Form 3160-3
(June 2015)

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

APPLICATION FOR PERMIT TO DRILL OR REENTER

5. Lease Serial No.: NMNM0359292

6. If Indian, Allotee or Tribe Name:

1a. Type of work: ☑ DRILL ☐ REENTER

1b. Type of Well: ☐ Oil Well ☑ Gas Well ☐ Other

1c. Type of Completion: ☐ Hydraulic Fracturing ☑ Single Zone ☐ Multiple Zone

7. If Unit or CA Agreement, Name and No.:

8. Lease Name and Well No.: SALADO DRAW 10 W0OB FED COM 2H [317127]

2. Name of Operator: MEWBOURNE OIL COMPANY [14744]

9. API Well No.: 30-025-49388

3a. Address: P O BOX 5270 HOBBS NM 88241

3b. Phone No. *(include area code)*: (575)393-5905

10. Field and Pool, or Exploratory: [83600] RED HILLS WOLFCAMP / wolfcamp

4. Location of Well *(Report location clearly and in accordance with any State requirements.*)*

At surface: SWSE / 235 FSL / 2030 FEL / LAT 32.0513783 / LONG -103.5582023

At proposed prod. zone: TR B / 100 FNL / 2310 FEL / LAT 32.0649716 / LONG -103.5591087

11. Sec., T. R. M. or Blk. and Survey or Area: SEC 10 / T26S / R33E / NMP

14. Distance in miles and direction from nearest town or post office*: 30 miles

12. County or Parish: LEA

13. State: NM

15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any): 320 feet

16. No of acres in lease:

17. Spacing Unit dedicated to this well: 320

18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft.: 50 feet

19. Proposed Depth: 12304 feet / 17569 feet

20. BLM/BIA Bond No. in file: FED: NM1693

21. Elevations (Show whether DF, KDB, RT, GL, etc.): 3316 feet

22. Approximate date work will start*: 06/29/2020

23. Estimated duration: 60 days

24. Attachments

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

1. Well plat certified by a registered surveyor.
2. A Drilling Plan.
3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office).
4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above).
5. Operator certification.
6. Such other site specific information and/or plans as may be requested by the BLM.

25. Signature	Name *(Printed/Typed)*	Date
(Electronic Submission)		08/30/2019

Title:

Approved by *(Signature)*	Name *(Printed/Typed)*	Date
(Electronic Submission)	Cody Layton / Ph: (575)234-5959	09/03/2021
Title	**Office**	
Assistant Field Manager Lands & Minerals	CARLSBAD	

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.
Conditions of approval, if any, are attached.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

NGMP Rec 09/09/2021

APPROVED WITH CONDITIONS

KZ
09/16/2021

NSL

REQUIRES NSL

(Continued on page 2)

*(Instructions on page 2)

Approval Date: 09/03/2021

District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

1 API Number	2 Pool Code	3 Pool Name
30-025-49388	83600	RED HILLS WOLFCAMP GAS

4 Property Code	5 Property Name	6 Well Number
317127	SALADO DRAW 10 WOOB FED COM	2H

7 OGRID NO.	8 Operator Name	9 Elevation
14744	MEWBOURNE OIL COMPANY	3316'

10 Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet From the	East/West line	County
O	10	26S	33E		235	SOUTH	2030	EAST	LEA

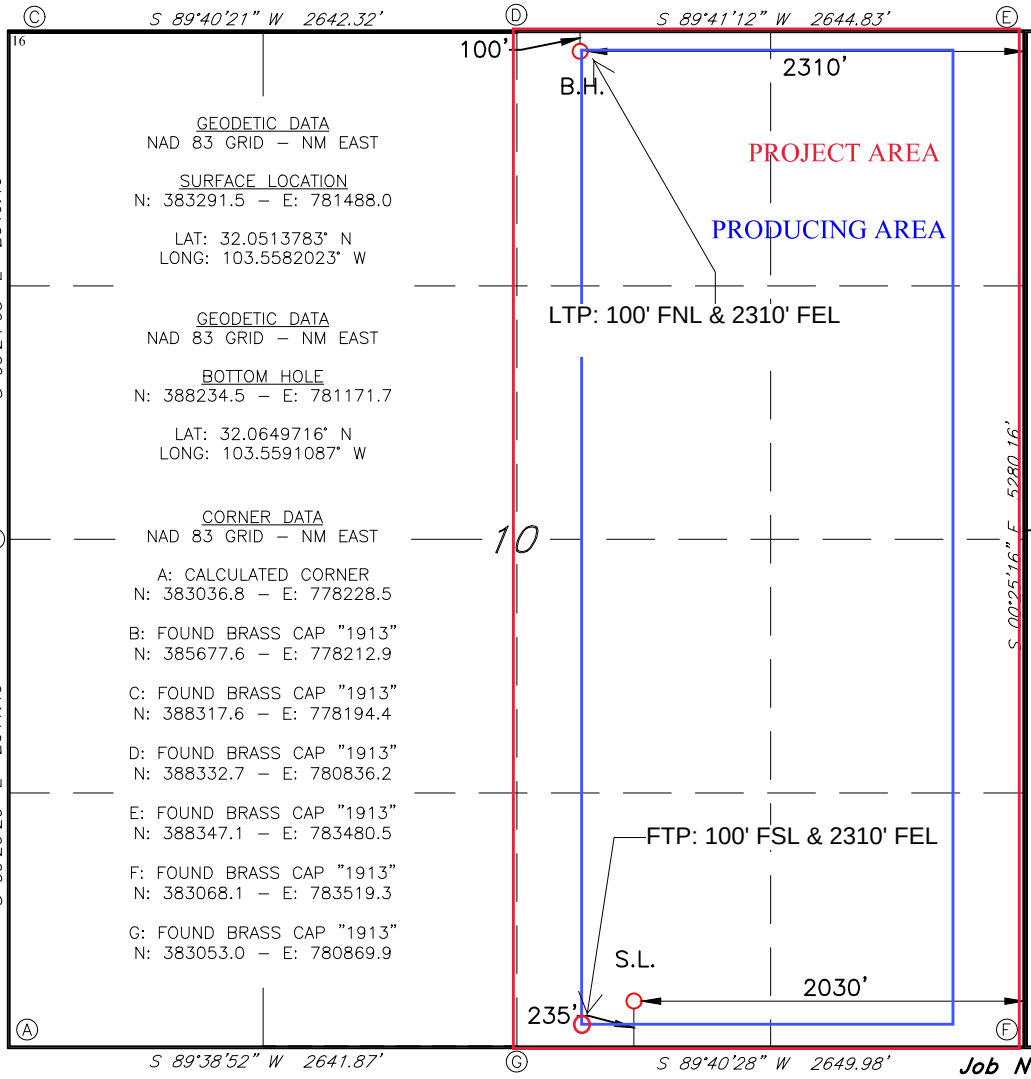
11 Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	10	26S	33E		100	NORTH	2310	EAST	LEA

12 Dedicated Acres	13 Joint or Infill	14 Consolidation Code	15 Order No.
320			

REQUIRES NSL is closer than 660 from side and is closer than 330 to end

No allowable will be assigned to this completion until all interest have been consolidated or a non-standard unit has been approved by the division.



17 OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Bradley A Bishop 4-29-20

Signature Date

BRADLEY BISHOP
Printed Name

BBISHOP@MEWBOURNE.COM
E-mail Address

18 SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

4–15–2020
Date of Survey

Signature and Seal of Professional Surveyor

ROBERT M. HOWETT NEW MEXICO 19680 PROFESSIONAL SURVEYOR

19680
Certificate Number

Job No.: LS19010099R

State of New Mexico
Energy, Minerals and Natural Resources Department

Submit Electronically
Via E-permitting

Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

NATURAL GAS MANAGEMENT PLAN

This Natural Gas Management Plan must be submitted with each Application for Permit to Drill (APD) for a new or recompleted well.

Section 1 – Plan Description
Effective May 25, 2021

I. Operator: Mewbourne Oil Co. **OGRID:** 14744 **Date:** 8/13/21

II. Type: ☒ Original ☐ Amendment due to ☐ 19.15.27.9.D(6)(a) NMAC ☐ 19.15.27.9.D(6)(b) NMAC ☐ Other.

If Other, please describe: _____

III. Well(s): Provide the following information for each new or recompleted well or set of wells proposed to be drilled or proposed to be recompleted from a single well pad or connected to a central delivery point.

Well Name	API	ULSTR	Footages	Anticipated Oil BBL/D	Anticipated Gas MCF/D	Anticipated Produced Water BBL/D
Salado Draw 10 W0OB Fed Com 2H	30-025-49388	O 10 26S 33E	235' FSL x 2030' FEL	1200	3000	2000

IV. Central Delivery Point Name: Salado Draw 10 W0OB Fed Com 2H [See 19.15.27.9(D)(1) NMAC]

V. Anticipated Schedule: Provide the following information for each new or recompleted well or set of wells proposed to be drilled or proposed to be recompleted from a single well pad or connected to a central delivery point.

Well Name	API	Spud Date	TD Reached Date	Completion Commencement Date	Initial Flow Back Date	First Production Date
Salado Draw 10 W0OB Fed Com 2H	30-025-49388	10/13/21	11/13/21	12/13/21	12/28/21	12/28/21

VI. Separation Equipment: ☒ Attach a complete description of how Operator will size separation equipment to optimize gas capture.

VII. Operational Practices: ☒ Attach a complete description of the actions Operator will take to comply with the requirements of Subsection A through F of 19.15.27.8 NMAC.

VIII. Best Management Practices: ☒ Attach a complete description of Operator's best management practices to minimize venting during active and planned maintenance.

Section 2 – Enhanced Plan
EFFECTIVE APRIL 1, 2022

Beginning April 1, 2022, an operator that is not in compliance with its statewide natural gas capture requirement for the applicable reporting area must complete this section.

☐ Operator certifies that it is not required to complete this section because Operator is in compliance with its statewide natural gas capture requirement for the applicable reporting area.

IX. Anticipated Natural Gas Production:

Well	API	Anticipated Average Natural Gas Rate MCF/D	Anticipated Volume of Natural Gas for the First Year MCF

X. Natural Gas Gathering System (NGGS):

Operator	System	ULSTR of Tie-in	Anticipated Gathering Start Date	Available Maximum Daily Capacity of System Segment Tie-in

XI. Map. ☐ Attach an accurate and legible map depicting the location of the well(s), the anticipated pipeline route(s) connecting the production operations to the existing or planned interconnect of the natural gas gathering system(s), and the maximum daily capacity of the segment or portion of the natural gas gathering system(s) to which the well(s) will be connected.

XII. Line Capacity. The natural gas gathering system ☐ will ☐ will not have capacity to gather 100% of the anticipated natural gas production volume from the well prior to the date of first production.

XIII. Line Pressure. Operator ☐ does ☐ does not anticipate that its existing well(s) connected to the same segment, or portion, of the natural gas gathering system(s) described above will continue to meet anticipated increases in line pressure caused by the new well(s).

☐ Attach Operator's plan to manage production in response to the increased line pressure.

XIV. Confidentiality: ☐ Operator asserts confidentiality pursuant to Section 71-2-8 NMSA 1978 for the information provided in Section 2 as provided in Paragraph (2) of Subsection D of 19.15.27.9 NMAC, and attaches a full description of the specific information for which confidentiality is asserted and the basis for such assertion.

Section 3 - Certifications

Effective May 25, 2021

Operator certifies that, after reasonable inquiry and based on the available information at the time of submittal:

☒ Operator will be able to connect the well(s) to a natural gas gathering system in the general area with sufficient capacity to transport one hundred percent of the anticipated volume of natural gas produced from the well(s) commencing on the date of first production, taking into account the current and anticipated volumes of produced natural gas from other wells connected to the pipeline gathering system; or

☐ Operator will not be able to connect to a natural gas gathering system in the general area with sufficient capacity to transport one hundred percent of the anticipated volume of natural gas produced from the well(s) commencing on the date of first production, taking into account the current and anticipated volumes of produced natural gas from other wells connected to the pipeline gathering system. ***If Operator checks this box, Operator will select one of the following:***

Well Shut-In. ☐ Operator will shut-in and not produce the well until it submits the certification required by Paragraph (4) of Subsection D of 19.15.27.9 NMAC; or

Venting and Flaring Plan. ☐ Operator has attached a venting and flaring plan that evaluates and selects one or more of the potential alternative beneficial uses for the natural gas until a natural gas gathering system is available, including:

- **(a)** power generation on lease;
- **(b)** power generation for grid;
- **(c)** compression on lease;
- **(d)** liquids removal on lease;
- **(e)** reinjection for underground storage;
- **(f)** reinjection for temporary storage;
- **(g)** reinjection for enhanced oil recovery;
- **(h)** fuel cell production; and
- **(i)** other alternative beneficial uses approved by the division.

Section 4 - Notices

1. If, at any time after Operator submits this Natural Gas Management Plan and before the well is spud:

(a) Operator becomes aware that the natural gas gathering system it planned to connect the well(s) to has become unavailable or will not have capacity to transport one hundred percent of the production from the well(s), no later than 20 days after becoming aware of such information, Operator shall submit for OCD's approval a new or revised venting and flaring plan containing the information specified in Paragraph (5) of Subsection D of 19.15.27.9 NMAC; or

(b) Operator becomes aware that it has, cumulatively for the year, become out of compliance with its baseline natural gas capture rate or natural gas capture requirement, no later than 20 days after becoming aware of such information, Operator shall submit for OCD's approval a new or revised Natural Gas Management Plan for each well it plans to spud during the next 90 days containing the information specified in Paragraph (2) of Subsection D of 19.15.27.9 NMAC, and shall file an update for each Natural Gas Management Plan until Operator is back in compliance with its baseline natural gas capture rate or natural gas capture requirement.

2. OCD may deny or conditionally approve an APD if Operator does not make a certification, fails to submit an adequate venting and flaring plan which includes alternative beneficial uses for the anticipated volume of natural gas produced, or if OCD determines that Operator will not have adequate natural gas takeaway capacity at the time a well will be spud.

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I certify that, after reasonable inquiry, the statements in and attached to this Natural Gas Management Plan are true and correct to the best of my knowledge and acknowledge that a false statement may be subject to civil and criminal penalties under the Oil and Gas Act.

Signature:	Bradley Bishop
Printed Name:	BRADLEY BISHOP
Title:	REGULATORY MANAGER
E-mail Address:	BBISHOP@MEWBOURNE.COM
Date:	8/13/21
Phone:	575-393-5905

OIL CONSERVATION DIVISION
(Only applicable when submitted as a standalone form)

Approved By:	
Title:	
Approval Date:	
Conditions of Approval:	

Mewbourne Oil Company

Natural Gas Management Plan – Attachment

VI. Separation equipment will be sized by construction engineering staff based on stated manufacturer daily throughput capacities and anticipated daily production rates to ensure adequate capacity. Closed vent system piping, compression needs, and VRUs will be sized utilizing ProMax modelling software to ensure adequate capacity for anticipated production volumes and conditions.

VII. Mewbourne Oil Company (MOC) will take following actions to comply with the regulations listed in 19.15.27.8 :

A. MOC will maximize the recovery of natural gas by minimizing the waste, as defined by 19.15.2 NMAC, of natural gas through venting and flaring. MOC will ensure that well(s) will be connected to a natural gas gathering system with sufficient capacity to transport natural gas. If there is no adequate takeaway for the gas, well(s) will be shut in until the natural gas gathering system is available.

B. All drilling operations will be equipped with a rig flare located at least 100 ft from the nearest surface hole. Rig flare will be utilized to combust any natural gas that is brought to surface during normal drilling operations. In the case of emergency venting or flaring the volumes will be estimated and reported appropriately.

C. During completion operations any natural gas brought to surface will be flared. Immediately following the finish of completion operations, all well flow will be directed to permanent separation equipment. Produced natural gas from separation equipment will be sent to sales. It is not anticipated that gas will not meet pipeline standards. However, if natural gas does not meet gathering pipeline quality specifications, MOC will flare the natural gas for 60 days or until the natural gas meets the pipeline quality specifications, whichever is sooner. MOC will ensure that the flare is sized properly and is equipped with automatic igniter or continuous pilot. The gas sample will analyzed twice per week and the gas will be routed into a gathering system as soon as pipeline specifications are met.

D. Natural gas will not be flared with the exceptions and provisions listed in the 19.15.27.8 D.(1) through (4). If there is no adequate takeaway for the separator gas, well(s) will be shut in until the natural gas gathering system is available with exception of emergency or malfunction situations. Venting and/or flaring volumes will be estimated and reported appropriately.

E. MOC will comply with the performance standards requirements and provisions listed in 19.15.27.8 E.(1) through (8). All equipment will be designed and sized to handle maximum anticipated pressures and throughputs in order to minimize the waste. Production storage tanks constructed after May 25, 2021 will be equipped with automatic gauging system. Flares constructed after May 25, 2021 will be equipped with automatic igniter or continuous pilot. Flares will be located at least 100' from the well and storage tanks unless otherwise approved by the division. MOC will conduct AVO inspections as described in 19.15.27.8 E (5) (a) with frequencies specified in 19.15.27.8 E (5) (b) and (c). All emergencies will be resolved as quickly and safely as feasible to minimize waste.

F. The volume of natural gas that is vented or flared as the result of malfunction or emergency during drilling and completions operations will be estimated. The volume of natural gas that is vented, flared or beneficially used during production operations, will be measured or estimated. MOC will install equipment to measure

the volume of natural gas flared from existing process piping or a flowline piped from equipment such as high pressure separators, heater treaters, or vapor recovery units associated with a well or facility associated with a well authorized by an APD issued after May 25, 2021 that has an average daily production greater than 60 Mcf/day. If metering is not practicable due to circumstances such as low flow rate or low pressure venting and flaring, MOC will estimate the volume of vented or flared natural gas. Measuring equipment will conform to industry standards and will not be designed or equipped with a manifold that allows the diversion of natural gas around the metering element except for the sole purpose of inspecting and servicing the measurement equipment.

