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.

The ASW Retrievable Bridge Plug is a version of the AS Retrievable Bridge Plug that allows the plug to be set on wireline or with a hydraulic setting tool, and retrieved with tubing. It cannot be reset in the wellbore once it is unset, but it can be pulled, re-dressed and run again. A Wireline Adapter Kit is required for this version.

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) 8-5/8" X 3-1/2" Spring Loaded Retrieving Tool (P/N 57785) – refer to technical manual *DL-577-8625-295*.

C) SPECIFICATION GUIDE

CASING		RECOMMENDED HOLE SIZE (INCHES)	GAGE OD (INCHES)	THREAD CONNECTION PIN DOWN	PART NUMBER
SIZE (INCHES)	WEIGHT (LBS/FT)				
8-5/8	20.0 – 28.0	8.017 – 8.191	7.750	3-1/2 EUE	72581RR 72581RRH[1] 72581RRV[2]
	24.0 – 40.0	7.725 – 8.097	7.500	3-1/2 EUE	72585RR 72585RRH[1] 72585RRV[2]

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

NOTE$_1$: Tools listed are 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)
8,000 PSI	142,000 LBS[†]	142,000 LBS	2,000 FT-LBS

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

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 work string to set lower slips. Pull tension to pack-off elements, slack off, and then pick up again to assure plug setting (20,000 lbs minimum). After setting plug, slack off work string 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 work string to set lower slips. Slack off sufficient weight to pack-off elements, then pick up to firmly set upper slips and slack off again (20,000 lbs minimum). After setting plug, slack off tubing weight, hold left-hand torque and pick up to free tubing from plug.

F) RELEASING PROCEDURES

Lower work string 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 (standard J-pins will shear at 50,000 lbs each – refer to Parts List for J-pins with other shear values). Once the J-pins are sheared, the tool cannot be moved down hole.

NOTE$_2$: Most of the component parts are manufactured from heat-treated alloy steel. Therefore, extended exposure to corrosives can be detrimental to the metallurgy. Care in cleaning the tool soon after removal from the well can help extend the life of component parts. After removal, close inspection of the parts is necessary to identify any parts which require replacement.

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) ELASTOMER TRIM TEMPERATURE GUIDE

NITRILE (STD)			
TEMPERATURE RANGE (F°)	**DUROMETER**		
	END	**MIDDLE**	**END**
70° - 125°	80	70	80
125° - 250°	90	70	90
150° - 250°	90	80	90
250° +	Contact D&L Sales		

RUBBER TYPE	**TEMPERATURE RANGE**
NITRILE	70° - 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) RECOMMENDED TOOLS (cont'd)

I-2) SPECIAL TOOLS

ITEM	QTY	DESCRIPTION	PART NUMBER
T1	1	DRAG BLOCK ASSEMBLY TOOL	AT095110

J) DISASSEMBLY

J-1) Clamp upper cone (9) in vise.

NOTE$_3$: If needed, align hole in upper cone (9) with slot in sealing mandrel (34) and insert punch (or other tool) to prevent tool components from rotating during disassembly.

J-1.1) Unscrew and remove set screws (35) from lower end of body extension (28).

J-1.2) Unscrew and separate body extension (28) from J-pin body (23) (**NOTE$_4$**: Left-hand threads).

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

J-1.3) Remove J-pins (15) from J-pin body (23).

J-1.4) Remove J-pin body (23) from J-slot mandrel (20).

J-1.5) Compress drag blocks (22) with drag block assembly tool (T1). Unscrew and remove set screws (32) from drag block body (18). Rotate drag block retainer (21) as needed to access set screws (32).

J-1.6) Unscrew and remove body extension (28) from drag block body (18) (**NOTE$_4$**: Left-hand threads).

J-1.7) Remove drag block retainer (21) from drag block body (18).

J-1.8) Release drag blocks (22). Remove drag blocks (22) and drag block springs (3) from drag block body (18).

J-1.9) Unscrew and remove rubber mandrel cap (19) from lower rubber mandrel (27).

