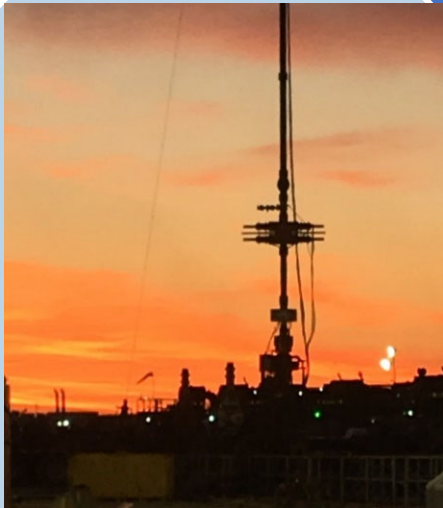




ABEL RAMLOC CONNECTOR™

A Safe and efficient remote connector of smaller ID BOP's & Lubricators with Wellhead equip. or BOPs during *Fracking, wireline, coil tubing and snubbing operations*



Rev-Y 2Dec23

Provided by **ABEL OIL TOOLS™**
<https://abel-oil-tools.com/>

ABEL RAMLOC CONNECTOR™



5-1/8" 15K WP

Webpage link for operations video:

<https://abel-oil-tools.com/media/RAM LOC TRAILER Draft 12-18-2020 03B MUSIC.mp4>



ABEL RAMLOC HPSN™



Webpage line for install/use video:

https://abel-oil-tools.com/?page_id=40

ABEL Oil Tools
Houston, Texas USA
<https://abel-oil-tools.com/>

Technical/Engineering: Att: Bill Abel
+1-713-202-1505 bill@abel-engr.com

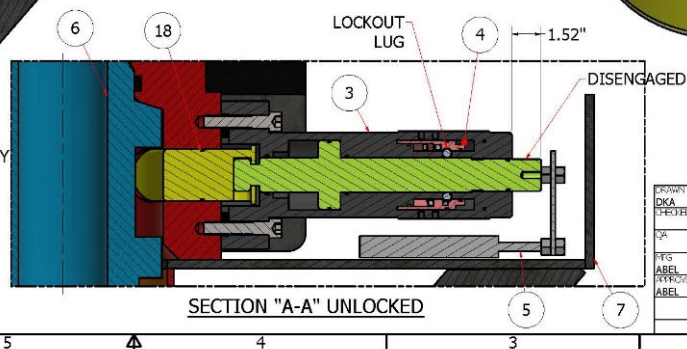
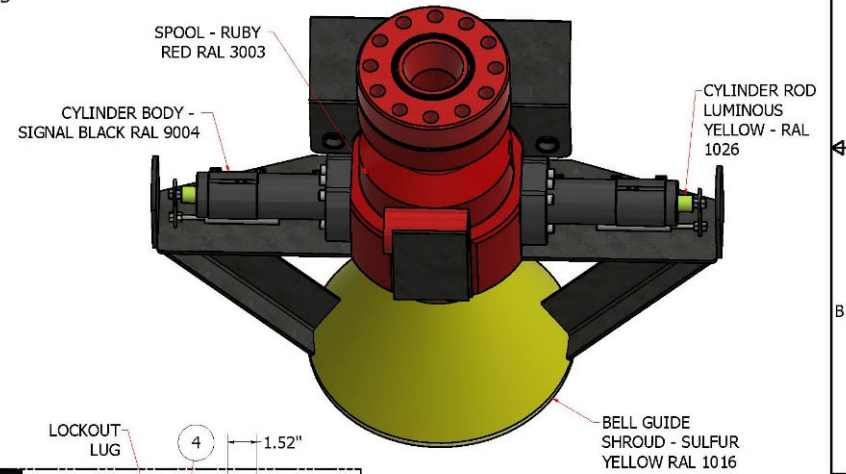
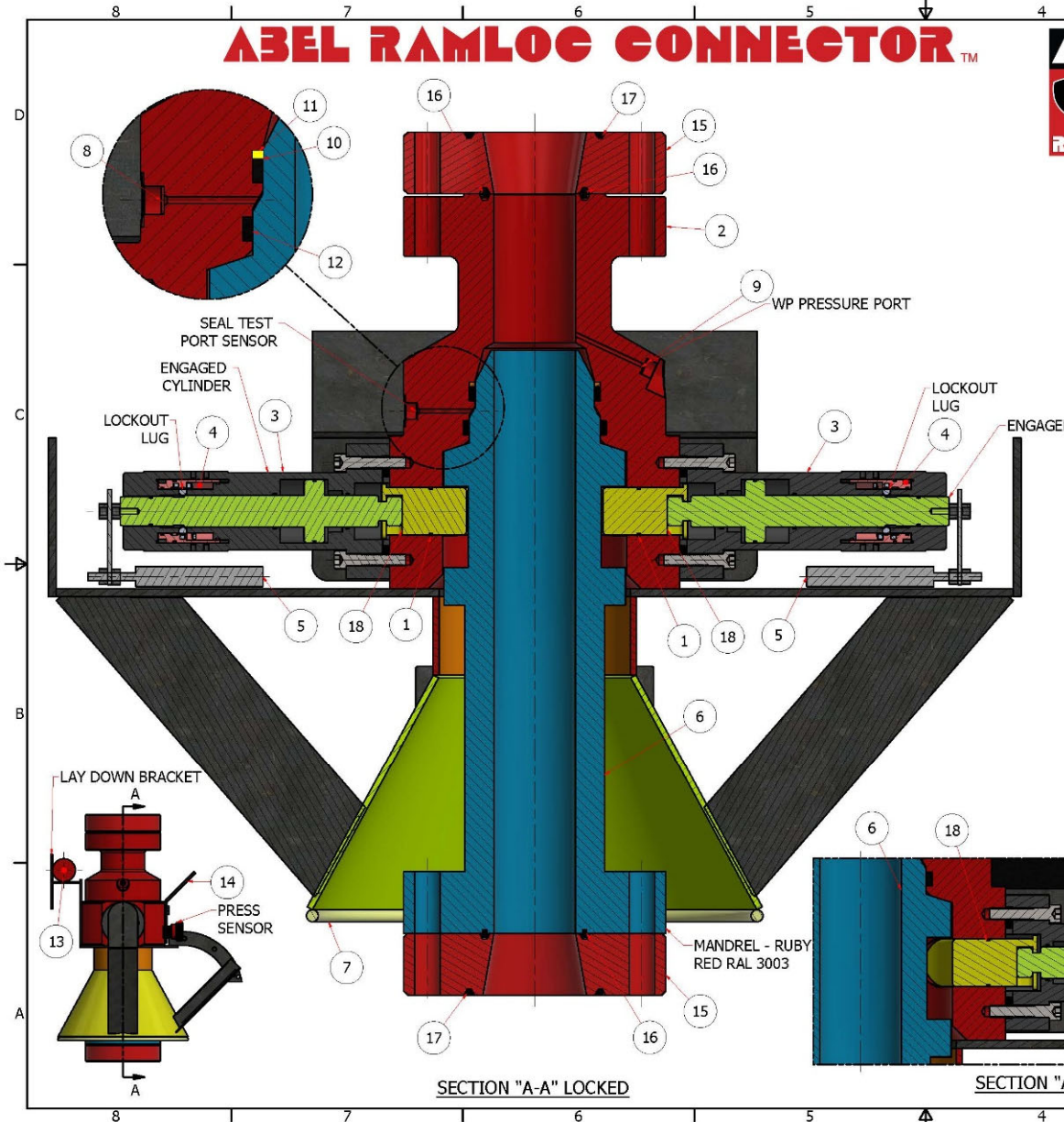
HPSN Drilling Support Tool
18-3/4" 13-5/8" and 11" 5/10k available

