A) DESCRIPTION

The CR Bridge Plug provides the end user with tools that will consistently contain well pressures at elevated temperatures and pressures. This plug permits faster removal from the well with either rotary or cable tool methods due to their compact size and the selection of high quality construction material.

The short, compact, interlocked construction assures the user that the CR Bridge Plug will provide faster, safer run-in, dependable set and pack-off and hold pressure that is safe for the casing weight and grade. The interlock construction and compact size requires minimal material removal during drill out. The outside diameter of these products has been held to a minimum to provide maximum tool-to-casing clearance for safe running and maximum fluid by-pass area during displacement procedures even in heavy mud systems.

NOTE$_1$: The CR Bridge Plug is designed to provide a temporary wellbore seal. For a permanent wellbore seal, cement must be set on top of the plug.

B) RELATED TOOLS (sold separately)

B-1) 5-1/2” WLAK for CR Bridge Plug (P/N 52355)—refer to technical manual *DL-523-5500-599*.

C) SPECIFICATION GUIDE

CASING			TOOL OD (INCHES)	PART NUMBER
SIZE (INCHES)	**WEIGHT** (LBS/FT)	**RECOMMENDED HOLE SIZE** (INCHES)		
5-1/2	14.0 – 23.0	4.670 – 5.012	4.312	84255WS

DIFFERENTIAL PRESSURE (MAX)	TEMPERATURE (MAX)
10,000 PSI	350° F

D) PRE-INSTALLATION INSPECTION PROCEDURES

Before use, D&L recommends inspection of the tool. Ensure parts have not been damaged during shipping. Replace damaged with D&L replacement parts. Contact D&L sales for replacement part information.

E) STORAGE RECOMMENDATIONS

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.

F) REMOVAL TECHNIQUES FOR CR BRIDGE PLUGS

F-1) GENERAL

Drilling is the preferred method of removing CR Bridge Plugs since drilling can usually be accomplished in less than 10 percent of the time it takes to millout the same tool. This high removal time for the milling technique is explained by the mechanics of the two methods. Drilling causes a chiseling effect, and milling has a shaving effect of the target. Further, milling yields more debris of the type that causes penetration stoppage. Drilling with a short tooth, medium hard formation rock bit is usually the best combination for cement retainer or bridge plug removal.

F-2) SUGGESTED DRILLING TECHNIQUE

Though the best drilling technique will vary with available equipment, a typical combination of a short tooth, medium hard formation rock bit (ADC Codes 2-1, 2-2, 2-3, 2-4, and 3-1), 75 to 120 rpm rotary speed and such drill collars as necessary for weight and bit stabilization will provide desirable results. To drill the CR Bridge Plug:

- Apply 5,000-7,000 lbs until top end of the mandrel is drilled (4 to 5 inches)
- Increase weight to 2,500-3,000 lbs per inch of bit diameter to drill out remainder
  Example: Use 12,000-14,500 lbs for a 4-3/4” OD bit
- Drill collars should be used as required for weight and bit stabilization
- A rotary speed of 75-125 rpm is recommended
- A Junk Basket should be used
- The mud viscosity and gel strength should be sufficient to remove and support the cuttings. A minimum annular velocity of 120 ft/min is recommended

When normal circulation is to be used, place a junk basket above the bit. If reverse circulation is planned, the casing scraper or other equipment in the tubing string should have an inside fluid passage as large as the passage through the bit so cuttings will not bridge.

Variations in bit speed and bit weight should be made to help break up debris to re-establish penetration should it cease while drilling.

Penetration may be stopped by “bit tracking” which is usually caused by insufficient weight on the bit. Bit tracking occurs when bit teeth travel in the same indentation of “track” made previously by another tooth. Successive tooth impact to the same location will sometimes deepen the track until indentations equal bit tooth length, reducing the impact of teeth to the point that they will not penetrate. Drilling penetration may be re-established by raising the bit off of the tool and then lowering the bit while maintaining rotation and making rapid bit contact with extra weight.

NOTE$_2$: Drilling times are directly related to tool size, bit stability, drilling weight, pump rate, bit RPM, type of bit, drilling fluid, etc. The same considerations should be used when drilling CR Bridge Plugs as would be used when drilling medium hard formations.

F-3) SUGGESTED MILLING TECHNIQUE

If equipment availability or other considerations dictate that the CR Bridge Plug be milled, the recommended combination is a junk type mill tool rotated at 60-150 rpm with 5,000-8,000 lbs on the mill.