VIII. For maintenance activities involving production equipment and compression, venting will be limited to the depressurization of the subject equipment to ensure safe working conditions. For maintenance of production and compression equipment the associated producing wells will be shut in to eliminate venting. For maintenance of VRUs all gas normally routed to the VRU will be routed to flare to eliminate venting.

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Drilling Plan Data Report

09/07/2021

APD ID: 10400041944
Submission Date: 08/30/2019

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM
Well Number: 2H

Well Type: CONVENTIONAL GAS WELL
Well Work Type: Drill

Highlighted data reflects the most recent changes

Show Final Text

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
459300	UNKNOWN	3330	28	28	OTHER : Top Soil	NONE	N
459311	RUSTLER	2379	925	925	ANHYDRITE, DOLOMITE	USEABLE WATER	N
459312	TOP SALT	2024	1280	1280	SALT	NONE	N
459301	BOTTOM SALT	-1446	4750	4750	SALT	NONE	N
459308	LAMAR	-1686	4990	4990	LIMESTONE	NATURAL GAS, OIL	N
459304	BELL CANYON	-1726	5030	5030	SANDSTONE	NATURAL GAS, OIL	N
459305	CHERRY CANYON	-2776	6080	6080	SANDSTONE	NATURAL GAS, OIL	N
459306	MANZANITA	-3026	6330	6330	LIMESTONE	NATURAL GAS, OIL	N
459299	BONE SPRING	-5826	9130	9130	LIMESTONE, SHALE	NATURAL GAS, OIL	N
459302	BONE SPRING 1ST	-6756	10060	10060	SANDSTONE	NATURAL GAS, OIL	N
459303	BONE SPRING 2ND	-7346	10650	10650	SANDSTONE	NATURAL GAS, OIL	N
459310	BONE SPRING 3RD	-8406	11710	11710	SANDSTONE	NATURAL GAS, OIL	N
459307	WOLFCAMP	-8876	12180	12180	LIMESTONE, SANDSTONE, SHALE	NATURAL GAS, OIL	Y

Section 2 - Blowout Prevention

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Pressure Rating (PSI): 10M **Rating Depth:** 17280

Equipment: Annular, Pipe Rams, Blind Rams

Requesting Variance? YES

Variance request: Request variance for the use of a flexible choke line from the BOP to Choke Manifold. Anchors not required by manufacturer. A multi-bowl wellhead will be used. See attached schematic.
Testing Procedure: BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested. Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

Choke Diagram Attachment:

Salado_Draw_10_W0OB_Fed_Com__2H_10M_BOPE_Choke_Diagram_rev_1_15_19_20190829142117.xlsx

Salado_Draw_10_W0OB_Fed_Com__2H_Flex_Line_Specs_API_16C_20190829142119.pdf

Salado_Draw_10_W0OB_Fed_Com__2H_Flex_Line_Specs_20190829142120.pdf

BOP Diagram Attachment:

Salado_Draw_10_W0OB_Fed_Com__2H_10M_Annular_BOP_Variance_20190829142132.doc

Salado_Draw_10_W0OB_Fed_Com__2H_10M_BOPE_Schematic_w_5M_Annular_20190829142133.pdf

Salado_Draw_10_W0OB_Fed_Com__2H_10M_Multi_Bowl_WH_Running_Proc_20190829142134.pdf

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	17.5	13.375	NEW	API	N	0	1000	0	1000	3326	2321	1000	H-40	48	ST&C	1.6	3.78	DRY	6.71	DRY	11.27
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	4915	0	4915	3326	-1574	4915	L-80	40	LT&C	1.21	2.25	DRY	4.66	DRY	3.7
3	PRODUCTION	8.75	7.0	NEW	API	N	0	12400	0	12272	3326	9167	12400	HCP-110	26	LT&C	1.29	1.64	DRY	2.15	DRY	2.57
4	LINER	6.125	4.5	NEW	API	N	11837	17280	11831	12308	-9167	-9187	5443	P-110	13.5	LT&C	1.28	1.49	DRY	4.6	DRY	5.74

Casing Attachments

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Casing Attachments

Casing ID: 1 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Salado_Draw_10_W0OB_Fed_Com_2H_Csg_assumptions_20200717101557.pdf

Casing ID: 2 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Salado_Draw_10_W0OB_Fed_Com_2H_Csg_assumptions_20200717101619.pdf

Casing ID: 3 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Salado_Draw_10_W0OB_Fed_Com_2H_Csg_assumptions_20200717101715.pdf

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Casing Attachments

Casing ID: 4 **String Type:** LINER

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Salado_Draw_10_W0OB_Fed_Com_2H_Csg_assumptions_20200717101819.pdf

Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	807	530	2.12	12.5	1124	100	Class C	Salt, Gel, Extender, LCM
SURFACE	Tail		807	1000	200	1.34	14.8	268	100	Class C	Retarder
INTERMEDIATE	Lead		0	4222	770	2.12	12.5	1632	25	Class C	Salt, Gel, Extender, LCM
INTERMEDIATE	Tail		4222	4915	200	1.34	14.8	268	25	Class C	Retarder
PRODUCTION	Lead		4715	9888	460	2.12	12.5	975	25	Class C	Gel, Retarder, Defoamer, Extender
PRODUCTION	Tail		9888	12400	400	1.18	15.6	472	25	Class H	Retarder, Fluid Loss, Defoamer
LINER	Lead		11837	17280	220	2.97	11.2	653	25	Class C	Salt, Gel, Fluid Loss, Retarder, Dispersant, Defoamer, Anti-Settling Agent

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Lost circulation material Sweeps Mud scavengers in surface hole

Describe the mud monitoring system utilized: Pason/PVT/Visual Monitoring

Circulating Medium Table

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
0	1000	SPUD MUD	8.6	8.8							
1000	4915	SALT SATURATED	10	10							
4915	12272	WATER-BASED MUD	8.6	9.5							
12272	12308	OIL-BASED MUD	10	13							

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

Will run GR/CNL in deeper offset Salado Draw 10 W1OB Fed Com #1H

List of open and cased hole logs run in the well:

CNL,DS,GR,MWD,MUDLOG

Coring operation description for the well:

None

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 8320 **Anticipated Surface Pressure:** 5613.12

Anticipated Bottom Hole Temperature(F): 165

Anticipated abnormal pressures, temperatures, or potential geologic hazards? NO

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

Salado_Draw_10_W0OB_Fed_Com__2H_H2S_Plan_20190829144942.doc

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

Salado_Draw_10_W0OB_Fed_Com_2H_Dir_plan_20200717102234.pdf
Salado_Draw_10_W0OB_Fed_Com_2H_Dir_plot_20200717102234.pdf

Other proposed operations facets description:

Other proposed operations facets attachment:

Salado_Draw_10_W0OB_Fed_Com_2H_Add_Info_20200717102250.pdf

Other Variance attachment:

Mewbourne Oil Company
Salado Draw 10 W0OB Fed Com #2H
Sec 10, T26S, R33E
SL: 235' FSL & 2030' FEL
BHL: 100' FNL & 2310' FEL

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Jt Tension	SF Body Tension
17.5"	0'	1000'	13.375"	48	H40	STC	1.68	3.78	6.71	11.27
12.25"	0'	4915'	9.625"	40	L80	LTC	1.21	2.25	3.70	4.66
8.75"	0'	12400'	7"	29	HCP110	LTC	1.29	1.64	2.15	2.57
6.125"	11837'	17280'	4.5"	13.5	P110	LTC	1.28	1.49	4.60	5.74
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h
Must have table for contingency casing

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Is casing API approved? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	Y
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

Mewbourne Oil Company
Salado Draw 10 W0OB Fed Com #2H
Sec 10, T26S, R33E
SL: 235' FSL & 2030' FEL
BHL: 100' FNL & 2310' FEL

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Jt Tension	SF Body Tension
17.5"	0'	1000'	13.375"	48	H40	STC	1.68	3.78	6.71	11.27
12.25"	0'	4915'	9.625"	40	L80	LTC	1.21	2.25	3.70	4.66
8.75"	0'	12400'	7"	29	HCP110	LTC	1.29	1.64	2.15	2.57
6.125"	11837'	17280'	4.5"	13.5	P110	LTC	1.28	1.49	4.60	5.74
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h
Must have table for contingency casing

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Is casing API approved? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	Y
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

Mewbourne Oil Company
Salado Draw 10 W0OB Fed Com #2H
Sec 10, T26S, R33E
SL: 235' FSL & 2030' FEL
BHL: 100' FNL & 2310' FEL

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Jt Tension	SF Body Tension
17.5"	0'	1000'	13.375"	48	H40	STC	1.68	3.78	6.71	11.27
12.25"	0'	4915'	9.625"	40	L80	LTC	1.21	2.25	3.70	4.66
8.75"	0'	12400'	7"	29	HCP110	LTC	1.29	1.64	2.15	2.57
6.125"	11837'	17280'	4.5"	13.5	P110	LTC	1.28	1.49	4.60	5.74
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h
Must have table for contingency casing

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Is casing API approved? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	Y
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

Mewbourne Oil Company
Salado Draw 10 W0OB Fed Com #2H
Sec 10, T26S, R33E
SL: 235' FSL & 2030' FEL
BHL: 100' FNL & 2310' FEL

Hole Size	Casing Interval From	Casing Interval To	Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Jt Tension	SF Body Tension
17.5"	0'	1000'	13.375"	48	H40	STC	1.68	3.78	6.71	11.27
12.25"	0'	4915'	9.625"	40	L80	LTC	1.21	2.25	3.70	4.66
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6.125"	11837'	17280'	4.5"	13.5	P110	LTC	1.28	1.49	4.60	5.74
				BLM Minimum Safety Factor			1.125	1	1.6 Dry 1.8 Wet	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h
Must have table for contingency casing

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Is casing API approved? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	Y
If yes, are there two strings cemented to surface?	Y
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

Hydrogen Sulfide Drilling Operations Plan
Mewbourne Oil Company

1. General Requirements

Rule 118 does not apply to this well because MOC has researched this area and no high concentrations of H2S were found. MOC will have on location and working all H2S safety equipment before the Delaware formation for purposes of safety and insurance requirements.

2. Hydrogen Sulfide Training

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will have received training from a qualified instructor in the following areas prior to entering the drilling pad area of the well:

1. The hazards and characteristics of hydrogen sulfide gas.
2. The proper use of personal protective equipment and life support systems.
3. The proper use of hydrogen sulfide detectors, alarms, warning systems, briefing areas, evacuation procedures.
4. The proper techniques for first aid and rescue operations.

Additionally, supervisory personnel will be trained in the following areas:

1 The effects of hydrogen sulfide on metal components. If high tensile tubular systems are utilized, supervisory personnel will be trained in their special maintenance requirements.
2 Corrective action and shut in procedures, blowout prevention, and well control procedures while drilling a well.
3 The contents of the Hydrogen Sulfide Drilling Operations Plan.

There will be an initial training session prior to encountering a know hydrogen sulfide source. The initial training session shall include a review of the site specific Hydrogen Sulfide Drilling Operations Plan.

3. Hydrogen Sulfide Safety Equipment and Systems

All hydrogen sulfide safety equipment and systems will be installed, tested, and operational prior to drilling below the 9 5/8" intermediate casing.

1. Well Control Equipment
   - A. Choke manifold with minimum of one adjustable choke/remote choke.
   - B. Blowout preventers equipped with blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit
   - C. Auxiliary equipment including annular type blowout preventer.
2. Protective Equipment for Essential Personnel
   Thirty minute self contained work unit located in the dog house and at briefing areas.

Additionally: If H2S is encountered in concentrations less than 10 ppm, fans will be placed in work areas to prevent the accumulation of hazardous amounts of poisonous gas. If higher concentrations of H2S are detected the well will be shut in and a rotating head, mud/gas separator, remote choke and flare line with igniter will be installed.

3. Hydrogen Sulfide Protection and Monitoring Equipment
Two portable hydrogen sulfide monitors positioned on location for optimum coverage and detection. The units shall have audible sirens to notify personnel when hydrogen sulfide levels exceed 20 PPM.

4. Visual Warning Systems
A. Wind direction indicators as indicated on the wellsite diagram.
B. Caution signs shall be posted on roads providing access to location. Signs shall be painted a high visibility color with lettering of sufficient size to be readable at reasonable distances from potentially contaminated areas.

4. Mud Program

The mud program has been designed to minimize the amount of hydrogen sulfide entrained in the mud system. Proper mud weight, safe drilling practices, and the use of hydrogen sulfide scavengers will minimize hazards while drilling the well.

5. Metallurgy

All tubular systems, wellheads, blowout preventers, drilling spools, kill lines, choke manifolds, and valves shall be suitable for service in a hydrogen sulfide environment when chemically treated.

6. Communications

State & County Officials phone numbers are posted on rig floor and supervisors trailer. Communications in company vehicles and toolpushers are either two way radios or cellular phones.

7. Well Testing

Drill stem testing is not an anticipated requirement for evaluation of this well. If a drill stem test is required, it will be conducted with a minimum number of personnel in the immediate vicinity. The test will be conducted during daylight hours only.

8. Emergency Phone Numbers

Eddy County Sheriff's Office	**911 or 575-887-7551**
Ambulance Service	**911 or 575-885-2111**
Carlsbad Fire Dept	**911 or 575-885-2111**
Loco Hills Volunteer Fire Dept.	**911 or 575-677-3266**
Closest Medical Facility - Columbia Medical Center of Carlsbad	**575-492-5000**

Mewbourne Oil Company	**Hobbs District Office**	**575-393-5905**
	Fax	**575-397-6252**
	2nd Fax	**575-393-7259**
District Manager	**Robin Terrell**	**575-390-4816**
Drilling Superintendent	**Frosty Lathan**	**575-390-4103**
	Bradley Bishop	**575-390-6838**

Drilling Foreman	**Wesley Noseff**	**575-441-0729**

Mewbourne Oil Company

Lea County, New Mexico NAD 83
Salado Draw 10 W0OB Fed Com #2H
Sec 10, T26S, R33E
SHL: 235' FSL & 2030' FEL
BHL: 100' FNL & 2310' FEL

Plan: Design #1

Standard Planning Report

17 July, 2020

Planning Report

Database:	Hobbs	**Local Co-ordinate Reference:**	Site Salado Draw 10 W0OB Fed Com #2H
Company:	Mewbourne Oil Company	**TVD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Project:	Lea County, New Mexico NAD 83	**MD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Site:	Salado Draw 10 W0OB Fed Com #2H	**North Reference:**	Grid
Well:	Sec 10, T26S, R33E	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	BHL: 100' FNL & 2310' FEL		
Design:	Design #1		

Project	Lea County, New Mexico NAD 83		
Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Salado Draw 10 W0OB Fed Com #2H				
Site Position:		**Northing:**	383,292.00 usft	**Latitude:**	32.0513797
From:	Map	**Easting:**	781,488.00 usft	**Longitude:**	-103.5582023
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.41 °

Well	Sec 10, T26S, R33E					
Well Position	**+N/-S**	0.0 usft	**Northing:**	383,292.00 usft	**Latitude:**	32.0513797
	+E/-W	0.0 usft	**Easting:**	781,488.00 usft	**Longitude:**	-103.5582023
Position Uncertainty		0.0 usft	**Wellhead Elevation:**	3,331.0 usft	**Ground Level:**	3,303.0 usft

Wellbore	BHL: 100' FNL & 2310' FEL			
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	IGRF2010	12/31/2014	7.13	59.94	48,160

Design	Design #1			
Audit Notes:				
Version:	**Phase:**	PROTOTYPE	**Tie On Depth:**	0.0

Vertical Section:	**Depth From (TVD) (usft)**	**+N/-S (usft)**	**+E/-W (usft)**	**Direction (°)**
	0.0	0.0	0.0	356.34

Plan Sections

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.00	0.00	0.00	0.00	
1,128.5	1.93	230.74	1,128.5	-1.4	-1.7	1.50	1.50	0.00	230.74	
11,708.5	1.93	230.74	11,702.5	-226.6	-277.3	0.00	0.00	0.00	0.00	
11,837.0	0.00	0.01	11,831.0	-228.0	-279.0	1.50	-1.50	0.00	180.00	KOP: 10' FSL & 2310'
12,586.7	90.05	359.59	12,308.0	249.4	-282.4	12.01	12.01	0.00	-0.41	
17,280.4	90.05	359.59	12,304.0	4,943.0	-316.0	0.00	0.00	0.00	0.00	BHL: 100' FNL & 231(