J-1.10) Wedge lower slips (17) outward (if needed). Remove drag block body assembly and disassemble:

J-1.10.1) Remove wedges (if needed). Remove lower slips (17) and lower slip springs (25) from drag block body (18).

J-1.11) Unscrew and remove set screws (32) from lower rubber mandrel (27).

J-1.12) Unscrew and remove lower rubber mandrel (27) from rubber mandrel (11).

J-1.13) Unscrew and remove set screws (35) from J-slot mandrel (20).

J-1.14) Unscrew and remove J-slot mandrel (20) from sealing mandrel (34).

J-1.15) Unscrew rubber mandrel (11) from center coupling (10).

J-1.16) Remove rubber mandrel assembly and disassemble:

J-1.16.1) Remove elements (13, 14), rubber spacers (12), and lower cone (16) from rubber mandrel (11).

J-1.16.2) Remove o-ring (38) from rubber mandrel (11).

J-1.17) Unscrew and remove gage ring (29) from center coupling (10).

J-1.18) Moving to upper end of tool, unscrew and remove set screws (35) from pulling head (1).

J-1.19) Unscrew and remove pulling head (1) from upper mandrel (2).

CAUTION$_5$: Compression spring (4) is compressed with spring tension against pulling head (1).

J-1.20) Remove compression spring (4) from upper mandrel (2).

J-1.21) Wedge releasing slips (7) and upper slips (8) outward (if needed). Remove upper slip body assembly and disassemble:

J-1.21.1) Unscrew and remove upper slip support (33) from upper slip body (6).

J-1.21.2) Remove wedges (if needed). Remove releasing slips (7), upper slips (8) and upper slip springs (26) from upper slip body (6).

J-1.22) Unscrew and remove set screws (32) from upper mandrel (2).

J) DISASSEMBLY (cont'd)

J-1.23) Unscrew and remove upper mandrel (2) from sealing mandrel (34).

J-1.24) Remove plug (5) from sealing mandrel (34).

J-1.24.1) Remove o-ring (37) from plug (5).

J-1.25) Remove sealing mandrel (34) from center coupling (10).

J-1.26) Unscrew and remove set screws (31) from upper cone (9).

J-1.27) Unscrew and remove center coupling (10) from upper cone (9).

J-1.27.1) Remove bonded seals (24) from center coupling (10).

J-1.27.1.1) Remove o-rings (36) from bonded seals (24).

J-1.27.2) Remove o-ring (39) from center coupling (10).

J-2) Unclamp and remove upper cone (9) from vise.

J-2.1) Remove seal retaining ring (30) from upper cone (9).

NOTE$_6$: To redress tool assembly, follow disassembly instructions. It is recommended by D&L Oil Tools to replace all seals, elements, o-rings, shear screws, etc. when redressing tool.

K) ASSEMBLY

NOTE$_7$: 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 unless states otherwise. (Fig. 3).

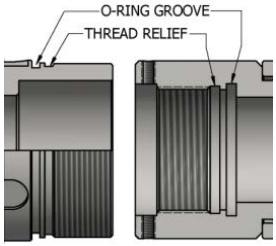


Fig. 3

K-1) Clamp upper cone (9) in vise.

K-1.1) Install seal retaining ring (30) in upper cone (9).

K-1.2) Install o-ring (39) in o-ring groove in center coupling (10).

K-1.3) Install o-rings (36) in o-ring grooves in bonded seals (24).

K-1.4) Install bonded seals (24) in center coupling (10).

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

K-1.5) Screw center coupling (10) into upper cone (9).

K-1.6) Screw set screws (31) into upper cone (9).

K-1.7) Install sealing mandrel (34) through bonded seals in center coupling (10).

CAUTION$_8$: Do not damage bonded seals during installation.

K-1.8) Install o-ring (37) in o-ring groove in plug (5).

K-1.9) Install plug (5) into end of sealing mandrel (34).

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

K-1.10) Screw upper mandrel (2) onto sealing mandrel (34).

NOTE$_3$: If needed align hole in upper cone (9) with slot in sealing mandrel (34) and insert punch (or other tool) to prevent tool components from rotating during assembly.

K-1.11) Screw set screws (32) into upper mandrel (2).