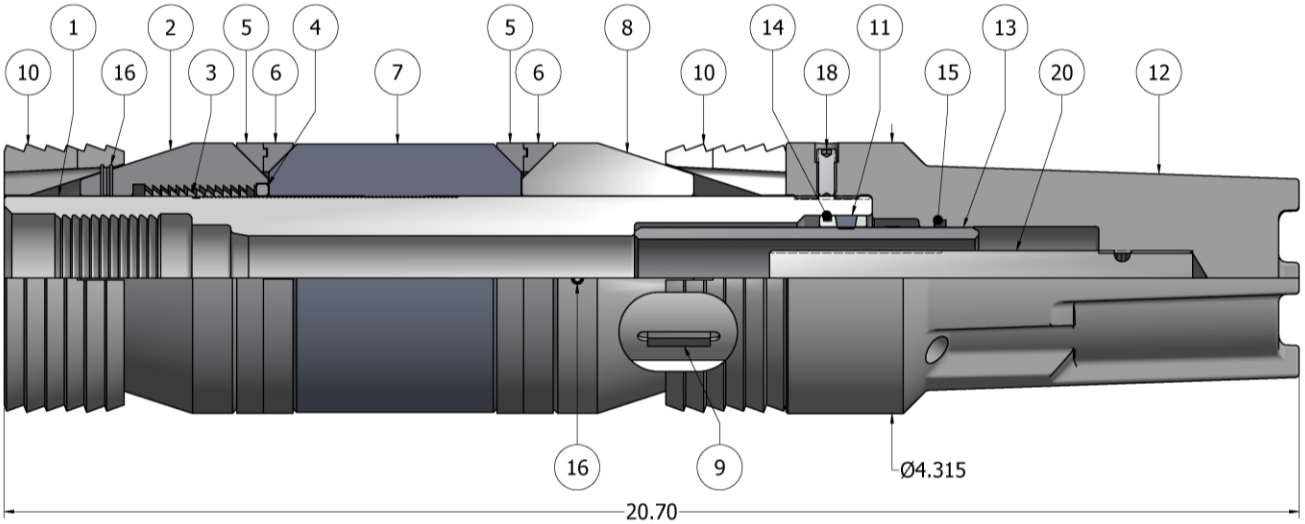
Use a mud viscosity of 60 cps and a minimum annular velocity of 120 ft/min to assure cutting removal. When ready to begin milling operations, start rotating the mill above the target and lower it slowly onto the target. Do not apply weight in excess of recommended amount. Excessive weight can tear out chunks of the CR Bridge Plug and make a bailer trip necessary to remove the chunks to allow further penetration. Maintain a constant milling rate by adding weight as the tool is milled away.

G) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	PART NUMBER
1	1	MANDREL	G-2 CAST IRON	84045210
2	1	UPPER CONE	DLMCIG2	84055410
3	1	LOCK RING	DLMS60	84055011
4	1	UPPER CONE RING	DLMS60	84055825
5	2	FEMALE EXPANSION RING	DLMDB65	84055815
6	2	MALE EXPANSION RING	DLMDB65	84055810
7	1	ELEMENT	80 DURO NITRILE	84055512
8	1	LOWER CONE	DLMCIG2	84055420
9	1	KEY	DLMSKS	KS018X018X100
10	2	SLIP	DLMCIG2	84055135
11	1	BONDED SEAL	1026/90 DURO NITRILE	84055520
12	1	BOTTOM SUB	DLMCIG2	84055620
13	1	VALVE PLUG	DLMDB80	84255660
14	1	133 O-RING	90 DURO NITRILE	90133
15	1	223 O-RING	90 DURO NITRILE	90223
16	5	ROLL PIN 3/16 X 1/2	STEEL	RP018050
17	1	SET SCREW 5/16-18 UNC X 3/4	STEEL	SSS031C075
18	1	SHEAR STUD (35,000#)	DLMSLS	52355900

ASSEMBLED WEIGHT	-	46 LBS

H) TECHNICAL ILLUSTRATION



NOTE3: During assembly, holes are drilled through upper cone and lower cone, and into mandrel, roll pins (16) installed, and then ground flush with upper cone and/or lower cone.

I) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
01/25/2019	A	Created new manual	-	-