ARC™ General Assembly

ABEL RAMLOC CONNECTOR™



ITEM QTY		PART NUMBER	DESCRIPTION
1	2	HPSN-040	MUD SEAL O-RING
2	1	HPSN-201	5 1/8" 15k HOLD-DOWN SPOOL
3	2	HPSN-203	RAMLOC CYLINDER
4	2	HPSN-204	RAM LOCK ASSEMBLY
5	2	HPSN-205	POSITION INDICATOR SENSOR
6	1	HPSN-206	5-1/8" 15K MANDREL
7	1	HPSN-207	BELL GUIDE ASSEMBLY
8	1	HSPN-208	15K SEAL PORT SENSOR
9	1	HPSN-209	15K WH PRESSURE SENSOR
10	1	HPSN-210	PARKER HANNIFIN POLYPACK-B 4003-37507500JA-625-B
11	1	HPSN-211	468537507500PR-SKIVE (PIP)
12	1	HPSN-212	PARKER HANNIFIN POLYPACK-B 4033-37508250JA-625-B
13	1	HPSN-213	SHUTOFF 15K
14	1	HPSN-218	HOSE SENSOR BUNDLE BULKHEAD
15	2	HPSN-220	5 1/8" 15M x 7 1/16" 10M DSA TAPERED BORE 7" TO 5" TRANSITION
16	2	BX169	RING GASKET - 5-1/8" 15K
17	2	BX156	RING GASKET - 7 - 1/16" 10K
18	2	HPSN-225	RAM BLOCK 1600K EACH



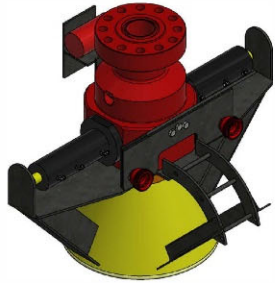
DESIGN	9/3/2019	
CHECKED	9/3/2020	
DATE		TITLE
FIG		ABEL RAMLOC CONNECTOR ASSEMBLY
APPROVED	9/3/2020	
SCALE	1 7/8"=1'-0"	SHEET 1 OF 1



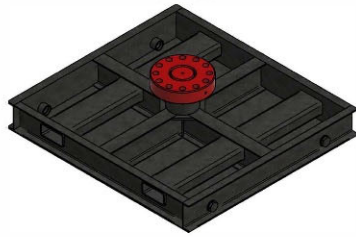
Proof of design tested to 30,000 psi

ARC™ Footprint

ABEL RAMLOG CONNECTOR™

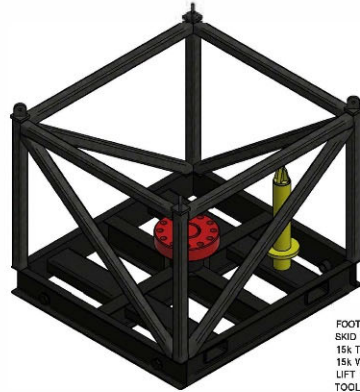


HPSN-217
WOM CONTROL BOX
TOTAL WT = 2375#



HPSN-218

FOOT PRINT 5'-4" x 5'-0"
SKID WT = 1154#
MANDREL WT = 650#
LIFT NUBBIN = 114#
TOOL WT = 2375#
TOTAL WT : 4,293#



HPSN-218-0

TOOL BOX WITH TOOLS = 250 lbs

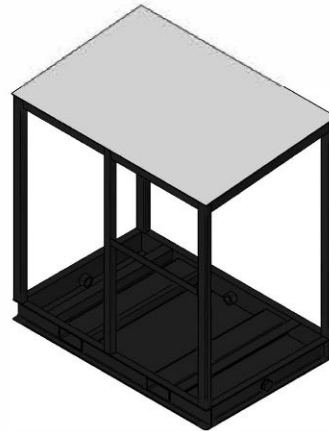


FOOT PRINT 5'-4" x 8'-0"
SKID WT = 1730#
15K TEST MANDREL WT = 650#
15K WELL MANDREL WT = 650#
LIFT NUBBIN = 115#
TOOL WT = 2375#
TOTAL WT = 5520#



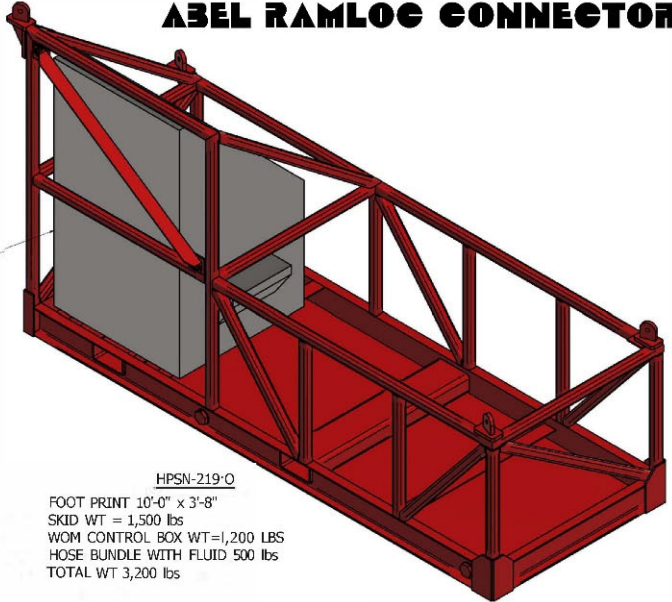
HPSN - 221

LIFT NUBBIN = 115#
MANDREL = 650
TOTAL WT 765#



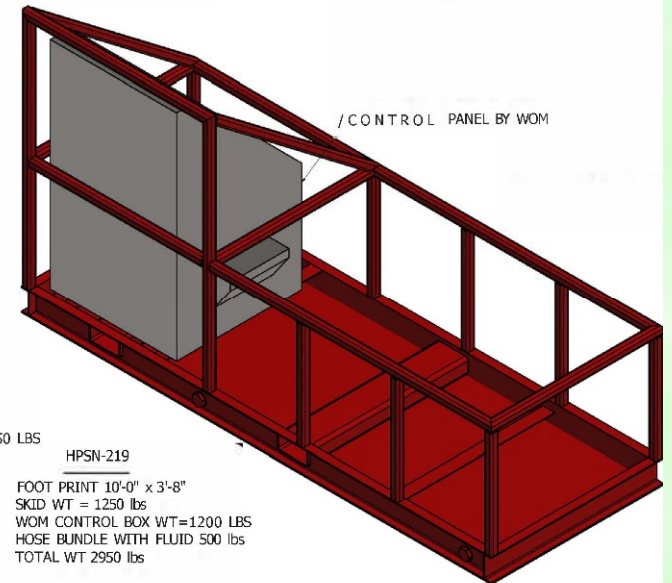
HPSN-222

COMPRESSOR SKID FOOT PRINT
5'-8" x 3'-8 1/2"
WT WITH COMPRESSOR 1715 LBS



HPSN-219-0

FOOT PRINT 10'-0" x 3'-8"
SKID WT = 1,500 lbs
WOM CONTROL BOX WT = 1,200 LBS
HOSE BUNDLE WITH FLUID 500 lbs
TOTAL WT 3,200 lbs



/CONTROL PANEL BY WOM

HPSN-219

FOOT PRINT 10'-0" x 3'-8"
SKID WT = 1250 lbs
WOM CONTROL BOX WT = 1200 LBS
HOSE BUNDLE WITH FLUID 500 lbs
TOTAL WT 2950 lbs

FOOT PRINT 6'-0" x 4'-0"
SKID WT = 1025 lbs
TOOL BOX WITH TOOLS = 250 lbs
MANDREL - 650 lbs each
NUBBIN W/T 115 lbs each
TOTAL W/T WITH 3 MANDRIL AND ONE LIFT NUBBIN = 3200 LBS
TOTAL WT WITH 6x MANDRILS 2x Lift Nubbins = 5200 lbs

MODIFIED with 6 Posts Nov-22

HPSN - 223

MANDREL SHIPPING SKID

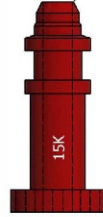


W/T 595 LBS



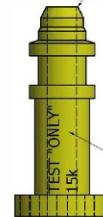
HPSN-206-10

WT 650



HPSN-206

W/T 650 LBS



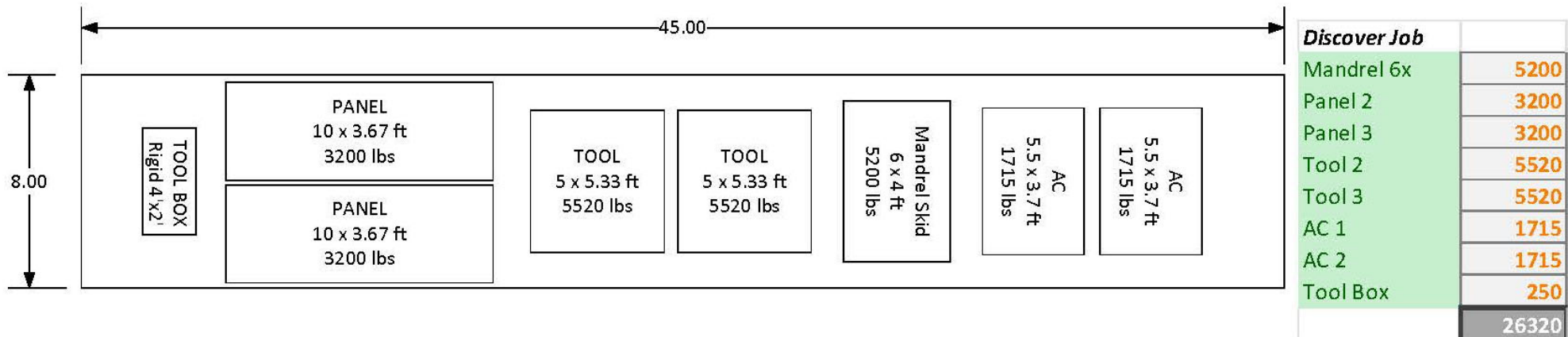
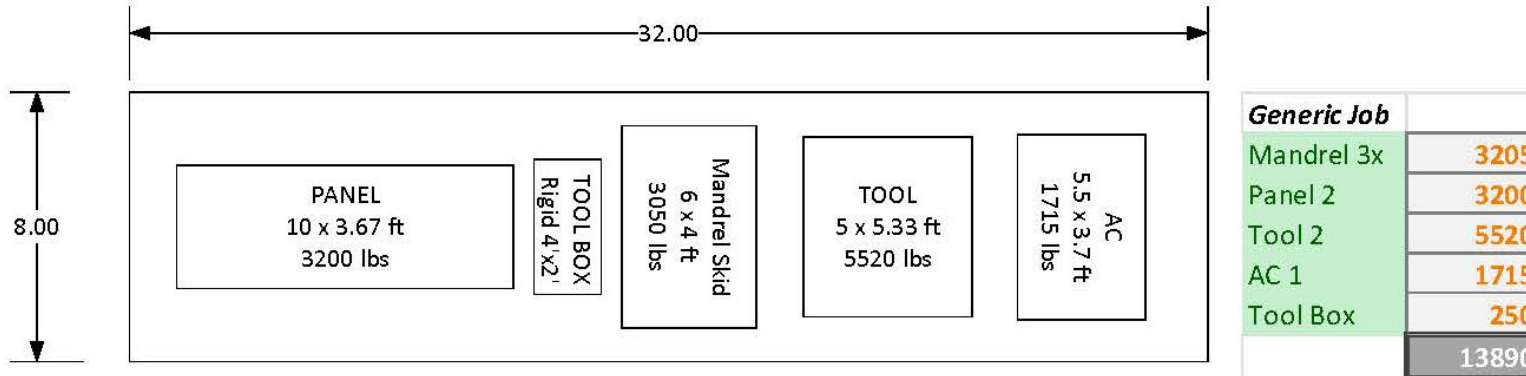
HPSN-206-T

STENCIL
(BLACK)

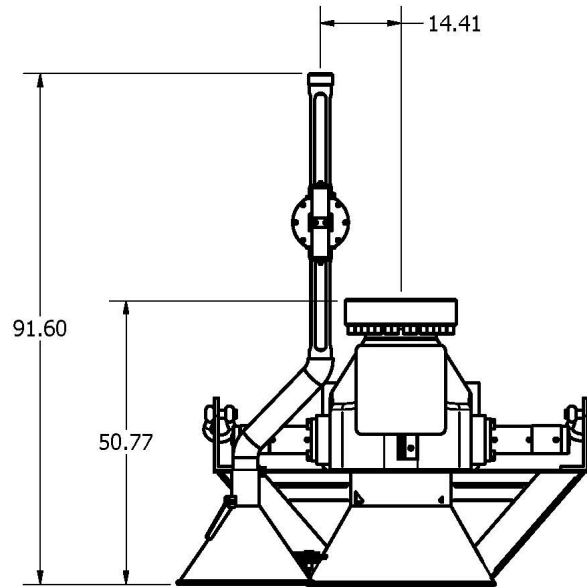
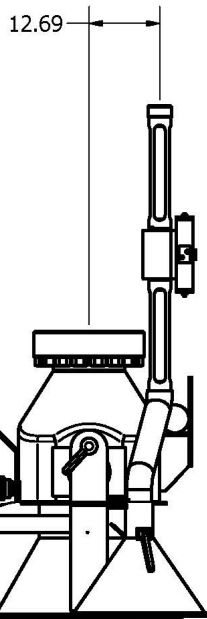
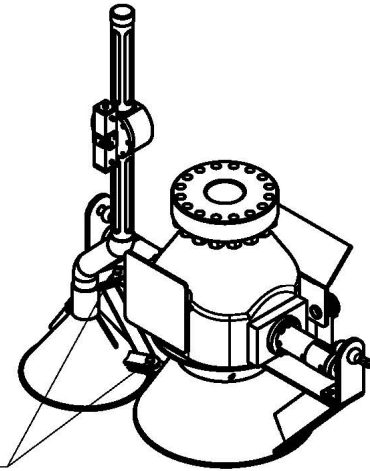
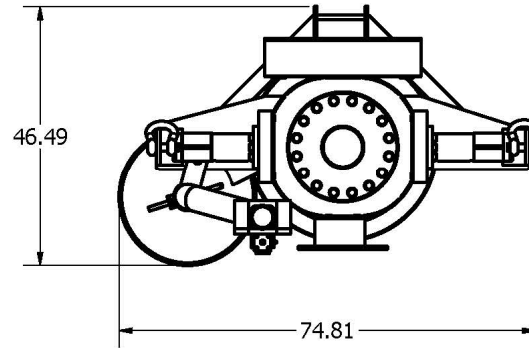
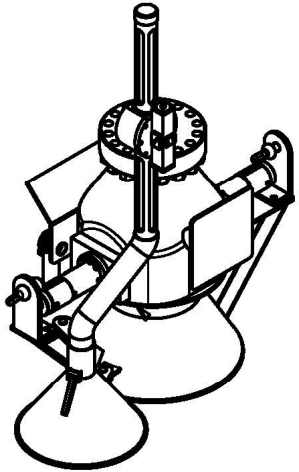
HPSN-206



ARC™ Typical Load Out

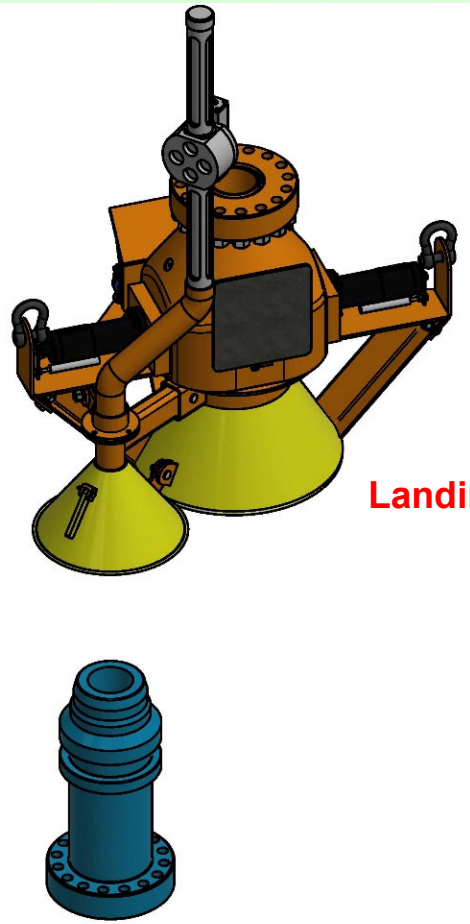
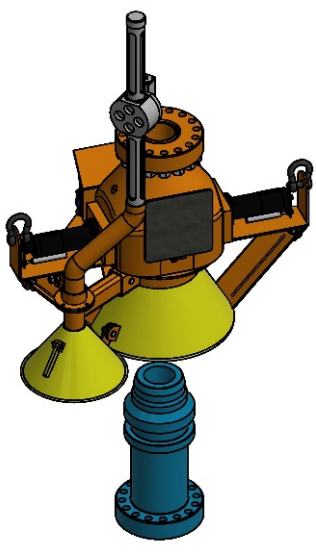