Planning Report

Database:	Hobbs	**Local Co-ordinate Reference:**	Site Salado Draw 10 W0OB Fed Com #2H
Company:	Mewbourne Oil Company	**TVD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Project:	Lea County, New Mexico NAD 83	**MD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Site:	Salado Draw 10 W0OB Fed Com #2H	**North Reference:**	Grid
Well:	Sec 10, T26S, R33E	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	BHL: 100' FNL & 2310' FEL		
Design:	Design #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
SHL: 235' FSL & 2030' FEL									
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
300.0	0.00	0.00	300.0	0.0	0.0	0.0	0.00	0.00	0.00
400.0	0.00	0.00	400.0	0.0	0.0	0.0	0.00	0.00	0.00
500.0	0.00	0.00	500.0	0.0	0.0	0.0	0.00	0.00	0.00
600.0	0.00	0.00	600.0	0.0	0.0	0.0	0.00	0.00	0.00
700.0	0.00	0.00	700.0	0.0	0.0	0.0	0.00	0.00	0.00
800.0	0.00	0.00	800.0	0.0	0.0	0.0	0.00	0.00	0.00
900.0	0.00	0.00	900.0	0.0	0.0	0.0	0.00	0.00	0.00
1,000.0	0.00	0.00	1,000.0	0.0	0.0	0.0	0.00	0.00	0.00
1,100.0	1.50	230.74	1,100.0	-0.8	-1.0	-0.8	1.50	1.50	0.00
1,128.5	1.93	230.74	1,128.5	-1.4	-1.7	-1.3	1.50	1.50	0.00
1,200.0	1.93	230.74	1,199.9	-2.9	-3.5	-2.7	0.00	0.00	0.00
1,300.0	1.93	230.74	1,299.9	-5.0	-6.1	-4.6	0.00	0.00	0.00
1,400.0	1.93	230.74	1,399.8	-7.1	-8.7	-6.6	0.00	0.00	0.00
1,500.0	1.93	230.74	1,499.8	-9.3	-11.4	-8.5	0.00	0.00	0.00
1,600.0	1.93	230.74	1,599.7	-11.4	-14.0	-10.5	0.00	0.00	0.00
1,700.0	1.93	230.74	1,699.7	-13.5	-16.6	-12.5	0.00	0.00	0.00
1,800.0	1.93	230.74	1,799.6	-15.7	-19.2	-14.4	0.00	0.00	0.00
1,900.0	1.93	230.74	1,899.5	-17.8	-21.8	-16.4	0.00	0.00	0.00
2,000.0	1.93	230.74	1,999.5	-19.9	-24.4	-18.3	0.00	0.00	0.00
2,100.0	1.93	230.74	2,099.4	-22.1	-27.0	-20.3	0.00	0.00	0.00
2,200.0	1.93	230.74	2,199.4	-24.2	-29.6	-22.2	0.00	0.00	0.00
2,300.0	1.93	230.74	2,299.3	-26.3	-32.2	-24.2	0.00	0.00	0.00
2,400.0	1.93	230.74	2,399.3	-28.4	-34.8	-26.2	0.00	0.00	0.00
2,500.0	1.93	230.74	2,499.2	-30.6	-37.4	-28.1	0.00	0.00	0.00
2,600.0	1.93	230.74	2,599.1	-32.7	-40.0	-30.1	0.00	0.00	0.00
2,700.0	1.93	230.74	2,699.1	-34.8	-42.6	-32.0	0.00	0.00	0.00
2,800.0	1.93	230.74	2,799.0	-37.0	-45.2	-34.0	0.00	0.00	0.00
2,900.0	1.93	230.74	2,899.0	-39.1	-47.8	-36.0	0.00	0.00	0.00
3,000.0	1.93	230.74	2,998.9	-41.2	-50.4	-37.9	0.00	0.00	0.00
3,100.0	1.93	230.74	3,098.9	-43.3	-53.0	-39.9	0.00	0.00	0.00
3,200.0	1.93	230.74	3,198.8	-45.5	-55.6	-41.8	0.00	0.00	0.00
3,300.0	1.93	230.74	3,298.7	-47.6	-58.2	-43.8	0.00	0.00	0.00
3,400.0	1.93	230.74	3,398.7	-49.7	-60.9	-45.7	0.00	0.00	0.00
3,500.0	1.93	230.74	3,498.6	-51.9	-63.5	-47.7	0.00	0.00	0.00
3,600.0	1.93	230.74	3,598.6	-54.0	-66.1	-49.7	0.00	0.00	0.00
3,700.0	1.93	230.74	3,698.5	-56.1	-68.7	-51.6	0.00	0.00	0.00
3,800.0	1.93	230.74	3,798.5	-58.2	-71.3	-53.6	0.00	0.00	0.00
3,900.0	1.93	230.74	3,898.4	-60.4	-73.9	-55.5	0.00	0.00	0.00
4,000.0	1.93	230.74	3,998.3	-62.5	-76.5	-57.5	0.00	0.00	0.00
4,100.0	1.93	230.74	4,098.3	-64.6	-79.1	-59.5	0.00	0.00	0.00
4,200.0	1.93	230.74	4,198.2	-66.8	-81.7	-61.4	0.00	0.00	0.00
4,300.0	1.93	230.74	4,298.2	-68.9	-84.3	-63.4	0.00	0.00	0.00
4,400.0	1.93	230.74	4,398.1	-71.0	-86.9	-65.3	0.00	0.00	0.00
4,500.0	1.93	230.74	4,498.1	-73.2	-89.5	-67.3	0.00	0.00	0.00
4,600.0	1.93	230.74	4,598.0	-75.3	-92.1	-69.3	0.00	0.00	0.00
4,700.0	1.93	230.74	4,698.0	-77.4	-94.7	-71.2	0.00	0.00	0.00
4,800.0	1.93	230.74	4,797.9	-79.5	-97.3	-73.2	0.00	0.00	0.00
4,900.0	1.93	230.74	4,897.8	-81.7	-99.9	-75.1	0.00	0.00	0.00
5,000.0	1.93	230.74	4,997.8	-83.8	-102.5	-77.1	0.00	0.00	0.00
5,100.0	1.93	230.74	5,097.7	-85.9	-105.1	-79.0	0.00	0.00	0.00

Planning Report

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Project:	Lea County, New Mexico NAD 83	**MD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Site:	Salado Draw 10 W0OB Fed Com #2H	**North Reference:**	Grid
Well:	Sec 10, T26S, R33E	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	BHL: 100' FNL & 2310' FEL		
Design:	Design #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,200.0	1.93	230.74	5,197.7	-88.1	-107.8	-81.0	0.00	0.00	0.00
5,300.0	1.93	230.74	5,297.6	-90.2	-110.4	-83.0	0.00	0.00	0.00
5,400.0	1.93	230.74	5,397.6	-92.3	-113.0	-84.9	0.00	0.00	0.00
5,500.0	1.93	230.74	5,497.5	-94.4	-115.6	-86.9	0.00	0.00	0.00
5,600.0	1.93	230.74	5,597.4	-96.6	-118.2	-88.8	0.00	0.00	0.00
5,700.0	1.93	230.74	5,697.4	-98.7	-120.8	-90.8	0.00	0.00	0.00
5,800.0	1.93	230.74	5,797.3	-100.8	-123.4	-92.8	0.00	0.00	0.00
5,900.0	1.93	230.74	5,897.3	-103.0	-126.0	-94.7	0.00	0.00	0.00
6,000.0	1.93	230.74	5,997.2	-105.1	-128.6	-96.7	0.00	0.00	0.00
6,100.0	1.93	230.74	6,097.2	-107.2	-131.2	-98.6	0.00	0.00	0.00
6,200.0	1.93	230.74	6,197.1	-109.3	-133.8	-100.6	0.00	0.00	0.00
6,300.0	1.93	230.74	6,297.0	-111.5	-136.4	-102.5	0.00	0.00	0.00
6,400.0	1.93	230.74	6,397.0	-113.6	-139.0	-104.5	0.00	0.00	0.00
6,500.0	1.93	230.74	6,496.9	-115.7	-141.6	-106.5	0.00	0.00	0.00
6,600.0	1.93	230.74	6,596.9	-117.9	-144.2	-108.4	0.00	0.00	0.00
6,700.0	1.93	230.74	6,696.8	-120.0	-146.8	-110.4	0.00	0.00	0.00
6,800.0	1.93	230.74	6,796.8	-122.1	-149.4	-112.3	0.00	0.00	0.00
6,900.0	1.93	230.74	6,896.7	-124.3	-152.0	-114.3	0.00	0.00	0.00
7,000.0	1.93	230.74	6,996.7	-126.4	-154.6	-116.3	0.00	0.00	0.00
7,100.0	1.93	230.74	7,096.6	-128.5	-157.3	-118.2	0.00	0.00	0.00
7,200.0	1.93	230.74	7,196.5	-130.6	-159.9	-120.2	0.00	0.00	0.00
7,300.0	1.93	230.74	7,296.5	-132.8	-162.5	-122.1	0.00	0.00	0.00
7,400.0	1.93	230.74	7,396.4	-134.9	-165.1	-124.1	0.00	0.00	0.00
7,500.0	1.93	230.74	7,496.4	-137.0	-167.7	-126.0	0.00	0.00	0.00
7,600.0	1.93	230.74	7,596.3	-139.2	-170.3	-128.0	0.00	0.00	0.00
7,700.0	1.93	230.74	7,696.3	-141.3	-172.9	-130.0	0.00	0.00	0.00
7,800.0	1.93	230.74	7,796.2	-143.4	-175.5	-131.9	0.00	0.00	0.00
7,900.0	1.93	230.74	7,896.1	-145.5	-178.1	-133.9	0.00	0.00	0.00
8,000.0	1.93	230.74	7,996.1	-147.7	-180.7	-135.8	0.00	0.00	0.00
8,100.0	1.93	230.74	8,096.0	-149.8	-183.3	-137.8	0.00	0.00	0.00
8,200.0	1.93	230.74	8,196.0	-151.9	-185.9	-139.8	0.00	0.00	0.00
8,300.0	1.93	230.74	8,295.9	-154.1	-188.5	-141.7	0.00	0.00	0.00
8,400.0	1.93	230.74	8,395.9	-156.2	-191.1	-143.7	0.00	0.00	0.00
8,500.0	1.93	230.74	8,495.8	-158.3	-193.7	-145.6	0.00	0.00	0.00
8,600.0	1.93	230.74	8,595.7	-160.4	-196.3	-147.6	0.00	0.00	0.00
8,700.0	1.93	230.74	8,695.7	-162.6	-198.9	-149.6	0.00	0.00	0.00
8,800.0	1.93	230.74	8,795.6	-164.7	-201.5	-151.5	0.00	0.00	0.00
8,900.0	1.93	230.74	8,895.6	-166.8	-204.2	-153.5	0.00	0.00	0.00
9,000.0	1.93	230.74	8,995.5	-169.0	-206.8	-155.4	0.00	0.00	0.00
9,100.0	1.93	230.74	9,095.5	-171.1	-209.4	-157.4	0.00	0.00	0.00
9,200.0	1.93	230.74	9,195.4	-173.2	-212.0	-159.3	0.00	0.00	0.00
9,300.0	1.93	230.74	9,295.3	-175.4	-214.6	-161.3	0.00	0.00	0.00
9,400.0	1.93	230.74	9,395.3	-177.5	-217.2	-163.3	0.00	0.00	0.00
9,500.0	1.93	230.74	9,495.2	-179.6	-219.8	-165.2	0.00	0.00	0.00
9,600.0	1.93	230.74	9,595.2	-181.7	-222.4	-167.2	0.00	0.00	0.00
9,700.0	1.93	230.74	9,695.1	-183.9	-225.0	-169.1	0.00	0.00	0.00
9,800.0	1.93	230.74	9,795.1	-186.0	-227.6	-171.1	0.00	0.00	0.00
9,900.0	1.93	230.74	9,895.0	-188.1	-230.2	-173.1	0.00	0.00	0.00
10,000.0	1.93	230.74	9,995.0	-190.3	-232.8	-175.0	0.00	0.00	0.00
10,100.0	1.93	230.74	10,094.9	-192.4	-235.4	-177.0	0.00	0.00	0.00
10,200.0	1.93	230.74	10,194.8	-194.5	-238.0	-178.9	0.00	0.00	0.00
10,300.0	1.93	230.74	10,294.8	-196.6	-240.6	-180.9	0.00	0.00	0.00
10,400.0	1.93	230.74	10,394.7	-198.8	-243.2	-182.8	0.00	0.00	0.00
10,500.0	1.93	230.74	10,494.7	-200.9	-245.8	-184.8	0.00	0.00	0.00

Planning Report

Database:	Hobbs	**Local Co-ordinate Reference:**	Site Salado Draw 10 W0OB Fed Com #2H
Company:	Mewbourne Oil Company	**TVD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Project:	Lea County, New Mexico NAD 83	**MD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Site:	Salado Draw 10 W0OB Fed Com #2H	**North Reference:**	Grid
Well:	Sec 10, T26S, R33E	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	BHL: 100' FNL & 2310' FEL		
Design:	Design #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,600.0	1.93	230.74	10,594.6	-203.0	-248.4	-186.8	0.00	0.00	0.00
10,700.0	1.93	230.74	10,694.6	-205.2	-251.0	-188.7	0.00	0.00	0.00
10,800.0	1.93	230.74	10,794.5	-207.3	-253.7	-190.7	0.00	0.00	0.00
10,900.0	1.93	230.74	10,894.4	-209.4	-256.3	-192.6	0.00	0.00	0.00
11,000.0	1.93	230.74	10,994.4	-211.5	-258.9	-194.6	0.00	0.00	0.00
11,100.0	1.93	230.74	11,094.3	-213.7	-261.5	-196.6	0.00	0.00	0.00
11,200.0	1.93	230.74	11,194.3	-215.8	-264.1	-198.5	0.00	0.00	0.00
11,300.0	1.93	230.74	11,294.2	-217.9	-266.7	-200.5	0.00	0.00	0.00
11,400.0	1.93	230.74	11,394.2	-220.1	-269.3	-202.4	0.00	0.00	0.00
11,500.0	1.93	230.74	11,494.1	-222.2	-271.9	-204.4	0.00	0.00	0.00
11,600.0	1.93	230.74	11,594.0	-224.3	-274.5	-206.4	0.00	0.00	0.00
11,700.0	1.93	230.74	11,694.0	-226.5	-277.1	-208.3	0.00	0.00	0.00
11,708.5	1.93	230.74	11,702.5	-226.6	-277.3	-208.5	0.00	0.00	0.00
11,800.0	0.56	230.74	11,794.0	-227.9	-278.9	-209.6	1.50	-1.50	0.00
11,837.0	0.00	0.01	11,831.0	-228.0	-279.0	-209.7	1.50	-1.50	0.00
KOP: 10' FSL & 2310' FEL									
11,900.0	7.56	359.59	11,893.8	-223.9	-279.0	-205.6	12.01	12.01	0.00
12,000.0	19.57	359.59	11,990.8	-200.4	-279.2	-182.2	12.01	12.01	0.00
12,100.0	31.59	359.59	12,080.8	-157.3	-279.5	-139.2	12.01	12.01	0.00
12,134.9	35.77	359.59	12,109.8	-138.0	-279.6	-119.9	12.01	12.01	0.00
FTP: 100' FSL & 2310' FEL									
12,200.0	43.60	359.59	12,159.9	-96.4	-279.9	-78.4	12.01	12.01	0.00
12,300.0	55.61	359.59	12,224.6	-20.4	-280.5	-2.5	12.01	12.01	0.00
12,400.0	67.62	359.59	12,272.1	67.4	-281.1	85.2	12.01	12.01	0.00
12,500.0	79.63	359.59	12,300.2	163.2	-281.8	180.8	12.01	12.01	0.00
12,586.7	90.05	359.59	12,308.0	249.4	-282.4	266.9	12.01	12.01	0.00
LP: 484' FSL & 2310' FEL									
12,600.0	90.05	359.59	12,308.0	262.7	-282.5	280.2	0.00	0.00	0.00
12,700.0	90.05	359.59	12,307.9	362.7	-283.2	380.0	0.00	0.00	0.00
12,800.0	90.05	359.59	12,307.8	462.7	-283.9	479.8	0.00	0.00	0.00
12,900.0	90.05	359.59	12,307.7	562.7	-284.7	579.7	0.00	0.00	0.00
13,000.0	90.05	359.59	12,307.6	662.7	-285.4	679.5	0.00	0.00	0.00
13,100.0	90.05	359.59	12,307.6	762.7	-286.1	779.4	0.00	0.00	0.00
13,200.0	90.05	359.59	12,307.5	862.7	-286.8	879.2	0.00	0.00	0.00
13,300.0	90.05	359.59	12,307.4	962.7	-287.5	979.0	0.00	0.00	0.00
13,400.0	90.05	359.59	12,307.3	1,062.7	-288.2	1,078.9	0.00	0.00	0.00
13,500.0	90.05	359.59	12,307.2	1,162.7	-289.0	1,178.7	0.00	0.00	0.00
13,600.0	90.05	359.59	12,307.1	1,262.7	-289.7	1,278.6	0.00	0.00	0.00
13,700.0	90.05	359.59	12,307.1	1,362.6	-290.4	1,378.4	0.00	0.00	0.00
13,800.0	90.05	359.59	12,307.0	1,462.6	-291.1	1,478.2	0.00	0.00	0.00
13,900.0	90.05	359.59	12,306.9	1,562.6	-291.8	1,578.1	0.00	0.00	0.00
14,000.0	90.05	359.59	12,306.8	1,662.6	-292.5	1,677.9	0.00	0.00	0.00
14,100.0	90.05	359.59	12,306.7	1,762.6	-293.2	1,777.8	0.00	0.00	0.00
14,200.0	90.05	359.59	12,306.6	1,862.6	-294.0	1,877.6	0.00	0.00	0.00
14,300.0	90.05	359.59	12,306.5	1,962.6	-294.7	1,977.4	0.00	0.00	0.00
14,400.0	90.05	359.59	12,306.5	2,062.6	-295.4	2,077.3	0.00	0.00	0.00
14,500.0	90.05	359.59	12,306.4	2,162.6	-296.1	2,177.1	0.00	0.00	0.00
14,600.0	90.05	359.59	12,306.3	2,262.6	-296.8	2,277.0	0.00	0.00	0.00
14,700.0	90.05	359.59	12,306.2	2,362.6	-297.5	2,376.8	0.00	0.00	0.00
14,800.0	90.05	359.59	12,306.1	2,462.6	-298.3	2,476.6	0.00	0.00	0.00
14,900.0	90.05	359.59	12,306.0	2,562.6	-299.0	2,576.5	0.00	0.00	0.00
15,000.0	90.05	359.59	12,305.9	2,662.6	-299.7	2,676.3	0.00	0.00	0.00
15,100.0	90.05	359.59	12,305.9	2,762.6	-300.4	2,776.2	0.00	0.00	0.00

Planning Report

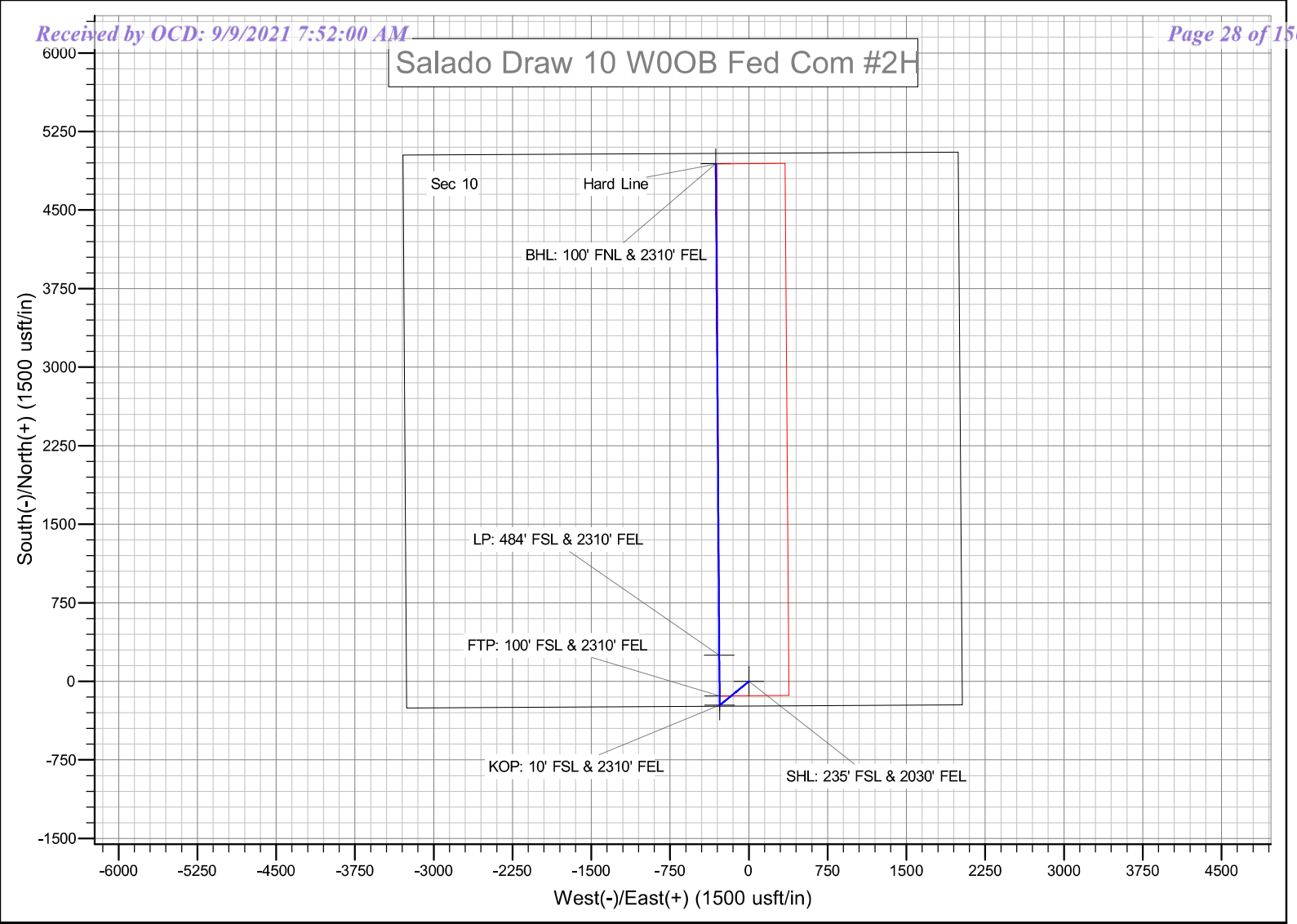
Database:	Hobbs	**Local Co-ordinate Reference:**	Site Salado Draw 10 W0OB Fed Com #2H
Company:	Mewbourne Oil Company	**TVD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Project:	Lea County, New Mexico NAD 83	**MD Reference:**	WELL @ 3331.0usft (Original Well Elev)
Site:	Salado Draw 10 W0OB Fed Com #2H	**North Reference:**	Grid
Well:	Sec 10, T26S, R33E	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	BHL: 100' FNL & 2310' FEL		
Design:	Design #1		

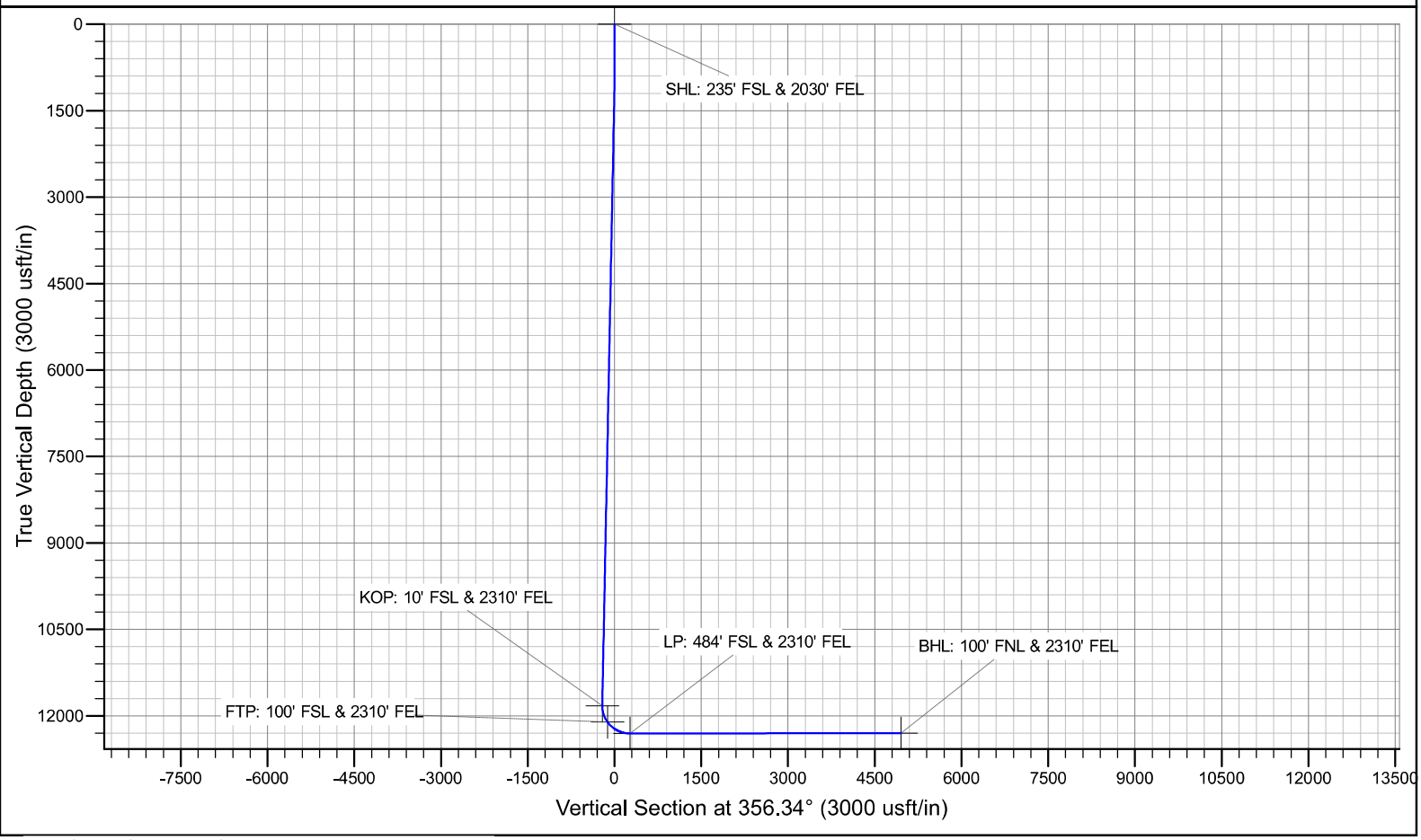
Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,200.0	90.05	359.59	12,305.8	2,862.6	-301.1	2,876.0	0.00	0.00	0.00
15,300.0	90.05	359.59	12,305.7	2,962.6	-301.8	2,975.8	0.00	0.00	0.00
15,400.0	90.05	359.59	12,305.6	3,062.6	-302.5	3,075.7	0.00	0.00	0.00
15,500.0	90.05	359.59	12,305.5	3,162.6	-303.3	3,175.5	0.00	0.00	0.00
15,600.0	90.05	359.59	12,305.4	3,262.6	-304.0	3,275.3	0.00	0.00	0.00
15,700.0	90.05	359.59	12,305.3	3,362.6	-304.7	3,375.2	0.00	0.00	0.00
15,800.0	90.05	359.59	12,305.3	3,462.6	-305.4	3,475.0	0.00	0.00	0.00
15,900.0	90.05	359.59	12,305.2	3,562.6	-306.1	3,574.9	0.00	0.00	0.00
16,000.0	90.05	359.59	12,305.1	3,662.6	-306.8	3,674.7	0.00	0.00	0.00
16,100.0	90.05	359.59	12,305.0	3,762.6	-307.6	3,774.5	0.00	0.00	0.00
16,200.0	90.05	359.59	12,304.9	3,862.6	-308.3	3,874.4	0.00	0.00	0.00
16,300.0	90.05	359.59	12,304.8	3,962.6	-309.0	3,974.2	0.00	0.00	0.00
16,400.0	90.05	359.59	12,304.8	4,062.6	-309.7	4,074.1	0.00	0.00	0.00
16,500.0	90.05	359.59	12,304.7	4,162.6	-310.4	4,173.9	0.00	0.00	0.00
16,600.0	90.05	359.59	12,304.6	4,262.6	-311.1	4,273.7	0.00	0.00	0.00
16,700.0	90.05	359.59	12,304.5	4,362.6	-311.8	4,373.6	0.00	0.00	0.00
16,800.0	90.05	359.59	12,304.4	4,462.6	-312.6	4,473.4	0.00	0.00	0.00
16,900.0	90.05	359.59	12,304.3	4,562.6	-313.3	4,573.3	0.00	0.00	0.00
17,000.0	90.05	359.59	12,304.2	4,662.6	-314.0	4,673.1	0.00	0.00	0.00
17,100.0	90.05	359.59	12,304.2	4,762.6	-314.7	4,772.9	0.00	0.00	0.00
17,200.0	90.05	359.59	12,304.1	4,862.6	-315.4	4,872.8	0.00	0.00	0.00
17,280.4	90.05	359.59	12,304.0	4,943.0	-316.0	4,953.1	0.00	0.00	0.00
BHL: 100' FNL & 2310' FEL									

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
SHL: 235' FSL & 2030' F - plan hits target center - Point	0.00	0.00	0.0	0.0	0.0	383,292.00	781,488.00	32.0513797	-103.5582023
KOP: 10' FSL & 2310' FI - plan hits target center - Point	0.00	0.01	11,831.0	-228.0	-279.0	383,064.00	781,209.00	32.0507585	-103.5591080
FTP: 100' FSL & 2310' F - plan hits target center - Point	0.00	0.00	12,109.9	-138.0	-279.6	383,154.00	781,208.35	32.0510059	-103.5591080
BHL: 100' FNL & 2310' F - plan hits target center - Point	0.00	0.00	12,304.0	4,943.0	-316.0	388,235.00	781,172.00	32.0649729	-103.5591078
LP: 484' FSL & 2310' FE - plan hits target center - Point	0.00	0.00	12,308.0	249.4	-282.4	383,541.40	781,205.60	32.0520708	-103.5591080


Salado Draw 10 W0OB Fed Com #2H
Sec 10
Hard Line
BHL: 100' FNL & 2310' FEL
LP: 484' FSL & 2310' FEL
FTP: 100' FSL & 2310' FEL
KOP: 10' FSL & 2310' FEL
SHL: 235' FSL & 2030' FEL
South(-)/North(+) (1500 usft/in)
West(-)/East(+) (1500 usft/in)
6000
5250
4500
3750
3000
2250
1500
750
0
-750
-1500
-6000
-5250
-4500
-3750
-3000
-2250
-1500
-750
0
750
1500
2250
3000
3750
4500


SHL: 235' FSL & 2030' FEL
KOP: 10' FSL & 2310' FEL
LP: 484' FSL & 2310' FEL
BHL: 100' FNL & 2310' FEL
FTP: 100' FSL & 2310' FEL
True Vertical Depth (3000 usft/in)
Vertical Section at 356.34° (3000 usft/in)
0
1500
3000
4500
6000
7500
9000
10500
12000
-7500
-6000
-4500
-3000
-1500
0
1500
3000
4500
6000
7500
9000
10500
12000
13500

Intent [X] As Drilled [ ]

API #

Operator Name:	Property Name:	Well Number
Mewbourne Oil Co.	Salado Draw 10 W0OB Fed Com	2H

Kick Off Point (KOP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
O	10	26S	33E		10	S	2310	E	Lea

Latitude	Longitude	NAD
32.0507585	-103.5591080	83

First Take Point (FTP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
O	10	26S	33E		100	S	2310	E	Lea

Latitude	Longitude	NAD
32.0510059	-103.5591080	83

Last Take Point (LTP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
B	10	26S	33E		100	N	2310	E	Lea

Latitude	Longitude	NAD
32.0649716	-103.5591087	83

Is this well the defining well for the Horizontal Spacing Unit? [Y]

Is this well an infill well? [N]

If infill is yes please provide API if available, Operator Name and well number for Defining well for Horizontal Spacing Unit.

API #

Operator Name:	Property Name:	Well Number

KZ 06/29/2018

PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**Mewbourne Oil Company**
LEASE NO.:	**NMNM0359292**
WELL NAME & NO.:	SALADO DRAW 10 W0OB FED COM 2H
SURFACE HOLE FOOTAGE:	235'/S & 2030'/E
BOTTOM HOLE FOOTAGE	100'/N & 2310'/E
LOCATION:	Section 10, T.26 S., R.33 E., NMP
COUNTY:	Lea County, New Mexico

COA

H2S	○ Yes	◉ No	
Potash	◉ None	○ Secretary	○ R-111-P
Cave/Karst Potential	○ Low	◉ Medium	○ High
Cave/Karst Potential	○ Critical		
Variance	○ None	◉ Flex Hose	○ Other
Wellhead	○ Conventional	◉ Multibowl	○ Both
Other	☐ 4 String Area	☐ Capitan Reef	☐ WIPP
Other	☐ Fluid Filled	☐ Cement Squeeze	☐ Pilot Hole
Special Requirements	☐ Water Disposal	☑ COM	☐ Unit

A. HYDROGEN SULFIDE

Hydrogen Sulfide (H2S) monitors shall be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, provide measured values and formations to the BLM.

B. CASING

Casing Design:

1. The **13-3/8** inch surface casing shall be set at approximately **1000** feet (a minimum of **25 feet (Lea County)** into the Rustler Anhydrite and above the salt) and cemented to the surface.

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after

 Approval Date: 09/03/2021

completing the cement job.

b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement)
c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
d. If cement falls back, remedial cementing will be done prior to drilling out that string.

2. The **9-5/8** inch intermediate casing shall be set at approximately **4915** feet. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:

   - Cement to surface. If cement does not circulate see B.1.a, c-d above. **Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.**
     Excess cement calculates to 19%, additional cement might be required.

❖ In Medium Cave/Karst Areas if cement does not circulate to surface on the first two casing strings, the cement on the 3rd casing string must come to surface.

3. The minimum required fill of cement behind the **7** inch production casing is:

   - Cement should tie-back at least **200 feet** into previous casing string. Operator shall provide method of verification.

4. The minimum required fill of cement behind the **4-1/2** inch production liner is:

   - Cement should tie-back **100 feet** into the previous casing. Operator shall provide method of verification.

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).'

2.

Option 1:

a. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **2000 (2M)** psi.

b. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the intermediate casing shoe shall be **10,000 (10M)** psi. **Variance is approved to use a 5000 (5M) Annular which shall be tested to 5000 (5M) psi.**

Option 2:

1. Operator has proposed a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **10,000 (10M)** psi. **Variance is approved to use a 5000 (5M) Annular which shall be tested to 5000 (5M) psi.**

    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
    b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
    c. Manufacturer representative shall install the test plug for the initial BOP test.
    d. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
    e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

D. SPECIAL REQUIREMENT (S)

Communitization Agreement

- The operator will submit a Communitization Agreement to the Carlsbad Field Office, 620 E Greene St. Carlsbad, New Mexico 88220, at least 90 days before the anticipated date of first production from a well subject to a spacing order issued by the New Mexico Oil Conservation Division. The Communitization Agreement will include the signatures of all working interest owners in all Federal and Indian leases subject to the Communitization Agreement (i.e., operating rights owners and lessees of record), or certification that the operator has obtained the written signatures of all such owners and will make those signatures available to the BLM immediately upon request.
- If the operator does not comply with this condition of approval, the BLM may take enforcement actions that include, but are not limited to, those specified in 43 CFR 3163.1.
- In addition, the well sign shall include the surface and bottom hole lease numbers. When the Communitization Agreement number is known, it shall also be on the sign.

GENERAL REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

a. Spudding well (minimum of 24 hours)
b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
c. BOPE tests (minimum of 4 hours)

☒ Eddy County
Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220, (575) 361-2822

☒ Lea County
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 393-3612

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.

   a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
   b. When the operator proposes to set surface casing with Spudder Rig

- Notify the BLM when moving in and removing the Spudder Rig.
- Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
- BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.

2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log. The casing intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.

3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements. The casing intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.

5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.

7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.
8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.

2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: The flex line must meet the requirements of API 16C. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.

3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.

4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:

    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.

b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
c. Manufacturer representative shall install the test plug for the initial BOP test.
d. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
e. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.

5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.

a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time, except the casing pressure test can be initiated immediately after bumping the plug (only applies to single stage cement jobs).

c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).

d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall

have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

e. The results of the test shall be reported to the appropriate BLM office.

f. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.

g. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

h. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the Wolfcamp formation, and shall be used until production casing is run and cemented.

D. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

OTA10132020

Hydrogen Sulfide Drilling Operations Plan
Mewbourne Oil Company

1. General Requirements

Rule 118 does not apply to this well because MOC has researched this area and no high concentrations of H2S were found. MOC will have on location and working all H2S safety equipment before the Delaware formation for purposes of safety and insurance requirements.

2. Hydrogen Sulfide Training

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will have received training from a qualified instructor in the following areas prior to entering the drilling pad area of the well:

1. The hazards and characteristics of hydrogen sulfide gas.
2. The proper use of personal protective equipment and life support systems.
3. The proper use of hydrogen sulfide detectors, alarms, warning systems, briefing areas, evacuation procedures.
4. The proper techniques for first aid and rescue operations.

Additionally, supervisory personnel will be trained in the following areas:

1 The effects of hydrogen sulfide on metal components. If high tensile tubular systems are utilized, supervisory personnel will be trained in their special maintenance requirements.
2 Corrective action and shut in procedures, blowout prevention, and well control procedures while drilling a well.
3 The contents of the Hydrogen Sulfide Drilling Operations Plan.

There will be an initial training session prior to encountering a know hydrogen sulfide source. The initial training session shall include a review of the site specific Hydrogen Sulfide Drilling Operations Plan.

3. Hydrogen Sulfide Safety Equipment and Systems

All hydrogen sulfide safety equipment and systems will be installed, tested, and operational prior to drilling below the 9 5/8" intermediate casing.

1. Well Control Equipment
   - A. Choke manifold with minimum of one adjustable choke/remote choke.
   - B. Blowout preventers equipped with blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit
   - C. Auxiliary equipment including annular type blowout preventer.
2. Protective Equipment for Essential Personnel
   Thirty minute self contained work unit located in the dog house and at briefing areas.

Additionally: If H2S is encountered in concentrations less than 10 ppm, fans will be placed in work areas to prevent the accumulation of hazardous amounts of poisonous gas. If higher concentrations of H2S are detected the well will be shut in and a rotating head, mud/gas separator, remote choke and flare line with igniter will be installed.

3. Hydrogen Sulfide Protection and Monitoring Equipment
Two portable hydrogen sulfide monitors positioned on location for optimum coverage and detection. The units shall have audible sirens to notify personnel when hydrogen sulfide levels exceed 20 PPM.

4. Visual Warning Systems
A. Wind direction indicators as indicated on the wellsite diagram.
B. Caution signs shall be posted on roads providing access to location. Signs shall be painted a high visibility color with lettering of sufficient size to be readable at reasonable distances from potentially contaminated areas.

4. Mud Program

The mud program has been designed to minimize the amount of hydrogen sulfide entrained in the mud system. Proper mud weight, safe drilling practices, and the use of hydrogen sulfide scavengers will minimize hazards while drilling the well.

5. Metallurgy

All tubular systems, wellheads, blowout preventers, drilling spools, kill lines, choke manifolds, and valves shall be suitable for service in a hydrogen sulfide environment when chemically treated.

6. Communications

State & County Officials phone numbers are posted on rig floor and supervisors trailer. Communications in company vehicles and toolpushers are either two way radios or cellular phones.

7. Well Testing

Drill stem testing is not an anticipated requirement for evaluation of this well. If a drill stem test is required, it will be conducted with a minimum number of personnel in the immediate vicinity. The test will be conducted during daylight hours only.

8. Emergency Phone Numbers

Eddy County Sheriff's Office	**911 or 575-887-7551**
Ambulance Service	**911 or 575-885-2111**
Carlsbad Fire Dept	**911 or 575-885-2111**
Loco Hills Volunteer Fire Dept.	**911 or 575-677-3266**
Closest Medical Facility - Columbia Medical Center of Carlsbad	**575-492-5000**

Mewbourne Oil Company	**Hobbs District Office**	**575-393-5905**
	Fax	**575-397-6252**
	2nd Fax	**575-393-7259**
District Manager	**Robin Terrell**	**575-390-4816**
Drilling Superintendent	**Frosty Lathan**	**575-390-4103**
	Bradley Bishop	**575-390-6838**

Drilling Foreman	**Wesley Noseff**	**575-441-0729**

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Waste type: GARBAGE

Waste content description: Garbage & trash

Amount of waste: 1500 pounds

Waste disposal frequency : One Time Only

Safe containment description: Enclosed trash trailer

Safe containmant attachment:

Waste disposal type: HAUL TO COMMERCIAL FACILITY **Disposal location ownership:** PRIVATE

Disposal type description:

Disposal location description: Waste Management facility in Carlsbad.

Reserve Pit

Reserve Pit being used? NO

Temporary disposal of produced water into reserve pit?

Reserve pit length (ft.) **Reserve pit width (ft.)**

Reserve pit depth (ft.) **Reserve pit volume (cu. yd.)**

Is at least 50% of the reserve pit in cut?

Reserve pit liner

Reserve pit liner specifications and installation description

Cuttings Area

Cuttings Area being used? NO

Are you storing cuttings on location? NO

Description of cuttings location

Cuttings area length (ft.) **Cuttings area width (ft.)**

Cuttings area depth (ft.) **Cuttings area volume (cu. yd.)**

Is at least 50% of the cuttings area in cut?

WCuttings area liner

Cuttings area liner specifications and installation description

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Section 8 - Ancillary Facilities

Are you requesting any Ancillary Facilities?: NO

Ancillary Facilities attachment:

Comments:

Section 9 - Well Site Layout

Well Site Layout Diagram:

SaladoDraw10_W0OBFedCom2H_2wellsitelayout_20200428142742.pdf

Comments:

Section 10 - Plans for Surface Reclamation

Type of disturbance: New Surface Disturbance

Multiple Well Pad Name: SALADO DRAW 10 W0OB & W1OB FED COM WELLS

Multiple Well Pad Number: 2

Recontouring attachment:

Drainage/Erosion control construction: None

Drainage/Erosion control reclamation: None

Well pad proposed disturbance (acres): 3.95

Road proposed disturbance (acres): 0.04

Powerline proposed disturbance (acres): 0

Pipeline proposed disturbance (acres): 1.28

Other proposed disturbance (acres): 0

Total proposed disturbance: 5.27

Well pad interim reclamation (acres): 1.75

Road interim reclamation (acres): 0

Powerline interim reclamation (acres): 0

Pipeline interim reclamation (acres): 0

Other interim reclamation (acres): 0

Total interim reclamation: 1.75

Well pad long term disturbance (acres): 2.2

Road long term disturbance (acres): 0

Powerline long term disturbance (acres): 0

Pipeline long term disturbance (acres): 0

Other long term disturbance (acres): 0

Total long term disturbance: 2.2

Disturbance Comments: In areas to be heavily disturbed, the top 6 inches of soil material, will be stripped and stockpiled on the perimeter of the well location to keep topsoil viable, and to make redistribution of topsoil more efficient during interim reclamation. Stockpiled topsoil should include vegetative material. Topsoil will be clearly segregated and stored separately from subsoils. Contaminated soil will not be stockpiled, but properly treated and handled prior to topsoil salvaging.

Reconstruction method: The areas planned for interim reclamation will then be recontoured to the original contour if feasible, or if not feasible, to an interim contour that blends with the surrounding topography as much as possible. Where applicable, the fill material of the well pad will be backfilled into the cut to bring the area back to the original contour. The interim cut and fill slopes prior to re-seeding will not be steeper than a 3:1 ratio, unless the adjacent native topography is steeper. Note: Constructed slopes may be much steeper during drilling, but will be recontoured to the above ratios during interim reclamation.

Topsoil redistribution: Topsoil will be evenly respread and aggressively revegetated over the entire disturbed area not needed for all-weather operations including cuts & fills. To seed the area, the proper BLM seed mixture, free of noxious

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Drilling Plan Data Report

09/07/2021

APD ID: 10400041944
Submission Date: 08/30/2019

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM
Well Number: 2H

Well Type: CONVENTIONAL GAS WELL
Well Work Type: Drill

Highlighted data reflects the most recent changes

Show Final Text

Section 1 - Geologic Formations

Formation ID	Formation Name	Elevation	True Vertical Depth	Measured Depth	Lithologies	Mineral Resources	Producing Formation
459300	UNKNOWN	3330	28	28	OTHER : Top Soil	NONE	N
459311	RUSTLER	2379	925	925	ANHYDRITE, DOLOMITE	USEABLE WATER	N
459312	TOP SALT	2024	1280	1280	SALT	NONE	N
459301	BOTTOM SALT	-1446	4750	4750	SALT	NONE	N
459308	LAMAR	-1686	4990	4990	LIMESTONE	NATURAL GAS, OIL	N
459304	BELL CANYON	-1726	5030	5030	SANDSTONE	NATURAL GAS, OIL	N
459305	CHERRY CANYON	-2776	6080	6080	SANDSTONE	NATURAL GAS, OIL	N
459306	MANZANITA	-3026	6330	6330	LIMESTONE	NATURAL GAS, OIL	N
459299	BONE SPRING	-5826	9130	9130	LIMESTONE, SHALE	NATURAL GAS, OIL	N
459302	BONE SPRING 1ST	-6756	10060	10060	SANDSTONE	NATURAL GAS, OIL	N
459303	BONE SPRING 2ND	-7346	10650	10650	SANDSTONE	NATURAL GAS, OIL	N
459310	BONE SPRING 3RD	-8406	11710	11710	SANDSTONE	NATURAL GAS, OIL	N
459307	WOLFCAMP	-8876	12180	12180	LIMESTONE, SANDSTONE, SHALE	NATURAL GAS, OIL	Y

Section 2 - Blowout Prevention

AFMSS

U.S. Department of the Interior
BUREAU OF LAND MANAGEMENT

Drilling Plan Data Report

09/07/2021

APD ID: 10400041944
Submission Date: 08/30/2019

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM
Well Number: 2H

Well Type: CONVENTIONAL GAS WELL
Well Work Type: Drill

Highlighted data reflects the most recent changes

Show Final Text

Section 1 - Geologic Formations

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459301	BOTTOM SALT	-1446	4750	4750	SALT	NONE	N
459308	LAMAR	-1686	4990	4990	LIMESTONE	NATURAL GAS, OIL	N
459304	BELL CANYON	-1726	5030	5030	SANDSTONE	NATURAL GAS, OIL	N
459305	CHERRY CANYON	-2776	6080	6080	SANDSTONE	NATURAL GAS, OIL	N
459306	MANZANITA	-3026	6330	6330	LIMESTONE	NATURAL GAS, OIL	N
459299	BONE SPRING	-5826	9130	9130	LIMESTONE, SHALE	NATURAL GAS, OIL	N
459302	BONE SPRING 1ST	-6756	10060	10060	SANDSTONE	NATURAL GAS, OIL	N
459303	BONE SPRING 2ND	-7346	10650	10650	SANDSTONE	NATURAL GAS, OIL	N
459310	BONE SPRING 3RD	-8406	11710	11710	SANDSTONE	NATURAL GAS, OIL	N
459307	WOLFCAMP	-8876	12180	12180	LIMESTONE, SANDSTONE, SHALE	NATURAL GAS, OIL	Y

Section 2 - Blowout Prevention

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Pressure Rating (PSI): 10M **Rating Depth:** 17280

Equipment: Annular, Pipe Rams, Blind Rams

Requesting Variance? YES

Variance request: Request variance for the use of a flexible choke line from the BOP to Choke Manifold. Anchors not required by manufacturer. A multi-bowl wellhead will be used. See attached schematic.
Testing Procedure: BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested. Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

Choke Diagram Attachment:

Salado_Draw_10_W0OB_Fed_Com__2H_10M_BOPE_Choke_Diagram_rev_1_15_19_20190829142117.xlsx

Salado_Draw_10_W0OB_Fed_Com__2H_Flex_Line_Specs_API_16C_20190829142119.pdf

Salado_Draw_10_W0OB_Fed_Com__2H_Flex_Line_Specs_20190829142120.pdf

BOP Diagram Attachment:

Salado_Draw_10_W0OB_Fed_Com__2H_10M_Annular_BOP_Variance_20190829142132.doc

Salado_Draw_10_W0OB_Fed_Com__2H_10M_BOPE_Schematic_w_5M_Annular_20190829142133.pdf

Salado_Draw_10_W0OB_Fed_Com__2H_10M_Multi_Bowl_WH_Running_Proc_20190829142134.pdf

Section 3 - Casing

Casing ID	String Type	Hole Size	Csg Size	Condition	Standard	Tapered String	Top Set MD	Bottom Set MD	Top Set TVD	Bottom Set TVD	Top Set MSL	Bottom Set MSL	Calculated casing length MD	Grade	Weight	Joint Type	Collapse SF	Burst SF	Joint SF Type	Joint SF	Body SF Type	Body SF
1	SURFACE	17.5	13.375	NEW	API	N	0	1000	0	1000	3326	2321	1000	H-40	48	ST&C	1.6	3.78	DRY	6.71	DRY	11.27
2	INTERMEDIATE	12.25	9.625	NEW	API	N	0	4915	0	4915	3326	-1574	4915	L-80	40	LT&C	1.21	2.25	DRY	4.66	DRY	3.7
3	PRODUCTION	8.75	7.0	NEW	API	N	0	12400	0	12272	3326	9167	12400	HCP-110	26	LT&C	1.29	1.64	DRY	2.15	DRY	2.57
4	LINER	6.125	4.5	NEW	API	N	11837	17280	11831	12308	-9167	-9187	5443	P-110	13.5	LT&C	1.28	1.49	DRY	4.6	DRY	5.74

Casing Attachments

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Casing Attachments

Casing ID: 1 **String Type:** SURFACE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Salado_Draw_10_W0OB_Fed_Com_2H_Csg_assumptions_20200717101557.pdf

Casing ID: 2 **String Type:** INTERMEDIATE

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Salado_Draw_10_W0OB_Fed_Com_2H_Csg_assumptions_20200717101619.pdf

Casing ID: 3 **String Type:** PRODUCTION

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Salado_Draw_10_W0OB_Fed_Com_2H_Csg_assumptions_20200717101715.pdf

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Casing Attachments

Casing ID: 4 **String Type:** LINER

Inspection Document:

Spec Document:

Tapered String Spec:

Casing Design Assumptions and Worksheet(s):

Salado_Draw_10_W0OB_Fed_Com_2H_Csg_assumptions_20200717101819.pdf

Section 4 - Cement

String Type	Lead/Tail	Stage Tool Depth	Top MD	Bottom MD	Quantity(sx)	Yield	Density	Cu Ft	Excess%	Cement type	Additives
SURFACE	Lead		0	807	530	2.12	12.5	1124	100	Class C	Salt, Gel, Extender, LCM
SURFACE	Tail		807	1000	200	1.34	14.8	268	100	Class C	Retarder
INTERMEDIATE	Lead		0	4222	770	2.12	12.5	1632	25	Class C	Salt, Gel, Extender, LCM
INTERMEDIATE	Tail		4222	4915	200	1.34	14.8	268	25	Class C	Retarder
PRODUCTION	Lead		4715	9888	460	2.12	12.5	975	25	Class C	Gel, Retarder, Defoamer, Extender
PRODUCTION	Tail		9888	12400	400	1.18	15.6	472	25	Class H	Retarder, Fluid Loss, Defoamer
LINER	Lead		11837	17280	220	2.97	11.2	653	25	Class C	Salt, Gel, Fluid Loss, Retarder, Dispersant, Defoamer, Anti-Settling Agent

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Lost circulation material Sweeps Mud scavengers in surface hole

Describe the mud monitoring system utilized: Pason/PVT/Visual Monitoring

Circulating Medium Table

Top Depth	Bottom Depth	Mud Type	Min Weight (lbs/gal)	Max Weight (lbs/gal)	Density (lbs/cu ft)	Gel Strength (lbs/100 sqft)	PH	Viscosity (CP)	Salinity (ppm)	Filtration (cc)	Additional Characteristics
0	1000	SPUD MUD	8.6	8.8							
1000	4915	SALT SATURATED	10	10							
4915	12272	WATER-BASED MUD	8.6	9.5							
12272	12308	OIL-BASED MUD	10	13							

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

Will run GR/CNL in deeper offset Salado Draw 10 W1OB Fed Com #1H

List of open and cased hole logs run in the well:

CNL,DS,GR,MWD,MUDLOG

Coring operation description for the well:

None

Operator Name: MEWBOURNE OIL COMPANY

Well Name: SALADO DRAW 10 W0OB FED COM **Well Number:** 2H

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 8320 **Anticipated Surface Pressure:** 5613.12

Anticipated Bottom Hole Temperature(F): 165

Anticipated abnormal pressures, temperatures, or potential geologic hazards? NO

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards attachment:

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

Salado_Draw_10_W0OB_Fed_Com__2H_H2S_Plan_20190829144942.doc

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

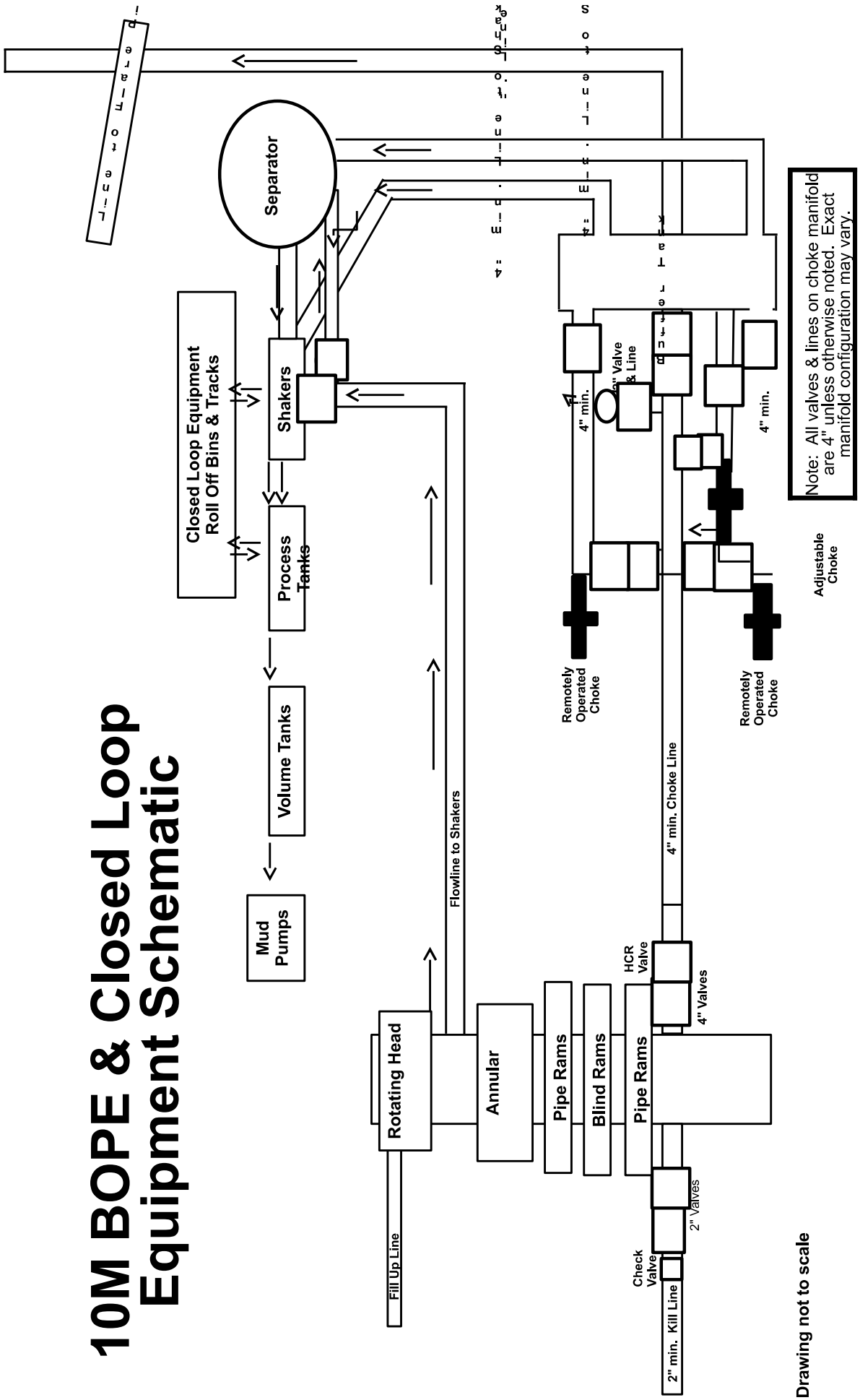
Salado_Draw_10_W0OB_Fed_Com_2H_Dir_plan_20200717102234.pdf
Salado_Draw_10_W0OB_Fed_Com_2H_Dir_plot_20200717102234.pdf

Other proposed operations facets description:

Other proposed operations facets attachment:

Salado_Draw_10_W0OB_Fed_Com_2H_Add_Info_20200717102250.pdf

Other Variance attachment:


10M BOPE & Closed Loop Equipment Schematic
Separator
Closed Loop Equipment Roll Off Bins & Tracks
Shakers
Process Tanks
Volume Tanks
Mud Pumps
Flowline to Shakers
Rotating Head
Annular
Pipe Rams
Blind Rams
Pipe Rams
HCR Valve
4" Valves
4" min. Choke Line
4" min.
4" Valve & Line
4" min.
Remotely Operated Choke
Remotely Operated Choke
Adjustable Choke
Note: All valves & lines on choke manifold are 4" unless otherwise noted. Exact manifold configuration may vary.
Fill Up Line
Check Valve
2" Valves
2" min. Kill Line
Drawing not to scale

GATES ENGINEERING & SERVICES NORTH AMERICA
7603 Prairie Oak Dr.
Houston, TX 77086

PHONE: (281) 602 - 4119
FAX:
EMAIL: Troy.Schmidt@gates.com
WEB: www.gates.com

10K CHOKE & KILL ASSEMBLY PRESSURE TEST CERTIFICATE

Customer:	A-7 AUSTIN INC DBA AUSTIN HOSE	Test Date:	8/20/2018
Customer Ref.:	4101901	Hose Serial No.:	H-082018-10
Invoice No.:	511956	Created By:	Moosa Naqvi

Product Description:	10KF3.035.0CK41/1610KFLGFXDxFLT L/E

End Fitting 1:	4 1/16 in. Fixed Flange	End Fitting 2:	4 1/16 in. Float Flange
Gates Part No.:	68503010-9721632	Assembly Code:	L40695052218H-082018-10
Working Pressure:	10,000 psi.	Test Pressure:	15,000 psi.

Gates Engineering & Services North America certifies that the following hose assembly has successfully passed all pressure testing requirements set forth in Gates specifications: GTS-04-052 (for 5K assemblies) or GTS-04-053 (10K assemblies), which include reference to Specification API 16C (2nd Edition); sections 7.5.4, 7.5.9, and 10.8.7. A test graph will accompany this test certificate to illustrate conformity to test requirements.

Quality:	QUALITY	Production:	PRODUCTION
Date :	8/20/2018	Date :	8/20/2018
Signature :	Moosa Naqvi	Signature :	

Form PTC - 01 Rev.0 2

ENGINEERING & SERVICES

GATES E & S NORTH AMERICA, INC.
134 44TH STREET
CORPUS CHRISTI, TEXAS 78405

PHONE: 361-887-9807
FAX: 361-887-0812
EMAIL: *Tim.Cantu@gates.com*
WEB: www.gates.com

10K CEMENTING ASSEMBLY PRESSURE TEST CERTIFICATE

Customer :	AUSTIN DISTRIBUTING	Test Date:	4/30/2015
Customer Ref. :	4060578	Hose Serial No.:	D-043015-7
Invoice No. :	500506	Created By:	JUSTIN CROPPER

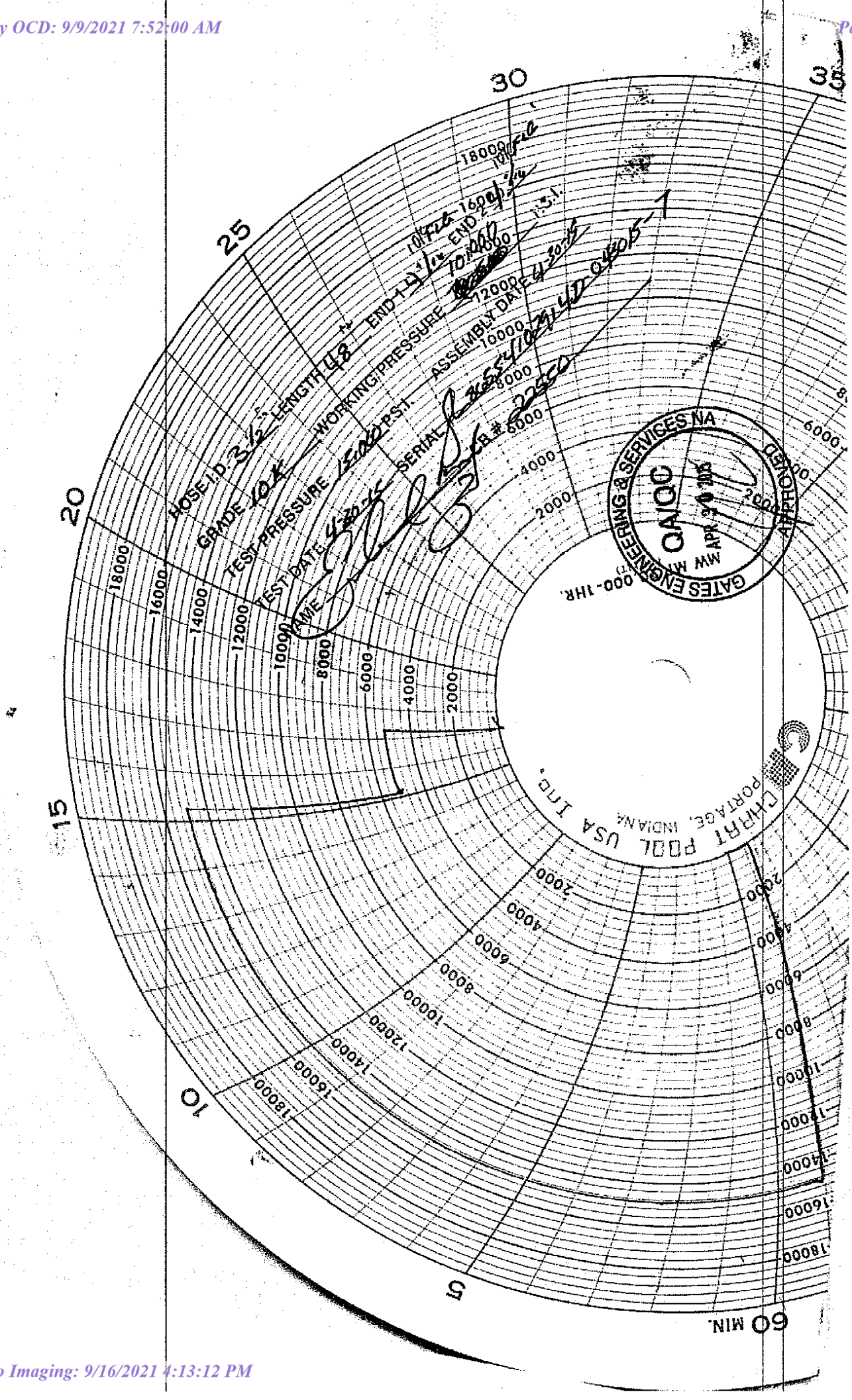
Product Description:	10K3.548.0CK4.1/1610KFLGE/E LE

End Fitting 1 :	4 1/16 10K FLG	End Fitting 2 :	4 1/16 10K FLG
Gates Part No. :	4773-6290	Assembly Code :	L36554102914D-043015-7
Working Pressure :	10,000 PSI	Test Pressure :	15,000 PSI

Gates E & S North America, Inc. certifies that the following hose assembly has been tested to the Gates Oilfield Roughneck Agreement/Specification requirements and passed the 15 minute hydrostatic test per API Spec 7K/Q1, Fifth Edition, June 2010, Test pressure 9.6.7 and per Table 9 to 15,000 psi in accordance with this product number. Hose burst pressure 9.6.7.2 exceeds the minimum of 2.5 times the working pressure per Table 9.

Quality Manager :	QUALITY	Produciton:	PRODUCTION
Date :	4/30/2015	Date :	4/30/2015
Signature :		Signature :	

Form-PTC - 01 Rev.0 2


HOSE I.D. 3 1/2"
LENGTH 48'
END 1
WORKING PRESSURE 10000 P.S.I.
ASSEMBLY DATE 4-30-15
GRADE D
END 2
TEST PRESSURE 15000 P.S.I.
SERIAL 365410-41405-1
TEST DATE 4-30-15
NAME
C.B. # 22560
GATES ENGINEERING & SERVICES NA
QA/QC
APPROVED
APR 30 2015
CHART POOL USA INC.
PORTAGE, INDIANA
60 MIN.
000-1HR.

10,000 PSI Annular BOP Variance Request

Mewbourne Oil Company request a variance to use a 5000 psi annular BOP with a 10,000 psi BOP stack. The component and compatibility tables along with the general well control plans demonstrate how the 5000 psi annular BOP will be protected from pressures that exceed its rated working pressure (RWP). The pressure at which the control of the wellbore is transferred from the annular preventer to another available preventer will not exceed 3500 psi (70% of the RWP of the 5000 psi annular BOP).

1. Component and Preventer Compatibility Tables

The tables below outline the tubulars and the compatible preventers in use. This table, combined with the drilling fluid, documents that two barriers to flow will be maintained at all times.

12-1/4" Intermediate Hole Section 10M psi Requirement					
Component	**OD**	**Primary Preventer**	**RWP**	**Alternate Preventer(s)**	**RWP**
Drillpipe	5.000" or 4.500"	Annular	5M	Upper 3.5"-5.5" VBR Lower 3.5"-5.5" VBR	10M 10M
HWDP	5.000" or 4.500"	Annular	5M	Upper 3.5"-5.5" VBR Lower 3.5"-5.5" VBR	10M 10M
Jars	6.500"	Annular	5M	-	-
DCs and MWD tools	6.500"- 8.000"	Annular	5M	-	-
Mud Motor	8.000"- 9.625"	Annular	5M	-	-
Intermediate Casing	9.625"	Annular	5M	-	-
Open-Hole	-	Blind Rams	10M	-	-

8-3/4" Production Hole Section 10M psi Requirement					
Component	**OD**	**Primary Preventer**	**RWP**	**Alternate Preventer(s)**	**RWP**
Drillpipe	5.000" or 4.500"	Annular	5M	Upper 3.5"-5.5" VBR Lower 3.5"-5.5" VBR	10M 10M
HWDP	5.000" or 4.500"	Annular	5M	Upper 3.5"-5.5" VBR Lower 3.5"-5.5" VBR	10M 10M
Jars	6.500"	Annular	5M	-	-
DCs and MWD tools	6.500"- 8.000"	Annular	5M	-	-
Mud Motor	6.750"- 8.000"	Annular	5M	-	-
Production Casing	7"	Annular	5M	-	-

Open-Hole	-	Blind Rams	10M	-	-

6-1/8" Lateral Hole Section 10M psi Requirement					
Component	**OD**	**Primary Preventer**	**RWP**	**Alternate Preventer(s)**	**RWP**
Drillpipe	4.500"	Annular	5M	Upper 3.5"-5.5" VBR Lower 3.5"-5.5" VBR	10M 10M
HWDP	4.500"	Annular	5M	Upper 3.5"-5.5" VBR Lower 3.5"-5.5" VBR	10M 10M
DCs and MWD tools	4.750"- 5.500"	Annular	5M	Upper 3.5"-5.5" VBR Lower 3.5"-5.5" VBR	10M 10M
Mud Motor	4.750"- 5.500"	Annular	5M	Upper 3.5"-5.5" VBR Lower 3.5"-5.5" VBR	10M 10M
Production Casing	4.500"	Annular	5M	Upper 3.5"-5.5" VBR Upper 3.5"-5.5" VBR	10M 10M
Open-Hole	-	Blind Rams	10M	-	-

VBR = Variable Bore Ram

2. Well Control Procedures

Below are the minimal high-level tasks prescribed to assure a proper shut-in while drilling, tripping, running casing, pipe out of the hole (open hole), and moving the BHA through the BOPs. At least one well control drill will be performed weekly per crew to demonstrate compliance with the procedure and well control plan. The well control drill will be recorded in the daily drilling log. The type of drill will be determined by the ongoing operations, but reasonable attempts will be made to vary the type of drill conducted (pit, trip, open hole, choke, etc.). This well control plan will be available for review by rig personnel in the Mewbourne Oil Company drilling supervisor's office on location and on the rig floor. All BOP equipment will be tested as per Onshore O&G Order No. 2 with the exception of the 5000 psi annular which will be tested to 70% of its RWP.

General Procedure While Drilling

1. Sound alarm (alert crew)
2. Space out drill string
3. Shut down pumps (stop pumps and rotary)
4. Shut-in well (uppermost applicable BOP, typically annular preventer, first. HCR & choke will already be in the closed position.)

5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP & SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach 70% or greater of the RWP of the annular preventer, confirm spacing and close the upper variable bore rams.

General Procedure While Tripping

1. Sound alarm (alert crew)
2. Stab full-opening safety valve & close
3. Space out drill string
4. Shut-in well (uppermost applicable BOP, typically annular preventer, first. HCR & choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP & SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach 70% of the RWP of the annular preventer, confirm spacing and close the upper variable bore rams.

General Procedure While Running Production Casing

1. Sound alarm (alert crew)

2. Stab crossover and full-opening safety valve and close
3. Space out string
4. Shut-in well (uppermost applicable BOP, typically annular preventer, first. HCR & choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP & SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach 70% or greater of the RWP of the annular preventer, confirm spacing and close the upper variable bore rams.

General Procedure With No Pipe In Hole (Open Hole)

1. Sound alarm (alert crew)
2. Shut-in with blind rams (HCR & choke will already be in the closed position)
3. Confirm shut-in
4. Notify toolpusher/company representative
5. Read and record the following:
    a. SICP
    b. Pit gain
    c. Time
6. Regroup and identify forward plan

General Procedures While Pulling BHA Through Stack

1. PRIOR to pulling last joint of drillpipe through stack:
    a. Perform flow check. If flowing, continue to (b).
    b. Sound alarm (alert crew)
    c. Stab full-opening safety valve and close
    d. Space out drill string with tool joint just beneath the upper variable bore rams
    e. Shut-in using upper variable bore rams (HCR & choke will already be in the closed position)
    f. Confirm shut-in
    g. Notify toolpusher/company representative
    h. Read and record the following:
        i. SIDPP & SICP
        ii. Pit gain
        iii. Time
    i. Regroup and identify forward plan
2. With BHA in the stack and compatible ram preventer and pipe combination immediately available:
    a. Sound alarm (alert crew)
    b. Stab crossover and full-opening safety valve and close
    c. Space out drill string with upset just beneath the upper variable bore rams
    d. Shut-in using upper variable bore rams (HCR & choke will already be in the closed position)
    e. Confirm shut-in
    f. Notify toolpusher/company representative
    g. Read and record the following:
        i. SIDPP & SICP
        ii. Pit gain

iii. Time

h. Regroup and identify forward plan

3. With BHA in the stack and NO compatible ram preventer and pipe combination immediately available:

a. Sound alarm (alert crew)

b. If possible, pull string clear of the stack and follow "Open Hole" procedure.

c. If impossible to pull string clear of the stack:

d. Stab crossover, make up one joint/stand of drillpipe and full-opening safety valve and close

e. Space out drill string with tooljoint just beneath the upper variable bore ram

f. Shut-in using upper variable bore ram (HCR & choke will already be in the closed position)

g. Confirm shut-in

h. Notify toolpusher/company representative

i. Read and record the following:

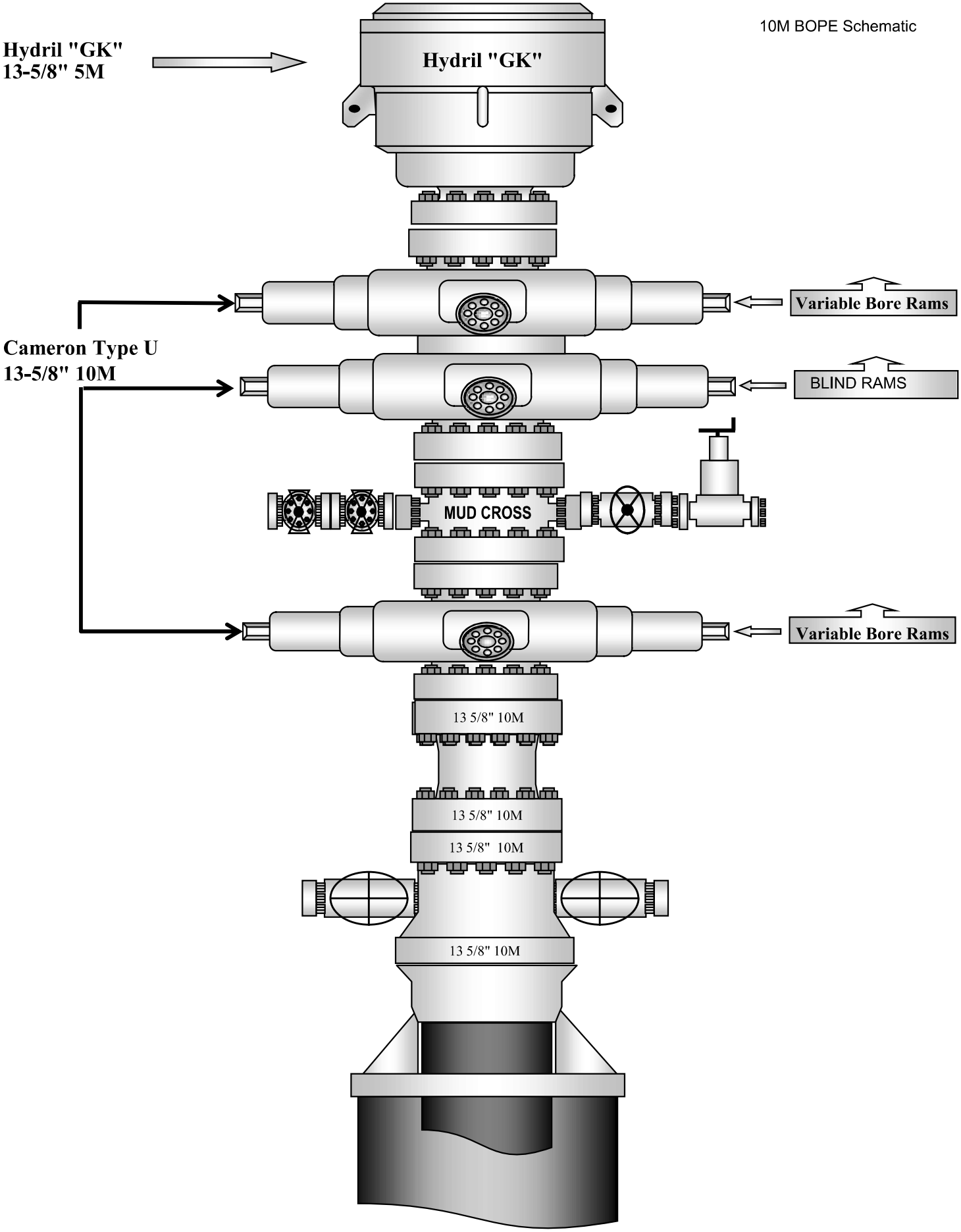
i. SIDPP & SICP

ii. Pit gain

iii. Time

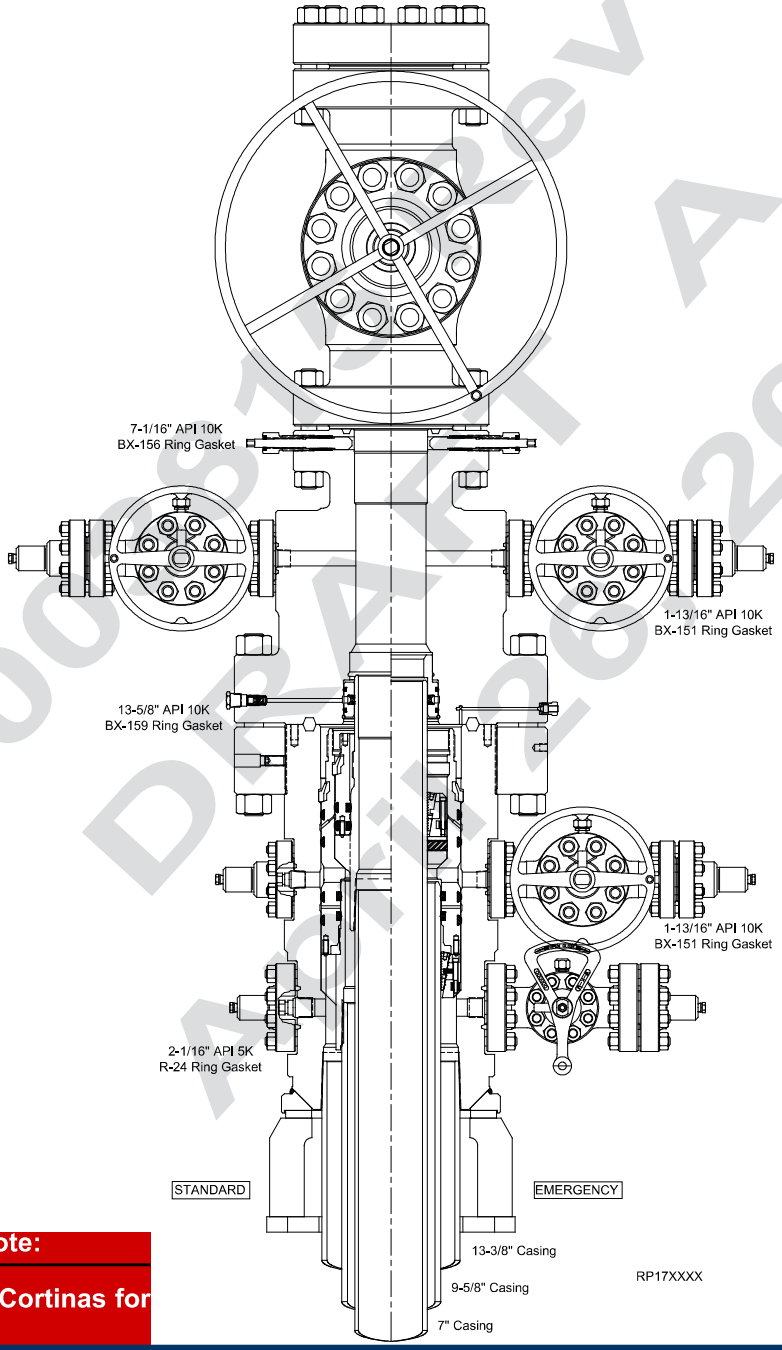
j. Regroup and identify forward plan

10M BOPE Schematic



RUNNING PROCEDURE

Mewbourne Oil Co



Publication Status Note:

Draft A sent to John Cortinas for review; RA 04/29/17

Surface Systems Publication

CAMERON A Schlumberger Company	13-5/8" 10K MN-DS System 13-3/8" x 9-5/8" x 7" Casing Program	RP-003815 Rev 01 Draft A

NOTE DRAFT Publication is for Review ONLY. NOT approved for System Installation. NOT approved for field usage. NOT approved for distribution. If you obtain a DRAFT copy - it is your responsibility to verify SAP revision level or contact Houston Engineering to ensure document has been approved and released.

Safety Hazard Indicators

The Safety Hazard Indicators listed below will be used throughout this procedure to indicate potentially hazardous and/or personnel risks that may be encountered during the performance of the tasks outlined in this procedure.

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury

Indicates a hazardous situation which, if not avoided, could result in death or serious injury

Indicates a hazardous situation which, if not avoided, will result in death or serious injury

Preferred to address practices not related to personal injury

ES-000175-02

This version of the document completely replaces any other version, published or unpublished. Document revision information is indicated on the bottom of each page.

To confirm the correct version is in use, make sure the revision and release date match those on the controlled version of the document in SAP. Refer to the Document Control page for the document revision history.

NOTE **This document alone does not qualify an individual to Install/Run the Equipment. This document is created and provided as a reference for Qualified Cameron Service Personnel and does not cover all scenarios that may occur.**

Table of Contents

Table of Contents

RUNNING PROCEDURE GENERAL WARNING

READ AND UNDERSTAND ALL INSTRUCTIONS. Failure to follow may result in serious personal injury and damage not only to the equipment but also the environment.

1. Safety is a combination of staying alert, common sense, and experience with the oil field equipment and environment. Read this Running Procedure prior to operating and installing the equipment. Be familiar with the operation terminologies of oil field equipment.
2. This document includes basic installation guidance. **The field service personnel shall be fully trained in all aspects of handling pressure control equipment as well as of the job that they are going to perform.** If any of the procedures and policies listed in this procedure cannot be followed, contact a Cameron Representative for the best course of action.
3. Proper **Personal Protective Equipment (PPE)** shall be utilized according to Company policies. Always use proper tools when servicing the equipment.
4. A **Job Hazard Analysis (JHA)** must be performed prior to beginning any service on a well location. A JHA review meeting will be held with all affected rig personnel PRIOR to the commencement of work to review the results of the JHA, evacuation routes, emergency contacts, etc. All meeting attendees and a Company Representative will sign-off on the JHA to acknowledge this meeting has taken place
5. **Be aware of unexpected circumstances** that may arise when operating or servicing the equipment. Utilize the **Step Back 5X5 Process** in order to assess the hazards posed before, during, and after the servicing of equipment under pressure or with the potential of hazardous chemicals present. Be familiar with the company's and facility's Lockout/Tagout program in order to ensure all sources of energy (i.e. electrical, pneumatic, pressure) are isolated and/or de-energized prior to beginning work.
6. All **governmental or Company safety requirements** shall be met before working on the equipment. **Requirements of fully tested pressure barriers prior to servicing the equipment shall be observed. Cameron recommends that two mechanical pressure barriers is the preferred practice.** Additional precautions should be taken to ensure that the mechanical pressure barriers are functioning correctly prior to any work being carried out on this particular equipment.
7. Always check for any **trapped pressure** before servicing the equipment. All valves downstream of the pressure barriers must be cycled several times to release any trapped pressure.
8. Ensure the chemical and physical properties of the fluid flow product inside the equipment are known. Obtain applicable **Material Safety Data Sheets (MSDS)** for commonly encountered chemicals such as hydrogen sulfide, cements, etc. in order to identify appropriate PPE to use, emergencies, procedures, and methods or exposure control.
9. Always use **correct lifting devices** and follow safety rules in handling heavy products. The actual weight can vary for the system configurations. Never attempt to lift the equipment by hand.
10. Cameron manufactures a variety of oil field equipment with different features and operating requirements. Be certain of the equipment model and refer to the appropriate procedure, before attempting any operation or service on the equipment. **This procedure is to assist field personnel in the operation and installation of the equipment that is listed in this document. Different procedures are available for other oil field products.**

SD-045055-01 Rev 01 - RP General Warning M.Contreras 25/OCT/2010

HSE Hand Safety Rules

1. **No Hands on Loads**
   Select the appropriate device to control the load
2. **Hands on Handles Only**
   Use manufacturers handles or safe alternatives
3. **Permission to Touch**
   Use lifting assistance/technology for loads > 20kg or 44 lbs
4. **Hands Off…Energy On**
   Remove hands from load BEFORE setting in motion
5. **Safe Cargo Handling**
   Use pallets & crates designed to prevent tip over or loss of load
6. **Use the Correct PPE**
   Use the right glove for the job (chemical, hot work, impact, etc.)

HSE VISION: NO ONE GETS HURT; NOTHING GETS HARMED HEALTH, SAFETY & ENVIRONMENT

HSE Tenets of Operation

Stop Work
Stop work immediately until unsafe behaviors and conditions are addressed.

Report ALL Incidents
Immediately report incidents, including injuries, illnesses, property damage, near misses, and environmental releases.

Leadership & Accountability
Hold each other accountable for working safely and complying with applicable regulations.

Equipment Operations
Always operate equipment and vehicles with safety devices enabled, and never beyond their capabilities, environmental limits, or designed purposes.

Follow Procedures
Maintain all training and follow established HSE policies and practices.

HSE Observations
Recognize safe behaviors and conditions, and address those at-risk.

PPE
Always wear the correct Personal Protective Equipment for the task.

Ask
Ask questions when in doubt, and for assistance when dealing with new or unusual situations.

HSE VISION: NO ONE GETS HURT; NOTHING GETS HARMED HEALTH, SAFETY & ENVIRONMENT

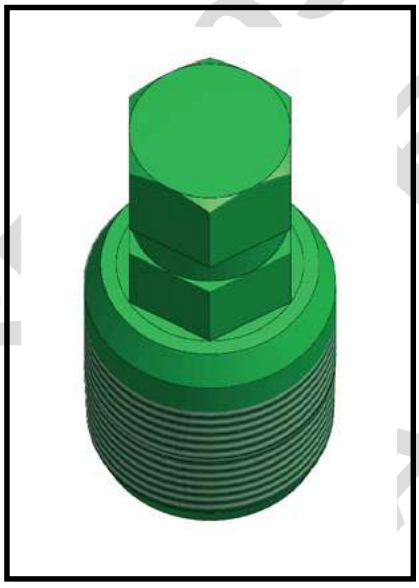
Valve Removal Plugs

STOP

For Installation and Removal of Valve Removal Plugs Refer to:

Publication: RP-001558

(Assembly Procedure for VR Plugs and Recommended Torque Values)

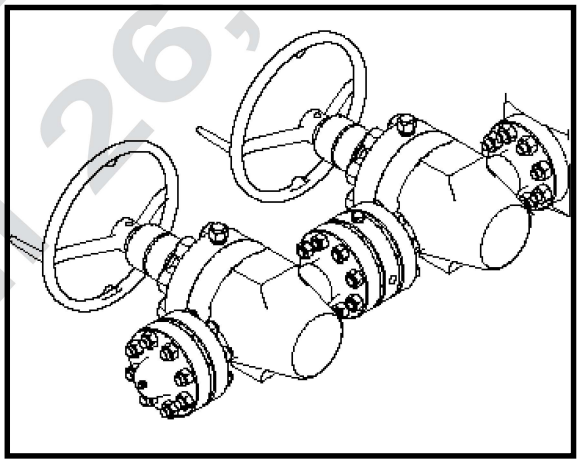


Make-up Requirements for API Flange Connections

STOP

For Make-up Requirements for API Flange Connections Refer to:

Publication: RP-002153

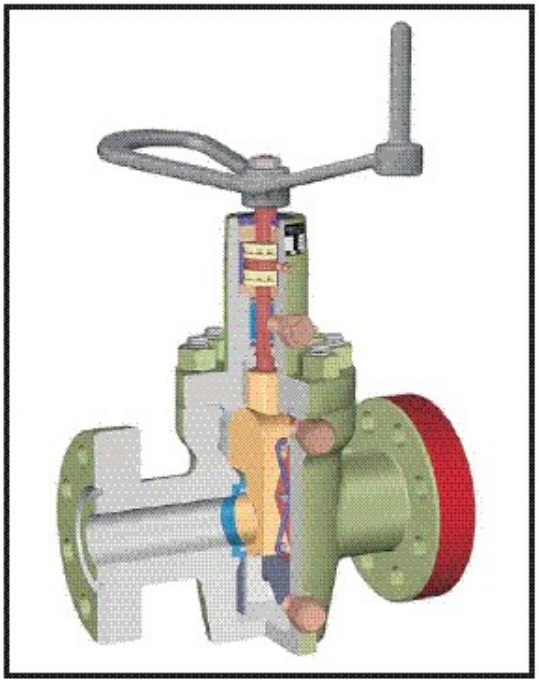


WKM Model M Power R- Seal Gate Valves

For Operation and Maintenance refer to:

Publication: TC9084-2

(Operation and Maintenance Manual)



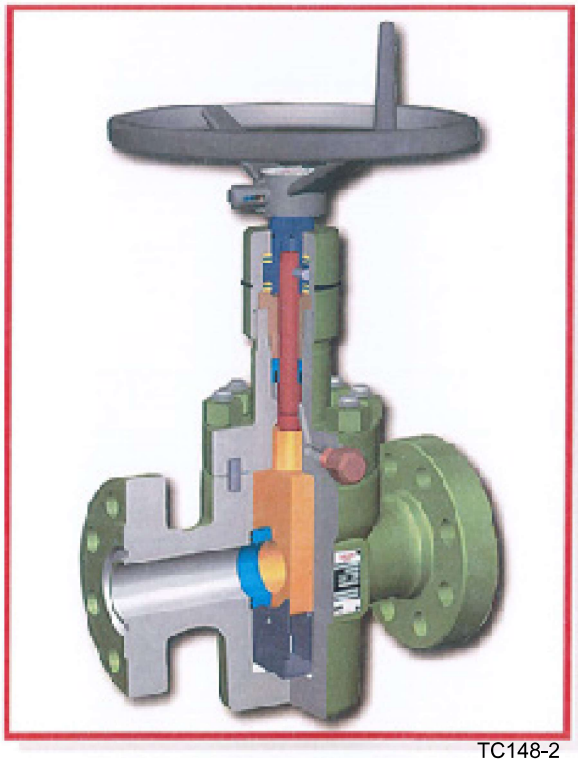
TC9084-2

Cameron Type FL & FLS Gate Valves

For Operation and Maintenance refer to:

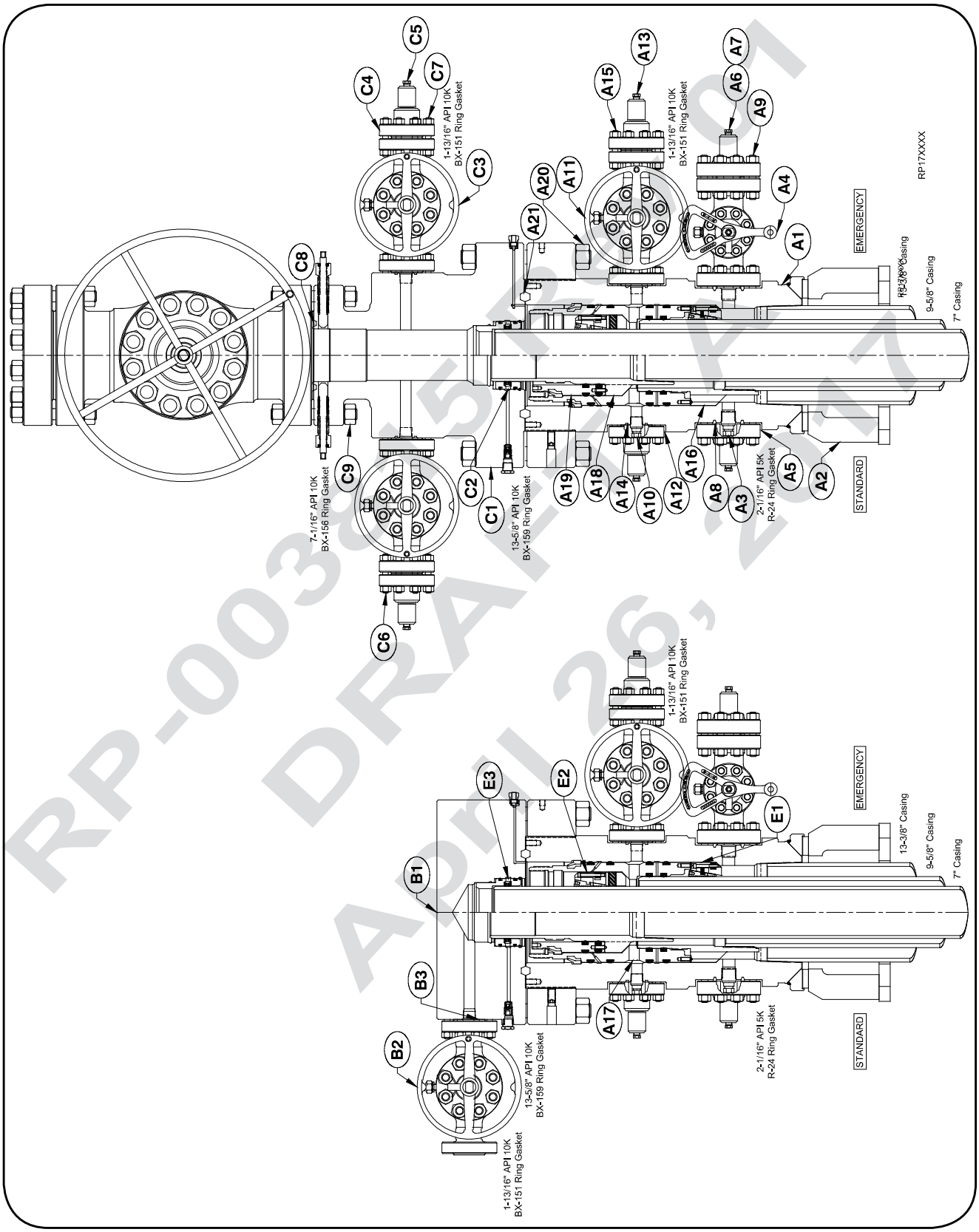
Publication: TC148-2

(FL & FLS Gate Valves Operation and Maintenance Manual)



TC148-2

System Drawing



Bill of Materials

NOTE Contact your Cameron representative for replacement part inquiries. Cameron personnel can check the latest revision of the assembly bill-of-material to obtain the appropriate and current replacement part number.

MN-DS HOUSING

Item	Qty	Description
A1	1	Assy; Casing Head Housing, MN-DS 10K,13-5/8" Nom 10K OEC BX-159 w/ 20.500"-4TPI LH Stub Acme Top f/ Thd'd Flg andPrep f/ Internal Snap Ring x 13-3/8" BC Box Thd Btm, w/ (2) Upper 1-13/16" API 10K BX-151 Outlets w/1-13/16" API VR Thds and(2) Lower 2-1/16" API 5K R-24 Outlets w/ 2-1/16" API VR Thds, w/ 4 Grout Ports, Min Bore: 12.615" Part# 2345472-10-01
A2	1	Assy, Landing Base f/ 'MN-DS' Thd'd Housings 13-5/8" Csg, 24" OD Base Plate w/ 3" Flow-by Slots, 850K Lbs Capacity Part# 2057661-06-01
A3	1	VR Plug 1-1/2" 11-1/2 TPI-3/4 TPF 'Vee' Tubing Thd, 2-1/16" 2K - 10K Part# 2222164-02-01
A4	1	Gate Valve, Manual, Model Aop Distributed, 2-1/16" Bore, 5K Psi, 2-1/16" API Flg x Flg Part# 2737400-01-01
A5	2	Companion Flange, 2-1/16" API 5K x 2" API LP Part# 142362-01-03-02
A6	2	Bull Plug 2" LP w/1/2" NPT x 3-3/4" Lg Part# 007481-01
A7	2	Bleeder Fitting, Plug 1/2" NPT, 10K Psi Max Part# 2738068-02
A8	3	Ring Gasket, R-24 Part# 702001-24-02
A9	8	Stud W /(2) Nuts, 7/8" x 6" Lg Part# Y51201-20220301

MN-DS HOUSING

Item	Qty	Description
A10	1	VR Plug 1-1/4" LP Thd,1-13/16" 2K - 10K Part# 2222164-01-01
A11	1	Gate Valve, Manual, Model FLS, 1-13/16" Bore, 10K Psi,1-13/16" API Flg x Flg Part# 141510-41-91-01
A12	2	Companion Flange, 1-13/16" API 10K w/ 2" API LP, 5K Psi WP Part# 142359-01-03-02
A13	1	Nipple, API 2" LP x 6" Lg Part# 021013-12
A14	3	Ring Gasket, BX-151 Part# 702003-15-12
A15	8	Stud w/ (2) Nuts, 3/4" x 5-1/4" Lg Part# Y51201-20120201
A16	1	Casing Hanger, Mandrel, Type 'MN-DS', 13-5/8" Nom x 9-5/8" API LC Box Thd Btmx 10.000"-4TPI LH Stub Acme Running Thd, Min Bore: 8.835", Max WP: 8K Psi, Max Hanging Load: 800KLbs Part# 2345509-04
A17	1	Assy; Packoff Support Bushing, Type 'MN-DS', 13-5/8" 10K, w/ 13-5/8" Nom Dovetail Seal, and 9-5/8" Nom 'T' Seal and w/ Internal and External-lock Ring Prep, Min Bore: 8.835" Part# 2161673-01-01
A18	1	Mandrel Hanger, Type 'MN-DS', 11" Nom x 7" 29 Lb/Ft API Buttress Thd Btm x 7.500"-4TPI LH Stub Acme Running Thdw/ 7" Nom Slick Neck Top w/ Flow-by Slots, Min Bore: 6.169" Part# 2345649-36-01

MN-DS HOUSING

Item	Qty	Description
A19	1	Assy; Seal Packoff f/ 11" Nom Type 'MN-DS', w/ 9.875"-4TPI LH Stub Acme Thd w/ 7-3/4" Dbl 'T' Seals At ID and Dovetails At OD Part# 2217588-05-03
A20	20	Stud w/ (2) Nuts, 1-7/8" x 17-3/4" Lg Part# 621650-15
A21	1	Ring Gasket, BX-159 Part# 702003-15-92

ABANDONMENT CAP

Item	Qty	Description
B1	1	Assy; Capping Flg, 7-1/16" API 10K BX-156 Std'd Blind Top x 13-5/8" API10K BX-159 Std'd Btm, w/ (1) 1-13/16" API 10K BX-151 SSO, w/ 1-13/16" API VR Thd, w/ 11" 'NX' Btm Prep, Oal: 12" Part# 2392883-03-01
B2	1	Gate Valve, Manual, Model FLS, 1-13/16" Bore, 10K Psi,1-13/16" API Flg x Flg Part# 141510-41-91-01
B3	1	Ring Gasket, BX-151 Part# 702003-15-12

TUBING SPOOL

Item	Qty	Description
C1	1	Assy; Tbg Spl, Type 'C', 13-5/8" API 10K Flg Btm x 7-1/16" API 10K Flg Top, w/ (2) 1-13/16" API 10K SSO's w/ 1-13/16" API VR, w/ Spcl 11" 'NX' Btm Prep Part# 2329584-01-02
C2	1	Assy; 'NX' Bushing Nom 11" w/ 7" OD Csg Part# 608783-17

Bill of Materials

NOTE Contact your Cameron representative for replacement part inquiries. Cameron personnel can check the latest revision of the assembly bill-of-material to obtain the appropriate and current replacement part number.

TUBING SPOOL

Item	Qty	Description
C3	2	Gate Valve, Manual, Model FLS, 1-13/16" Bore, 10K Psi, 1-13/16" API Flg x Flg Part# 141510-41-91-01
C4	2	Companion Flange, 1-13/16" API 10K w/ 2" API LP, 5K Psi WP Part# 142359-01-03-02
C5	1	Nipple, API 2" LP x 6" Lg Part# 021013-12
C6	3	Ring Gasket, BX-151 Part# 702003-15-12
C7	16	Stud w/ (2) Nuts, 3/4" x 5-1/4" Lg Part# Y51201-20120201
C8	1	Ring Gasket, BX-156 Part# 702003-15-64
C9	12	Stud w/ (2) Nuts, 1-1/2" x 11-1/4" Lg Part# 621650-07

EMERGENCY EQUIPMENT

Item	Qty	Description
E1	1	Assy; Type MN-DS-IC-1, Casing Slip, 13-5/8" Nom x 9-5/8" Csg, w/ Holes f/ Anti-Rotation Pins Part# 2161741-08-01
E2	1	Casing Hanger, IC-2, 11" x 7" Part# Y15001-21303801
E3	1	Assy; 'NX' Bushing, 11" Nom x 7" Csg w/ Integral Bit Guide Part# 2161829-01-01

SERVICE TOOLS

Item	Qty	Description
ST1	1	Conversion Assy; Casing Head Torque Tool, f/ 'Mn-Ds' w/ Lift Plate, 13-3/8" API 8Rnd Short Thd Casing Box Thd Top x .750"-10Unc (16) Bolt Pattern Btm (8) Torque Pins, Min Bore: 12.605" Safe Hanging Load: 290K Lbf Max Rated Torque: 20K Lbf-Ft Max Rated Pressure: 3K Psi Part# 2143701-75
ST2	1	Assy; Test Plug, Type 'C', 13-5/8" Nom f/ Use In Cactus Head w/ 'WQ' Seal 4-1/2" IF Box X 4-1/2" IF Pin Btm, w/ Weep Hole On Top Portion Of Test Plug Part# 2247044-01-01
ST3	1	Running Tool, 13-5/8" Nom, w/ Dbl Lead Pin Thd Btm x 4-1/2" IF Box Thd Top, w/ 6-1/2" OD Ext'D Neck Part# 608536-19
ST4	1	Assy; Wear Bushing, f/ 13-5/8" Nom MN-DS, w/ 4 O-Rings f/ Use w/ Thd'D Running Tool, Min Bore: 12.615" Part# 2394103-01-01
ST5	1	Assy; Running Tool, 13-5/8" Nom, w/ 9-5/8" API 8Rd LC Box Thd Top x 10.000"-4TPI LH Stub Acme Running Thd Btm, w/ Single O-Ring and (3) Centralizing Ribs, Min Bore: 8.73" Part# 2161757-69-01
ST6	1	Assy; Jetting Tool, 13-5/8" Nom Compact Housing, Type 'SSMC' Part# 2125914-01

SERVICE TOOLS

Item	Qty	Description
ST7	1	Running Tool, Type 'MN-DS' f/ 13-5/8" Nom Packoff Support Bushing w/ 4-1/2" API IF Thd Top x 4-1/2" API IF Thd Btm and 12.375" 4-TPI LH Stub Acme Thd, Working Load: 275K Lbf Part# 2017712-10-01
ST8	1	Assy; Test Plug, Type 'IC', 11" Nom, 4-1/2" IF Box Top x Pin Btm, w/ Weep Hole On Top Portion of Test Plug, w/ (2) Dovetail Seal Grooves Part# 2247042-10-01
ST9	1	Tool f/ Running & Retrieving Wear Bushing 11" Nom x 4-1/2" API IF Thd w/ Dbl Lead Thd Part# 661822-06
ST10	1	Assy; Wear Bushing, f/ 11" Nom Type 'MN-DS', Dbl Lead Thd, Min Bore: 8.910" Part# 2125720-10-01
ST11	1	Assy; Running Tool f/ Fluted Mandrel Hanger, 'MN-DS', 11" Nom x 7.500"-4 TPI LH Stub Acme Thd Btm x 7" API Buttress Box Thd Top, Min Bore: 6.66", Max Lifting Load Capacity: 500K Lbs Part# 2161757-87-01
ST12	1	Assy; Weldment, Wash-Tool, 11" Nom x 23.00" Lgw/ NC50 (4-1/2" If) Box Thd Top Part# 2017726-05-01
ST13	1	Running Tool, f/ 11" Nom Seal Assembly w/ 4-1/2" API IF Thd Top x 2-7/8" API IF Thd Btm and 9.875"-4TPI LH Stub Acme Thd, Oal: 21.60" Part# 2017712-07-01

Bill of Materials

NOTE Contact your Cameron representative for replacement part inquiries. Cameron personnel can check the latest revision of the assembly bill-of-material to obtain the appropriate and current replacement part number.

MN-DS HOUSING

Item	Qty	Description
ST14	1	Lockring Installation Tool Part# 2360305-48
ST15	1	Assy; 13-5/8" Nom Combo Tool, Running & Testing, 3-1/2" IF API Box Thd Top & Btm w/ 2.485" OD 4-TPI LH Type 'H' BPV Thd Part# 2247068-03-01
ST16	1	Assy; 13-5/8" Nom MN-DS Bit Guide, f/ 7" Csg w/ (4) Communication/ Weep Holes, (4) Welded Stop Lugs, Min Bore: 6.34" Part# 2254334-06

Stage 1.0 — 13-3/8" Casing

SAFETY NOTE: Always wear proper PPE (Personal Protective Equipment) such as safety shoes, safety glasses, hard hat, gloves, etc. to handle and install equipment.

⚠ CAUTION Threaded Devices should *NEVER* be routinely tightened under pressure. This includes: Flange Bolting, Pipe Plugs, Bull Plugs, Union Nuts, Tiedown/Lockscrew Glands.

⚠ CAUTION Use of Teflon tape is prohibited. Use appropriate thread compound/sealant only. TS-73; PN: 687950-38-31-26, TF-15; PN: 687950-39-31-26, Liquid O-Ring 104G or any other thread sealant approved by Cameron Engineering.

1.1. Install the Casing Head Housing

1.1.1. Run the 13-3/8" casing and space out as required. Retrieve the landing joint.

NOTE Lift plate, Running Tool, Landing Joint, Casing Head Housing, and Lower Pup Joint (Steps 1.1.2. - 1.1.9.) will be made up offline and shipped to location as one assembly.

OFFLINE

1.1.2. Examine the ***MN-DS Housing (Item A1).*** Verify the following:

- bore is clean and free of debris
- ring groove and seal areas are clean and undamaged
- all threads are clean and undamaged
- pup joint and all outlet equipment are properly installed, clean and undamaged
- outlet equipment removed and flush plugs are installed
- ***Landing Base (Item A2)*** is properly installed, clean and undamaged

1.1.3. Orient the assembly as illustrated on page 14.

1.1.4. Examine the ***Casing Head Torque Tool assembly (Item ST1).*** Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged
- o-rings are properly installed, clean and undamaged
- all torque pins are properly installed, retracted, clean and undamaged

1.1.5. Make up a landing joint to the top of the Torque Tool assembly.

NOTE Landing joint may be made up to the Running Tool in advance.

1.1.6. