements and re-latch. The plug may now be removed or re-located.

F-1) EMERGENCY RELEASE

If the plug will not release conventionally, slack off re-set, then pick straight up to shear J-pins and release the plug (7,500 lbs/pin) Once the J-pins are sheared, the tool cannot be moved down hole.

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)	**PRESSURE AFFECTED AREA** (SQ. INCHES)	
	ABOVE	**BELOW**
2-3/8	0.413 (DOWN)	-0.413 (UP)

Example: Consider a 2-3/8" AS Bridge Plug set on 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 2-3/8" AS Bridge Plug. 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 0.413 in^2. Multiplying the differential pressure (3,000 psi) by the pressure affected area (0.413 in^2) results in a force of 1,239 lbs. The piston effect on the packer mandrel is a downward force of 1,239 lbs.

H) 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.

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	AT045110

K) DISASSEMBLY

CAUTION$_4$: Lift the AS Retrievable Bridge Plug by placing the catline just below the pulling head. **DO NOT** lift the bridge plug by the upper slip body assembly.

K-1) Clamp center coupling (8) in vise.

K-1.1) Unscrew and remove set screws (24) from bottom sub (33).

K-1.2) Unscrew and remove bottom sub (33) from J-slot mandrel (13).

K-1.3) Unscrew and remove set screws (24) from body extension (15).

K-1.4) Unscrew and separate body extension (15) from J-pin body (17) (**NOTE$_4$**: Left-hand threads).

NOTE$_5$: Drag block body and assembly must be free to rotate.

K-1.4.1) Remove J-pins (20) from J-pin body (17).

K-1.4.2) Remove J-pin body (17) from J-slot mandrel (13).

K-1.5) Unscrew and remove set screws (19) from body extension (15).

K-1.6) Unscrew and remove body extension (15) from drag block body (23) (**NOTE$_4$**: Left-hand threads).

K-1.7) Unscrew and remove rubber mandrel cap (11) from rubber mandrel (9). Move drag block body assembly as necessary to access rubber mandrel cap (11).

NOTE$_6$: If the J-slot mandrel (13) turns in relation to the rubber mandrel (9), **STOP - Tighten the connection before trying to loosen the cap again.**

K) DISASSEMBLY (cont'd)

K-1.8) Compress drag blocks (14) with drag block assembly tool (T1). Remove drag block retainer (16) from drag block body (23).

K-1.9) Release drag blocks (14). Remove drag blocks (14) and drag block springs (32) from drag block body (23).

K-1.10) Wedge lower slips (12) outwards (if needed). Remove drag block body assembly and disassemble:

K-1.10.1) Remove wedges (if needed). Remove lower slips (12) and slip springs (31) from drag block body (23).

K-1.11) Unscrew and remove set screws (18) from J-slot mandrel (13).

K-1.12) Unscrew and remove J-slot mandrel (13) from sealing mandrel (4).

K-1.13) Unscrew rubber mandrel (9) from center coupling (8).

K-1.14) Remove rubber mandrel assembly and disassemble:

K-1.14.1) Remove elements (26, 22), rubber spacers (27), and lower cone (10) from rubber mandrel (9).

K-1.15) Moving to upper end of tool, unscrew and remove set screws (24) from pulling head (1).

K-1.16) Unscrew and remove pulling head (1) from upper mandrel (2).

CAUTION$_5$: Compression spring (3) is compressed with spring tension against pulling head (1).

K-1.17) Remove compression spring (3) from upper mandrel (2).

K-1.18) Wedge releasing slip (5) and upper slips (6) outward (if needed). Remove upper slip body assembly and disassemble:

K-1.18.1) Remove wedges (if needed). Remove releasing slip (5), upper slips (6) and slip springs (31) from upper slip body (21).

K-1.19) Unscrew and remove set screws (24) from upper mandrel (2).

K-1.20) Unscrew and remove upper mandrel (2) from sealing mandrel (4).

K-1.21) Remove sealing mandrel (4) from bonded seals (25) and center coupling (8).

K-1.22) Unscrew and remove set screws (24) from center coupling (8).

K-1.23) Unscrew and remove upper cone (7) from center coupling (8).

K-1.23.1) Remove o-ring (30) and bonded seal (25) from upper cone (7).

K-1.23.1.1) Remove o-ring (28) from bonded seal (25).

K-2) Unclamp and remove center coupling (8) from vise.

K-3) Remove o-ring (29) and bonded seal (25) from center coupling (8).

K-3.1.1) Remove o-ring (28) from bonded seal (25).

L) ASSEMBLY

NOTE$_8$: Clean and inspect all parts. Replace all worn and damaged parts. Install parts in proper order, orientation and tighten/torque all connections properly.

CAUTION$_6$: To ensure tool operates properly, install o-rings in o-ring grooves NOT thread reliefs (Fig. 3).

L-1) Install o-ring (29) in groove in center coupling (8).

L-2) Install o-ring (28) in groove in bonded seal (25).

L-3) Install bonded seal (25) into center coupling (8).

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

L-4) Clamp center coupling (8) in vise.

L-4.1) Install o-ring (30) in groove in upper cone (7).

L-4.2) Install o-ring (28) in groove in bonded seal (25).

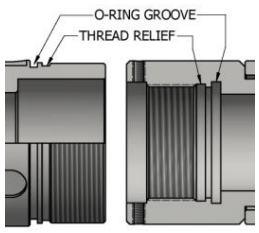


Fig. 3

L) ASSEMBLY (cont'd)

L-4.3) Install bonded seal (25) in upper cone (7).

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

L-4.4) Screw upper cone (7) into center coupling (8).

L-4.5) Screw set screws (24) into center coupling (8).

L-4.6) Install sealing mandrel (4) through bonded seals (25).

CAUTION6: Do not rip or damage valves during installation.

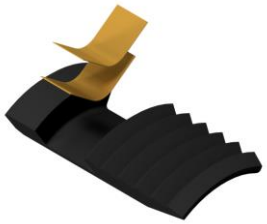


Fig. 4

L-4.7) Screw upper mandrel (2) onto sealing mandrel (4).

L-4.8) Screw set screws (24) into upper mandrel (2).

L-4.9) Assemble upper slip body assembly and install onto upper mandrel (2):

L-4.9.1) Install releasing slip (5), upper slips (6) and slip springs (31) into upper slip body (21). Wedge slips outward.

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

L-4.9.2) Install upper slip body (21) onto upper mandrel (2). Remove wedges.

L-4.10) Install compression spring (3) onto upper mandrel (2).

L-4.11) Screw pulling head (1) onto upper mandrel (2).

CAUTION5: Compression spring (3) is compressed with spring tension against pulling head (1).

L-4.12) Screw set screws (24) into pulling head (1).

L-4.13) Moving to lower end of tool, assemble rubber mandrel assembly and install:

L-4.13.1) Slide lower cone (10), elements (26, 22), and rubber spacers (27) onto rubber mandrel (9).

L-4.13.2) Slide rubber mandrel assembly onto sealing mandrel (4). Screw rubber mandrel (9) into center coupling (8).

Fig. 5

L-4.14) Screw J-slot mandrel (13) onto sealing mandrel (4).

L-4.15) Screw set screws (18) into J-slot mandrel (13).

L-4.16) Assemble drag block body assembly and install:

L-4.16.1) Install lower slips (12) and slip springs (31) into drag block body (23). Wedge lower slips (12) outward.

NOTE9: Uses three (3 ea) spring per slip (Fig. 5).

L-4.16.2) Set drag blocks (14) and drag block springs (32) in drag block body (23). Compress drag blocks (14).

NOTE10: Uses two (2 ea) springs per drag block (Fig. 6).

L-4.16.3) Slide drag block retainer (16) onto drag block body (23) capturing ends of drag blocks (14).

L-4.16.4) Install drag block body assembly onto rubber mandrel (9).

Fig. 6

L-4.17) Screw rubber mandrel cap (11) onto lower rubber mandrel (9).

L-4.18) Screw body extension (15) onto drag block body (23) (**NOTE4**: Left-hand threads). Remove wedges.

L-4.19) Screw set screws (19) into body extension (15).

L-4.20) Slide J-pin body (17) onto J-slot mandrel (13).

L-4.21) Align holes in J-pin body (17) with slot in J-slot mandrel (13). Install J-pins (20) into J-pin body (17).

L-4.22) Screw body extension (15) onto J-pin body (17) (**NOTE4**: Left-hand threads).

NOTE5: Drag block body assembly must be free to rotate.

L-4.23) Screw set screws (24) into body extension (15).

L) ASSEMBLY (cont'd)

L-4.24) Position J-pins (20) in running position of J-slot in J-slot mandrel (13).

L-4.25) Screw bottom sub (33) onto J-slot mandrel (13).

L-4.26) Screw set screws (24) into bottom sub (33).

L-5) Unclamp center coupling (8) from vise and remove tool assembly.

CAUTION4: Lift the AS Retrievable Bridge Plug by placing the catline just below the pulling head. **DO NOT** lift the bridge plug by the upper slip body assembly.

M) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 72523RR-075SR
1	1	PULLING HEAD	DLMS150	72523710
2	1	UPPER MANDREL	DLMS150	72523211
3	1	COMPRESSION SPRING	DLMCRSP	60325920
4	1	SEALING MANDREL	DLMS150	72523215
5	1	RELEASING SLIP	DLMS110	60023125
6	2	UPPER SLIP	DLMS110	60023115C
7	1	UPPER CONE	DLMS110	72523410
8	1	CENTER COUPLING	DLMS110	72523620
9	1	RUBBER MANDREL	DLMS125	72523220
10	1	LOWER CONE	DLMS110	72523420
11	1	RUBBER MANDREL CAP	DLMS110	60123230
12	3	LOWER SLIP	DLMS110	60023135C
13	1	J-SLOT MANDREL	DLMS150	72523230
14	4	DRAG BLOCK	DLMSDB8	9023900
15	1	BODY EXTENSION	DLMS110	72523370
16	1	DRAG BLOCK RETAINER	DLMS110	60323910
17	1	J-PIN BODY	DLMS110	72523875
18	2	1/4-20 UNC X 3/16 SOCKET SET SCREW	STEEL	SSS025C018
19	4	#10-24 UNC X 3/16 SOCKET SET SCREW	STEEL	SSS1024C018
20	2	J-PIN	DLMS110	72523870
21	1	UPPER SLIP BODY	DLMS125	72523320
22	1	ELEMENT	70 DURO NITRILE	72523511
23	1	DRAG BLOCK BODY	DLMS125	60323335
24	12	5/16-18 UNC X 1/4 SOCKET SET SCREW	STEEL	SSS031C025
25	2	BONDED SEAL	90 DURO NITRILE	72523520
26	2	ELEMENT	90 DURO NITRILE	72523513
27	2	RUBBER SPACER	DLMS60	72523840
28	2	119 O-RING	90 DURO NITRILE	90119
29	1	214 O-RING	90 DURO NITRILE	90214
30	1	220 O-RING	90 DURO NITRILE	90220

M) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 72523RR-075SR
31	15	SLIP SPRING	-	7125900
32	8	DRAG BLOCK SPRING	DLMINC750	9102901
33	1	BOTTOM SUB	DLMS150	72523231

REDRESS KIT (RDK)		72523050
ASSEMBLED WEIGHT		30 LBS

M-1) ELASTOMER TRIM OPTIONS

NOTE1: For temperature range, refer to Elastomer Trim Temperature Guide.

M-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 72523RRH-075SR
22	1	ELEMENT	70 DURO HSN	72523511H
25	2	BONDED SEAL	90 DURO HSN	72523520H
26	2	ELEMENT	90 DURO HSN	72523513H
28	2	119 O-RING	90 DURO HSN	90119H
29	1	214 O-RING	90 DURO HSN	90214H
30	1	220 O-RING	90 DURO HSN	90220H

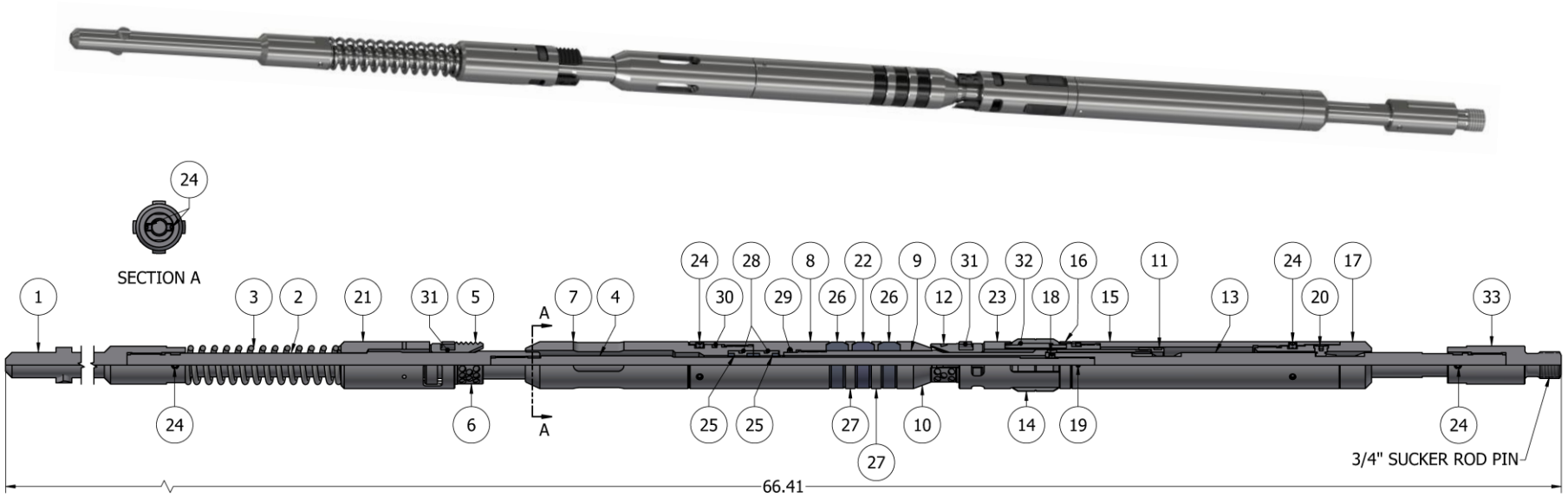
REDRESS KIT (RDK)		72523050H

M-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 72523RRV-075SR
22	1	ELEMENT	70 DURO VITON	72523511V
25	2	BONDED SEAL	90 DURO VITON	72523520V
26	2	ELEMENT	90 DURO VITON	72523513V
28	2	119 O-RING	90 DURO VITON	90119V
29	1	214 O-RING	90 DURO VITON	90214V
30	1	220 O-RING	90 DURO VITON	90220V

REDRESS KIT (RDK)		72523050V

N) TECHNICAL ILLUSTRATION



O) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
04/20/2023	C	Revised 60023135C qty 3 was 4, 7125900 was 72523975 / 72523976	J.Anderson	E.Visaez
04/28/2022	B	Revised P/N 90119 qty was 1	J.Anderson	E.Visaez
01/14/2022	A	Created manual	-	-