ARC™ Ball Dropper

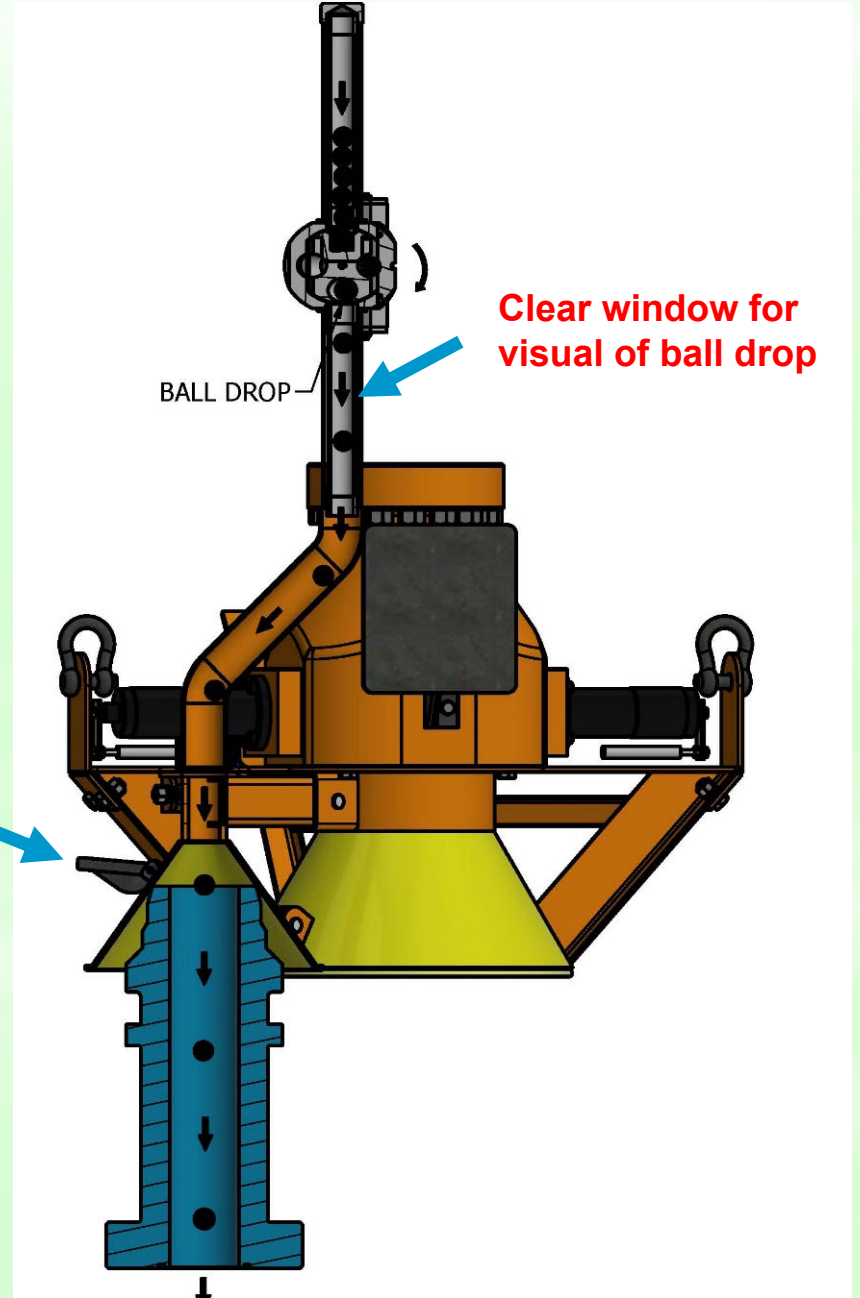


DRAWN	6/28/2021	
DKA		
CHECKED		TITLE
QA		
MFG		BALL DROPPER MODIFICATION
APPROVED		

ARC™ Ball Dropper



Landing indicator



- 1) LOCKOUT engages automatically (spring driven) when the lock piston travels to the fully engaged position (similar to hose quick connect) and 2x stronger than the opening force of the operational cylinder
- 2) LOCKOUT mechanism must be dis-engaged with hydraulic pressure to allow lugs to be opened (Loss of power does not affect this feature)
- 3) Analog SHUTOFF driven by Well Head Pressure (22 psi) prevents opening pressure from being applied to open the tool. (WHP > 30 psi tool will **not** open)
- 4) Status of rams are displayed in % open/closed (using drilling choke position technology).
- 5) Panel utilizes WOM's proven drilling choke technology (battery operated pressure sensors that are intrinsically safe)
- 6) Panel power of air, accumulator, manifold are prominently displayed.
- 7) Operator holds open LOCKOUT valve simultaneously (2-hand operation).
- 8) Quick test dual seal and alarm status if leaks during the frac job to 10 ksi (test line double checked)

L. William "Bill" Abel PE

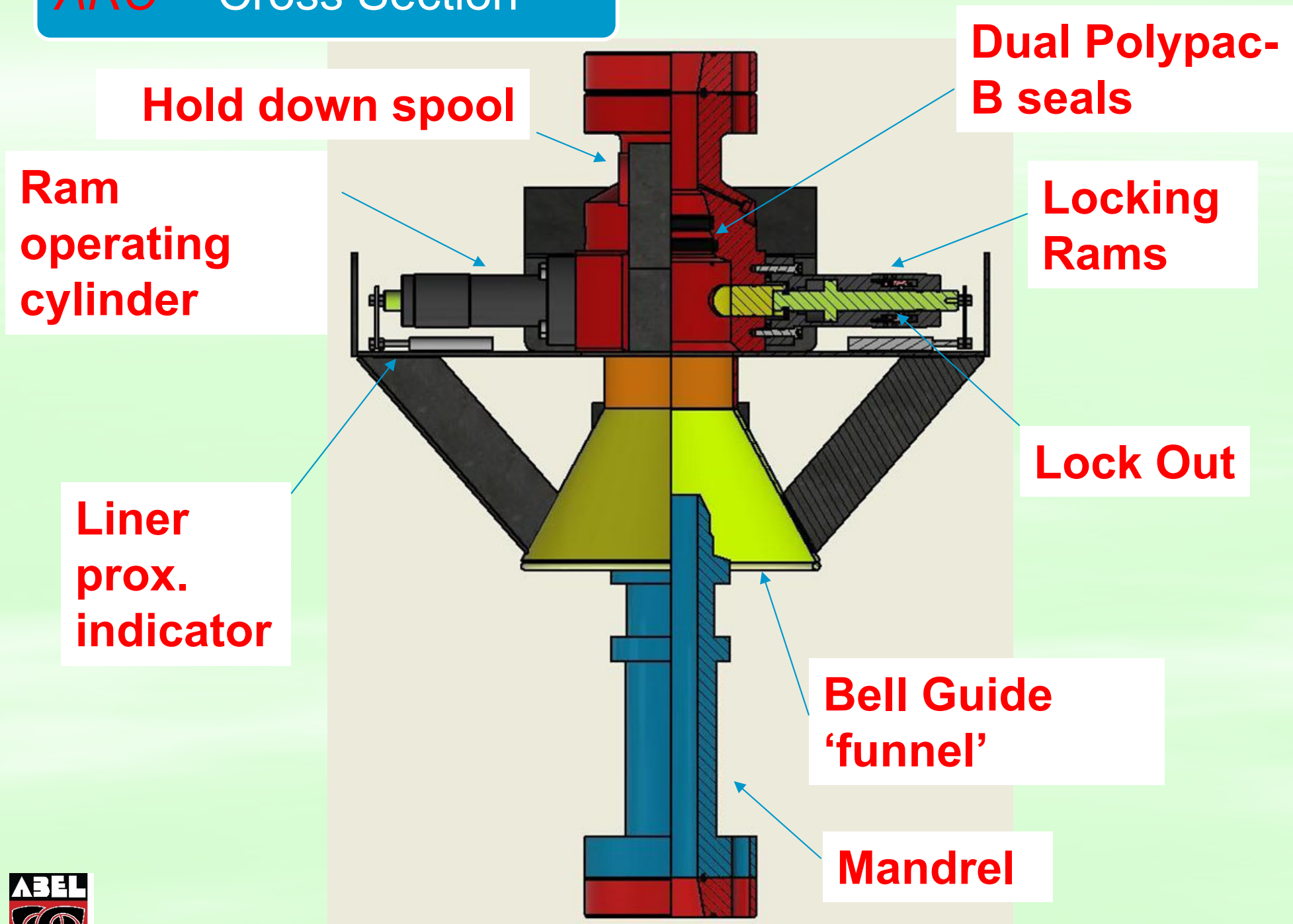
General Partner / Managing Director

Off: Cell +1-713-202-1505 +1-713-355-3838

email: bill@abel-engr.com / billabel@aol.com

Note: Field tested 3x pads (PNR) 408 stages, 1x pad (Caza Pet) 160 stages, 6-well pad 832 stages 100% success 0.7% NPT 2021-2022 2x Pads=612 stages Zero NPT; 1,444 total stages