K) ASSEMBLY (cont'd)

K-1.12) Assemble upper slip body assembly and install:

K-1.12.1) Install releasing slips (7), upper slips (8) and upper slip springs (26) into upper slip body (6). Wedge slips outward.

NOTE$_8$: Install one (1ea) spring per slip (Fig. 4).

Fig. 4

K-1.12.2) Screw upper slip support (33) into upper slip body (6).

K-1.12.3) Install upper slip body assembly onto upper mandrel (2). Remove wedges.

K-1.13) Install compression spring (4) onto upper mandrel (2).

K-1.14) Screw pulling head (1) onto upper mandrel (2).

CAUTION$_5$: Compression spring (4) will be compressed with spring tension against pulling head (1).

K-1.15) Screw set screws (35) into pulling head (1).

K-1.16) Moving to lower end of tool, screw gage ring (29) onto center coupling (10).

K-1.17) Assemble rubber mandrel assembly and install:

K-1.17.1) Install o-ring (38) in o-ring groove in rubber mandrel (11).

K-1.17.2) Install elements (13, 14), rubber spacers (12), and lower cone (16) onto rubber mandrel (11).

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

K-1.17.3) Install rubber mandrel assembly onto sealing mandrel (34).

K-1.18) Screw rubber mandrel (11) into center coupling (10).

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

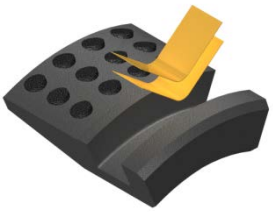


Fig. 5

K-1.19) Screw J-slot mandrel (20) onto sealing mandrel (34).

K-1.20) Screw set screws (35) into J-slot mandrel (20).

K-1.21) Screw lower rubber mandrel (27) onto rubber mandrel (11).

K-1.22) Screw set screws (32) into lower rubber mandrel (27).

K-1.23) Assemble drag block body assembly and install:

K-1.23.1) Install lower slips (17) and lower slip springs (25) into drag block body (18).Wedge slips outward.

NOTE$_9$: Install two (2ea) springs per slip (Fig. 5).

K-1.23.2) Install drag block body assembly onto lower rubber mandrel (27). Remove wedges.

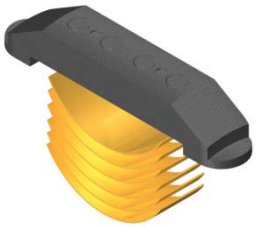


Fig. 6

K-1.24) Screw rubber mandrel cap (19) onto lower rubber mandrel (27).

K-1.25) Install drag blocks (22) and drag block springs (3) into drag block body (18). Compress drag blocks (22) with drag block assembly tool (T1).

NOTE$_{10}$: Install six (6ea) springs per drag block (Fig. 6).

K-1.26) Install drag block retainer (21) onto drag block body (18) capturing ends of drag blocks (22).

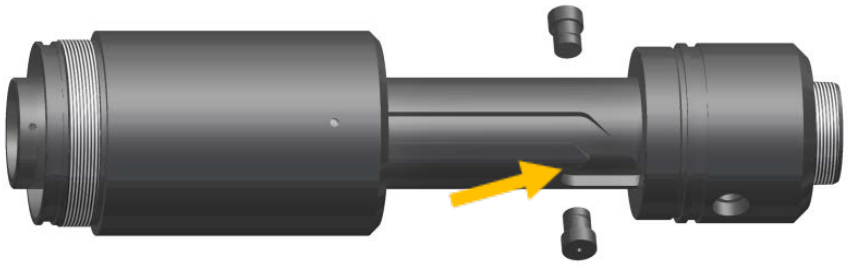
K-1.27) Screw body extension (28) into drag block body (18) (**NOTE$_4$**: Left-hand threads).

K-1.28) Screw set screws (32) into drag block body (18). Move drag block retainer (21) as necessary to access threaded holes in drag block body (18). Release drag blocks (22).

K-1.29) Install J-pin body (23) onto J-slot mandrel (20).

K) ASSEMBLY (cont'd)

Fig. 7



K-1.30) Align holes in J-pin body (23) with lower tension shoulder of J-slot mandrel (20). Install J-pins (15) into J-pin body (23) (Fig. 7).

