



BUMPER SUB

2-7/8", 10 FT STROKE, NC 31 TOOL JOINT

Manual No:
DL-533-2875-1196

Revision: **A**

Revision Date:
12/17/2018

Authored by: *J.Anderson*

Approved by: *N.Banker*

A) DESCRIPTION

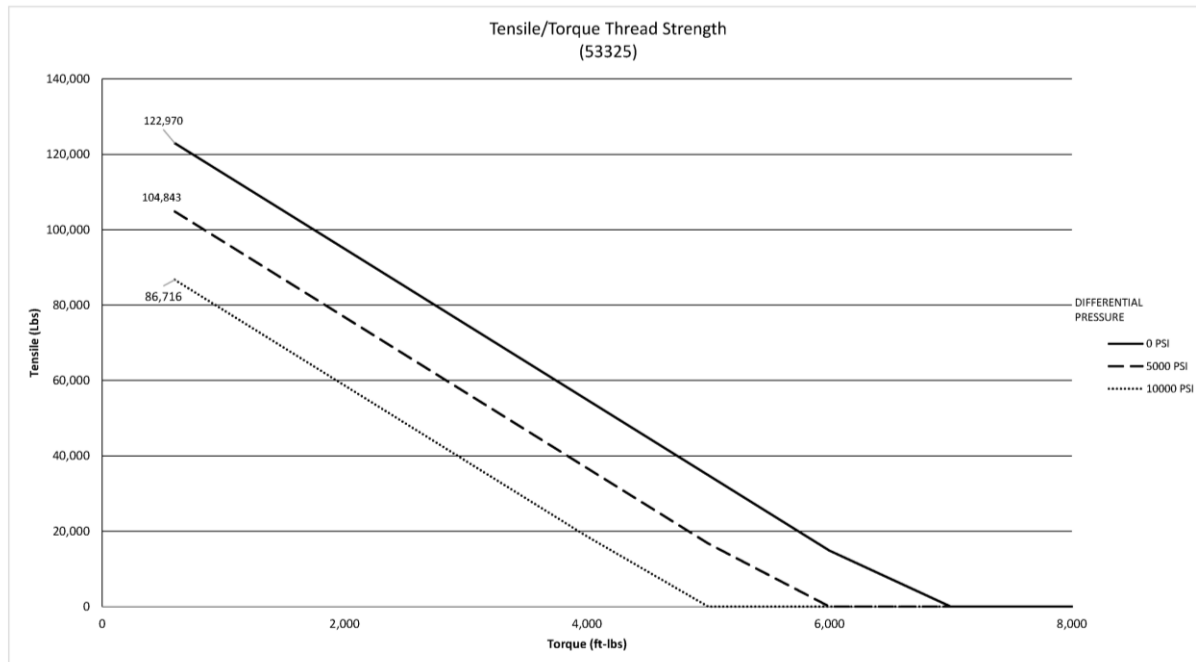
The Bumper Sub is a heavy duty travel joint that is designed to transmit high torque. A hex-shaped mandrel is incorporated in the tool design providing a large contact surface which transmits the torque through the tool. Proven bonded seals are used to provide a seal across the full stroke of the bumper sub.

B) SPECIFICATION GUIDE

SIZE (INCHES)	STROKE (FEET)	TOOL OD (INCHES)	TOOL ID (INCHES)	THREAD CONNECTION BOX UP / PIN DOWN	PART NUMBER
2-7/8	10	4.125	2.13	NC 31 TOOL JOINT	53325-120

DIFFERENTIAL PRESSURE (MAX)	TENSILE LOAD THRU TOOL (MAX)
10,000 PSI	123,000 LBS*

*Tensile load rating of tool can be affected by the amount of torque applied through the threads:



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



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C) PRE-INSTALLATION INSPECTION PROCEDURES

CAUTION: 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.

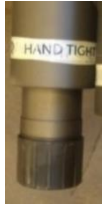


Fig. 1

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"	
2,000 – 4,000 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.

D) 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.

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.



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E) PRESSURE AFFECTED AREA(S) GUIDE

When run downhole, the bumper sub is subjected to the force created by differential pressure inside or outside the sub that acts on the pressure affected area (i.e., the piston effect). Depending on the drill pipe size and weight and the seal area of the bumper sub, the force created by differential pressure acts to expand or contract the sub. An upward force, designated as a negative (-) value, acts to expand the sub. A downward force, designated as a positive value, acts to contract the sub. These forces must be accounted for when operating the bumper sub. Other factors (e.g., drill pipe movement due to temperature change) must be considered separately to determine all the forces acting on the bumper sub.

DRILL PIPE SIZE (INCHES)	PRESSURE AFFECTED AREA (IN ²)	
	DRILL PIPE PRESSURE	ANNULUS PRESSURE
2-3/8	-7.03 (UP)	5.19 (DOWN)
2-7/8	-4.94 (UP)	3.13 (DOWN)
3-1/2	-2.59 (UP)	0

Example: Consider a 2-7/8" Bumper Sub set on 2-7/8" drill pipe with a differential pressure of 3,000 psi in the annulus outside the bumper sub. What is the force acting on the seal area of the sub?

To calculate the force (lbs) acting on the seal area of the sub, refer to the Pressure Affected Area Guide for a 2-7/8" Bumper Sub set on 2-7/8" drill pipe. In this example, the differential pressure from the annulus acts on the seal area of the sub across a pressure affected area of 3.13 in². Multiplying the differential pressure (3,000 psi) by the pressure affected area (3.13 in²) results in a force of 9,390 lbs. The piston effect on the bumper sub is a downward force of 9,390 lbs.

F) ELASTOMER TRIM TEMPERATURE GUIDE

RUBBER TYPE	TEMPERATURE RANGE
NITRILE	40° - 250°F
HSN (HNBR)	70° - 300°F
VITON	100° - 350°F

G) RECOMMENDED 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
- STRAP WRENCH
- 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



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H) DISASSEMBLY

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

H-1.1) From lower end of tool, unscrew and remove set screws (10) from bottom sub (5).

H-1.2) Unscrew and remove bottom sub (5) from mandrel (6).

H-1.2.1) Remove o-ring (14) from bottom sub (5).

H-1.3) Unscrew and remove set screws (11) from lower end of outer cylinder (4).

H-1.4) Unscrew hex sub (9) from outer cylinder (4).

H-1.5) Pull mandrel assembly out of outer cylinder (4). Set aside for disassembly.

H-1.6) Moving to upper end of tool, unscrew and remove set screws (11) from upper end of outer cylinder (4).

H-1.7) Unscrew and remove outer cylinder (4) from top sub (1).

H-2) Unclamp and remove top sub (1) from vise.

H-2.1) Remove o-ring (15) from top sub (1).

H-3) Clamp mandrel (6) of mandrel assembly in vise.

NOTE₁: Slide hex sub (9) to same end as seal mandrel (2) before clamping.

H-3.1) Unscrew and remove seal retainer (3) from seal mandrel (2).

H-3.2) Remove bonded seals (8) and seal spacer (7) from seal mandrel (2).

H-3.2.1) Remove o-rings (12) from seals (8).

H-3.3) Unscrew and remove seal mandrel (2) from mandrel (6).

H-3.3.1) Remove o-rings (13, 15) from seal mandrel (2).

H-3.4) Slide hex sub (9) from mandrel (6).

H-4) Unclamp and remove mandrel (6) from vise.

I) ASSEMBLY

NOTE₃: 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).

I-1) Clamp mandrel (6) in vise.

NOTE₂: Provide adequate clearance to assemble all parts onto mandrel (6) before clamping.

I-1.1) Slide hex sub (9) onto mandrel (6).

I-1.2) Install o-rings (13, 15) in o-ring grooves in seal mandrel (2).

I-1.3) Screw seal mandrel (2) onto mandrel (6).

CAUTION₁: Do not rip or tear o-ring during installation.

I-1.4) Install o-rings (12) in o-ring grooves in bonded seals (8).

I-1.5) Slide bonded seals (8) and seal spacer (7) onto seal mandrel (2).

CAUTION₁: Do not rip or tear o-rings during installation.

I-1.6) Screw seal retainer (3) onto seal mandrel (2).

I-2) Unclamp and remove mandrel (6) from vise. Set mandrel assembly aside.

I-3) Install o-ring (15) in o-ring groove in top sub (1).

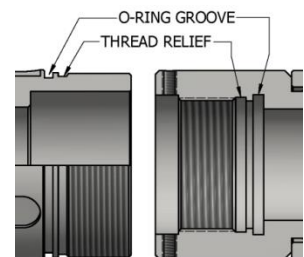


Fig. 2



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I) ASSEMBLY (cont'd)

I-4) Clamp top sub (1) in vise.

I-4.1) Screw outer cylinder (4) onto top sub (1).

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

I-4.2) Screw set screws (11) into upper end of outer cylinder (4).

I-4.3) Slide mandrel assembly into outer cylinder (4).

I-4.4) Screw hex sub (9) into outer cylinder (4).

I-4.5) Screw set screws (11) into lower end of outer cylinder (4).

I-4.6) Install o-ring (14) in o-ring groove in bottom sub (5).

I-4.7) Screw bottom sub (5) onto mandrel (6).

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

I-4.8) Screw set screws (10) into bottom sub (5).

I-5) Unclamp top sub (1) from vise and remove assembled tool.

J) PARTS LIST

ITEM	QTY	DESCRIPTION	MATERIAL	P/N 53325-120
1	1	TOP SUB	DLMS110	53325610
2	1	SEAL MANDREL	DLMS110	53325111
3	1	SEAL RETAINER	DLMS110	53325112
4	1	OUTER CYLINDER	DLMS110	53325104-120
5	1	BOTTOM SUB	DLMS110	53325630
6	1	MANDREL	DLMS110	53325210-120
7	1	SEAL SPACER	DLMS60	58035550-2000
8	2	BONDED SEAL	90 DURO NITRILE	58035520
9	1	HEX SUB	DLMS110	53325102
10	4	SET SCREW 5/16-18 UNC X 3/8	STEEL	SSS031C037
11	8	SET SCREW 5/16-18 UNC X 5/16	STEEL	SSS031C031
12	2	152 O-RING	90 DURO NITRILE	90152
13	1	231 O-RING	90 DURO NITRILE	90231
14	1	334 O-RING	90 DURO NITRILE	90334
15	2	338 O-RING	90 DURO NITRILE	90338

REDRESS KIT	53325050
ASSEMBLED WEIGHT	357 LBS



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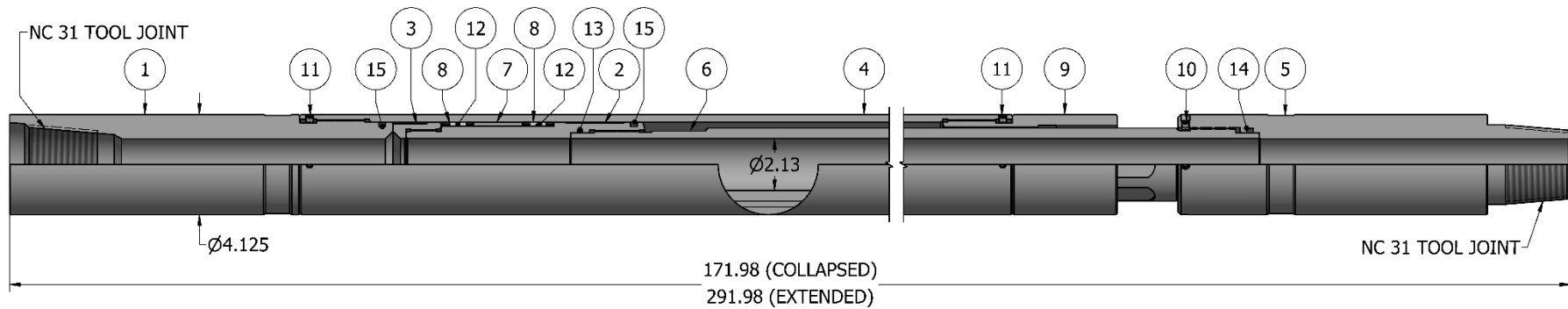
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K) TECHNICAL ILLUSTRATION



L) REVISION HISTORY

DATE	REVISION	DESCRIPTION OF CHANGES	REVISED BY	APPROVED BY
12/17/2018	A	Created new manual	-	-