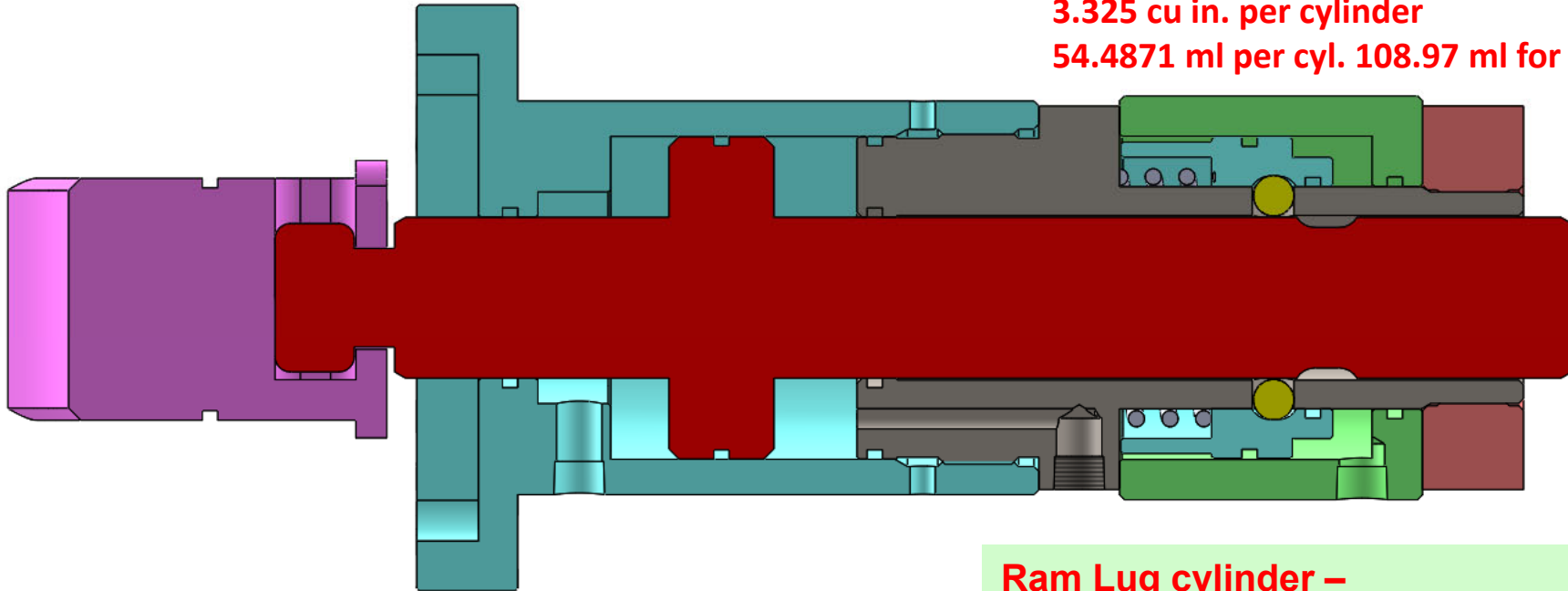
ARC™ Cross Section



ARC™ Locking Lug Cylinder Detail

Closing 2x Locking Lug cylinders –
Close tool takes 2 x 256 = 512 ml

LOCKOUT cylinder –
4.01" Cylinder ID, 2.76" Rod OD,
Stroke 0.50" (open/close)
3.325 cu in. per cylinder
54.4871 ml per cyl. 108.97 ml for both



Open 2x locking lug cylinders –
Lockout 109 ml
Open 512 ml
Total = 621 ml

Ram Lug cylinder –
4" Cylinder ID, 2" Rod OD,
Stroke 1.66" (open/close).
15.63 cu. in. per cylinder or 256 ml or
0.26 liter or 0.52 liter to open/close
or 0.72 beers each x2 = 1.44 beers

1 cu. in. = 16.3871 cc or ml
354.882 ml = 1 beer (12 fl oz)

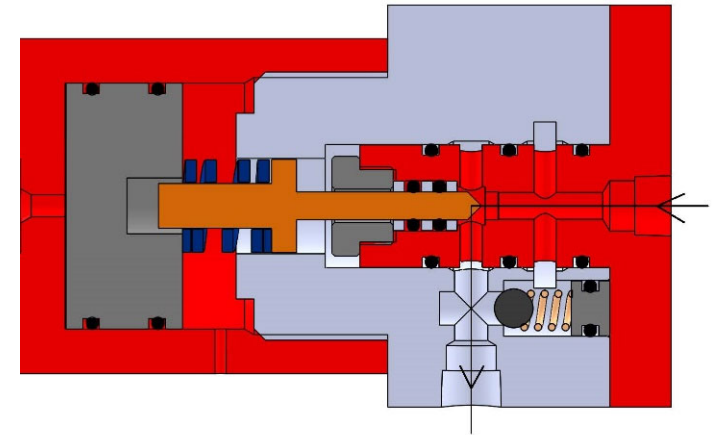
RAMLOC CONNECTOR™ Use on live wells

- RamLoc has successfully supported 6x frac jobs including the prototype tool (total: 19 wells on 6 pads)
- Preston 21d / Hou-Herzog 13d / Pembroke 8d
operated 1008 hours with 9.3 hours NPT or 0.9% (<1%) operator error
- 408 stages with no failures to come on or off, tested seals to 9500+ psi each stage, no leaks or issues.
- One set of polypac-B seals saw ALL PNR 408 stages
(~430 quick tests & 408 body tests = ~840 test cycles)
- Caza NM job was 160 stages w/ zero leaks/discharge of any kind was recorded from a seal failure.
- Discovery Great Divide Pad **(263 stages, zero NPT, 725 hrs)**
- Discovery S. Hospital348 Pad **(348 stages, zero NPT, 744 hrs)**

Grand total NPT is 12.8 hrs in 3221 hrs or (0.40%)

ARC™ SHUT-OFF

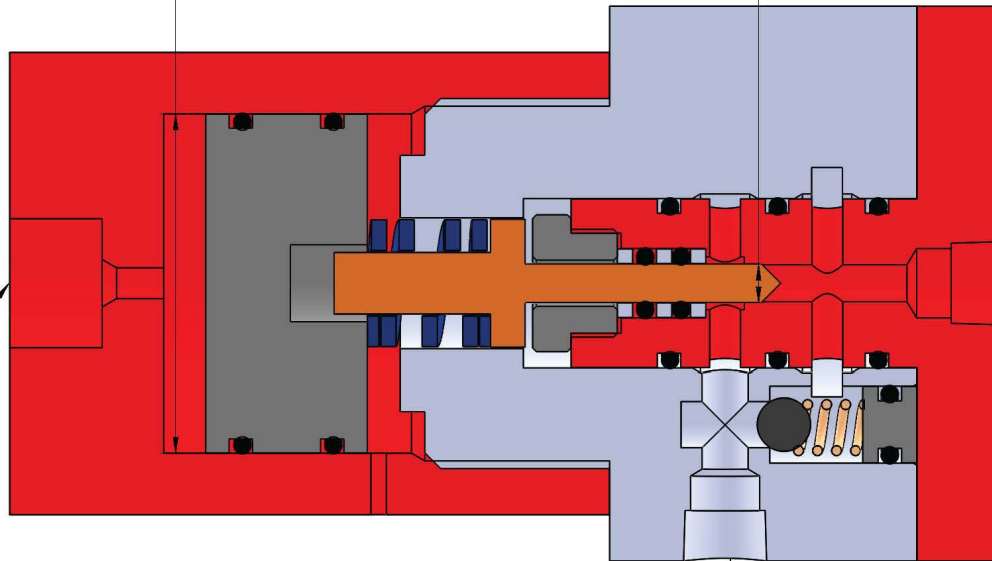
NO WELLBORE PRESSURE HYDRAULIC SUPPLY OPEN



EFFECTIVE AREA = 5.94
FORCE WITH 40 PSI = 238 lb
 ϕ 2.75

EFFECTIVE AREA = .076
FORCE WITH 3000 PSI = 230 lb
 ϕ .313

WELLBORE
PRESSURE
INLET

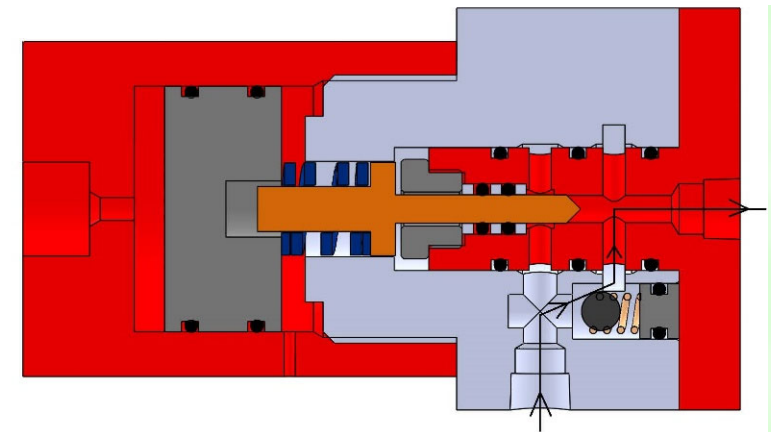


INLET
HYDRAULIC
SUPPLY
3000 PSI
MAX

OUTLET TO
HYDRAULIC
CYLINDER

WELLBORE PRESSURE	HYDRAULIC PRESSURE REQUIRED TO OPEN RAMS
40	3131
30	2344
20	1563
10	781

HYDRAULIC FLUID RETURN DURING RAM CLOSING OPERATION

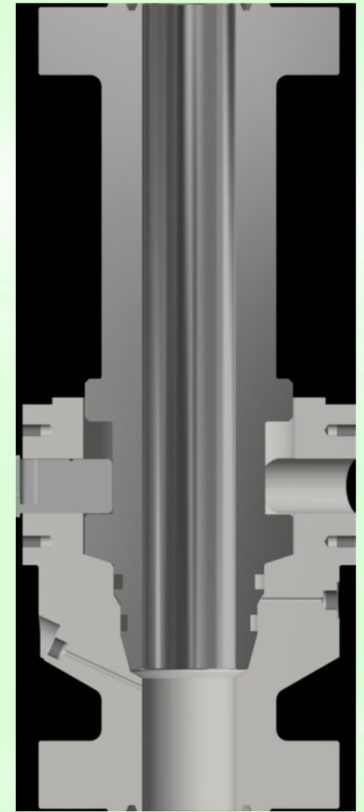
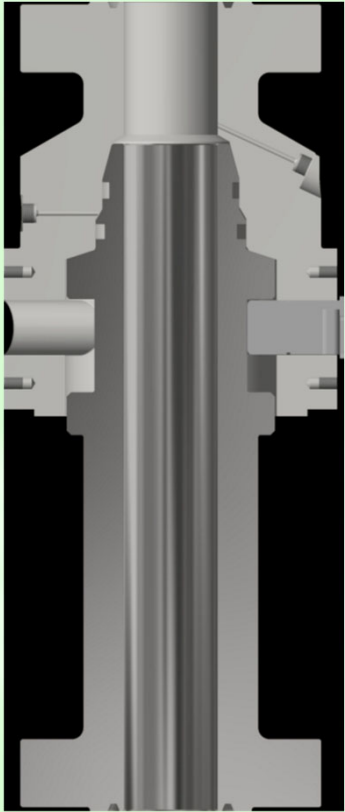


ARCTM Frac Support Tool

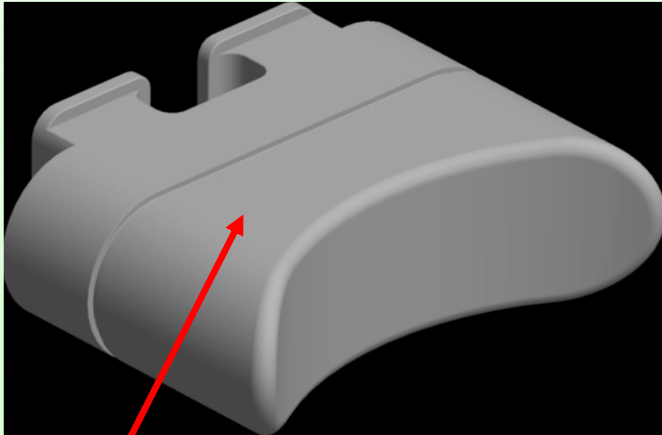
Main features:

- Made to API 6A spec (cert. of conformance issued)
- Dual testable seals
- SF exceed API by 50%
- Tested to 30,000 psi
- Rated to 15ksi WP
- 6x features prevent inadvertent opening of locking lugs
- Can be run mandrel up or down

Mandrel up reduces cost as one spool and control required for multiple wells

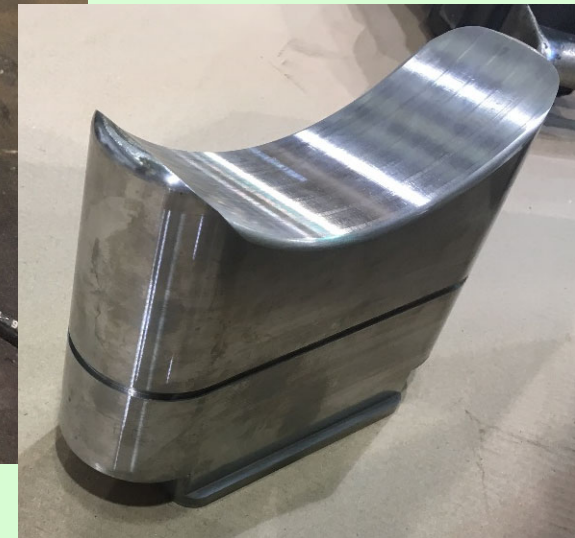


ARCTM Locking Lug Detail



**Bearing / shear areas
2100 kip loading (at yield
of the base material)**

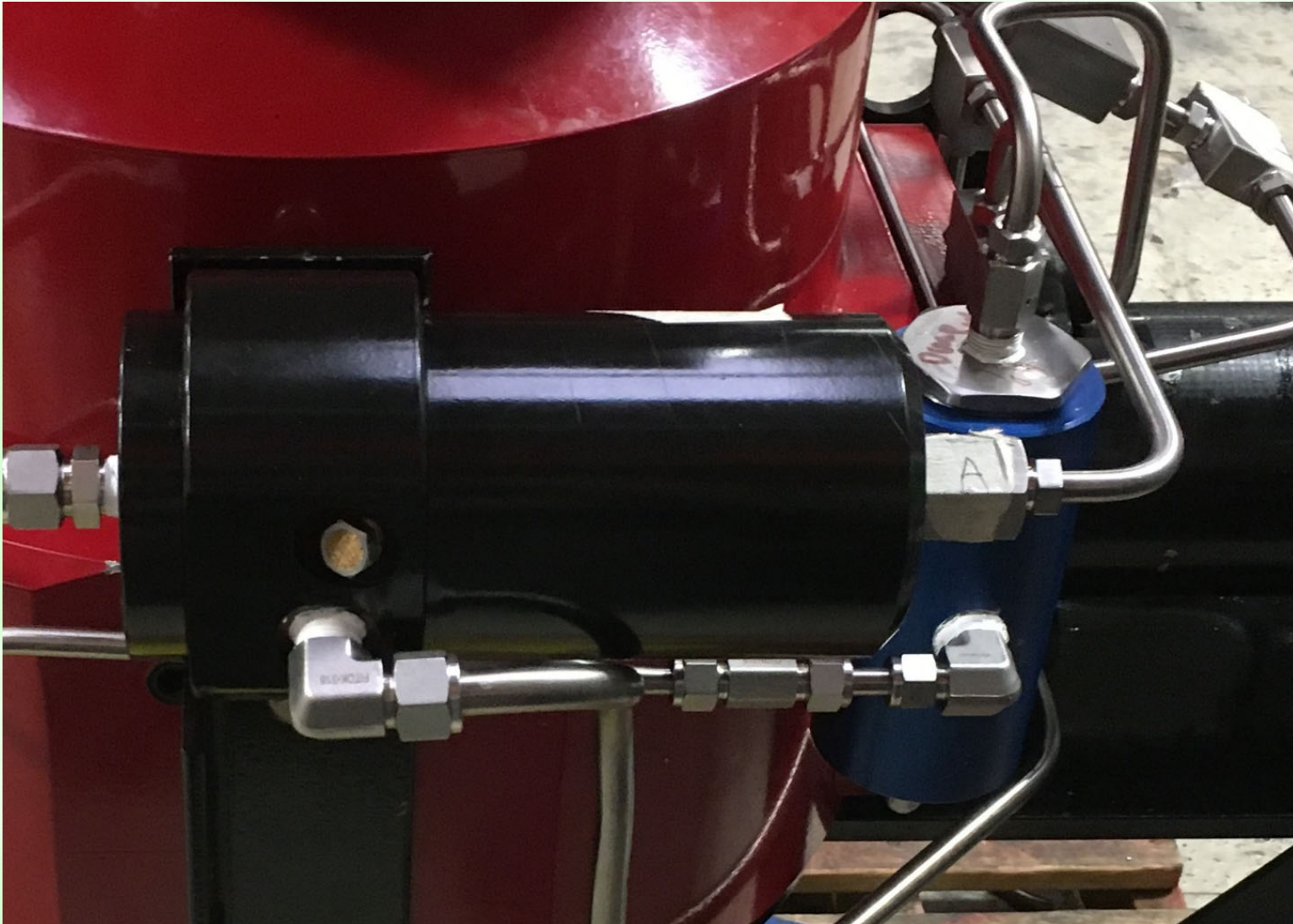
**Locking Lugs hold
mandrel in place when
well is pressurized**



ARCTM Hold-down Spool



ARC™ SHUT-OFF





Console

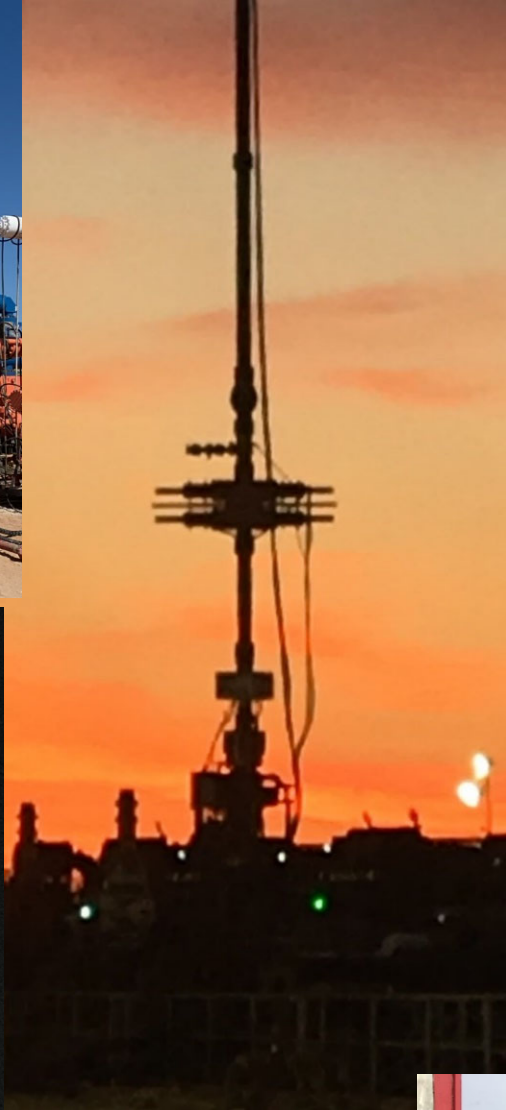
- 1) WHP and SEAL Port digital display
- 2) Positions % display for ram lug open/close
- 3) WHP/Seal port pressure monitored electronically
- 4) All functions are clearly labeled.



Gallery



Pics



© ABEL Oil Tools Exec Summary
Rev-X 17-Jan-23

Pics



Patent Info and Copyrights

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ABEL ENGINEERING LLP IS LICENSED UNDER U.S. PATENT numbers: 7,267,179; 7,334,634; 7,383,887; and 7,464,751 and 9,416,894 B2 (issued 12Aug16).

HPSN / RamLoc™ trademark and logo copyright applied for Jan-2014/2020.



ABEL RAMLOC CONNECTOR™

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