K-1.31) Slide drag block body assembly down and screw body extension (28) onto J-pin body (23) (**NOTE$_4$**: Left-hand threads).

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

K-1.32) Screw set screws (35) into body extension (28).

K-2) Unclamp upper cone (9) from vise and remove assembled tool.

L) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	20.0 – 28.0# P/N 72581RR	24.0 – 40.0# P/N 72585RR
1	1	PULLING HEAD	DLMS110	72585715	
2	1	UPPER MANDREL	DLMS110	72585210	
3	36	DRAG BLOCK SPRING	INCONEL	9101900	
4	1	COMPRESSION SPRING	DLMCRSP	60373920	
5	1	PLUG	DLMS60	72585216	
6	1	UPPER SLIP BODY	L-80	72585320	
7	2	RELEASING SLIP	P-110	61985125	
8	3	UPPER SLIP W/ CARBIDE	P-110	61985115C	
9	1	UPPER CONE	P-110	72585410	
10	1	CENTER COUPLING	DLMS110	72585620	
11	1	RUBBER MANDREL	DLMS110	72585220	
12	2	RUBBER SPACER	DLMS35	60281840	60285840
13	1	ELEMENT	70 DURO NITRILE	60281511	60285511
14	2	ELEMENT	90 DURO NITRILE	60281513	60285513
15	2	J-PIN **NOTE$_{11}$**: Shear value is stamped on J-pin.	DLMS110	72585870-15 (15,000#)	
				72585870-25 (25,000#)	
				72585870 (50,000# STD)	
16	1	LOWER CONE	P-110	72581420	72585420
17	4	LOWER SLIP W/ CARBIDE	P-110	60081135C	60082135C

L) PARTS LIST (cont'd)

ITEM	QTY	DESCRIPTION	MATERIAL	20.0 – 28.0# P/N 72581RR	24.0 – 40.0# P/N 72585RR
18	1	DRAG BLOCK BODY	DLMS35/1026	60382335	
19	1	RUBBER MANDREL CAP	DLMS60	72485230	
20	1	J-SLOT MANDREL	P-110	72585230	
21	1	DRAG BLOCK RETAINER	1026	60381910	60382910
22	6	DRAG BLOCK W/ CARBIDE	DLMSDB4	9080900C	
23	1	J-PIN BODY	DLMS110	72585875	
24	2	BONDED SEAL	90 DURO NITRILE	60070520	
25	8	LOWER SLIP SPRING	-	7170901	
26	5	UPPER SLIP SPRING	-	DL94830	
27	1	LOWER RUBBER MANDREL	P-110	72585221	
28	1	BODY EXTENSION	P-110	72585370	
29	1	UPPER GAGE RING	L-80	60281830	60282830
30	1	SEAL RETAINING RING	DLMS60	72585225	
31	3	SET SCREW 5/16-18 UNC X 7/16	STEEL	SSS031C043	
32	9	SET SCREW 3/8-16 UNC X 3/8	STEEL	SSS037C037	
33	1	UPPER SLIP SUPPORT	P-110	72585348	
34	1	SEALING MANDREL	DLMS110	72585214	
35	9	SET SCREW 3/8-16 UNC X 1/2	STEEL	SSS037C050	
36	2	153 O-RING	90 DURO NITRILE	90153	
37	1	228 O-RING	90 DURO NITRILE	90228	
38	1	254 O-RING	90 DURO NITRILE	90254	
39	1	355 O-RING	90 DURO NITRILE	90355	

REDRESS KIT (RDK)		72581050	72585050
ASSEMBLED WEIGHT		533 LBS	527 LBS

L-1) ELASTOMER TRIM OPTIONS

NOTE$_{12}$: For temperature range, refer to Elastomer Trim Temperature Guide.

L-1.1) HSN

ITEM	QTY	DESCRIPTION	MATERIAL	20.0 – 28.0# P/N 72581RRH	24.0 – 40.0# P/N 72585RRH
13	1	ELEMENT	70 DURO HSN	60281511H	60285511H
14	2	ELEMENT	90 DURO HSN	60281513H	60285513H
24	2	BONDED SEAL	90 DURO HSN	60070520H	
36	2	153 O-RING	90 DURO HSN	90153H	
37	1	228 O-RING	90 DURO HSN	90228H	
38	1	254 O-RING	90 DURO HSN	90254H	
39	1	355 O-RING	90 DURO HSN	90355H	

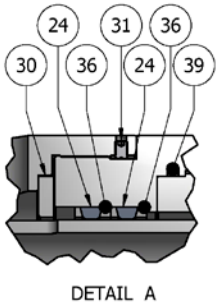
		REDRESS KIT (RDK)		72581050H	72585050H

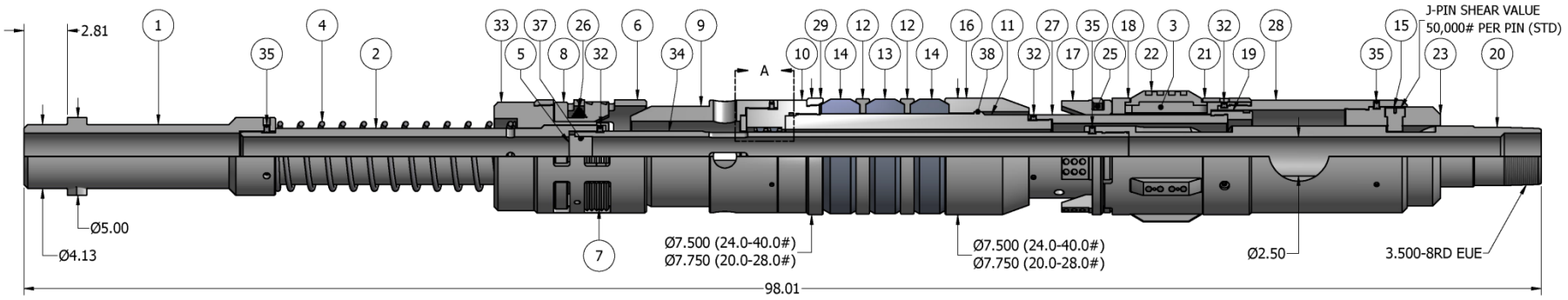
L-1.2) VITON

ITEM	QTY	DESCRIPTION	MATERIAL	20.0 – 28.0# P/N 72581RRV	24.0 – 40.0# P/N 72585RRV
13	1	ELEMENT	70 DURO VITON	60281511V	60285511V
14	2	ELEMENT	90 DURO VITON	60281513V	60285513V
24	2	BONDED SEAL	90 DURO VITON	60070520V	
36	2	153 O-RING	90 DURO VITON	90153V	
37	1	228 O-RING	90 DURO VITON	90228V	
38	1	254 O-RING	90 DURO VITON	90254V	
39	1	355 O-RING	90 DURO VITON	90355V	

		REDRESS KIT (RDK)		72581050V	72585050V

M) TECHNICAL ILLUSTRATION





N) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
04/04/2016	F	Added 72581RR, 72581RRH, 72581RRV, General Screw Torque Recommendations.	S. McEntire	N. Banker
12/15/2015	E	Revised Elastomer Durometer Temperatures – Nitrile (90/80/90 Duro) was 250° - 300°F, Nitrile (Contact D&L Sales) was 300°F +, Rubber Type Temperature Ranges – Nitrile was 70° - 300°F, HSN was 70° - 325°F.	J. Anderson	B. Oligschlaeger
11/18/2015	D	Added max. hanging weight on set tool, max. tensile load thru tool, max. torque thru tool.	J. Anderson	K. Riggs
06/10/14	C	Revised drag block assembly tool was AT010110, assembled weight was 521LBS; Added Related Tools, HSN and Viton options (P/N 72585RRH, 72585RRV), max. differential pressure, Pre-Installation Inspection Procedures, caution for tightening connections, caution for lifting plug, Storage Procedures, Element Selection Guide, Recommended Tools, P/N 72585870-15 and 72585870-25 to Parts List, Options Parts List, Revision History.	S. McEntire	K. Riggs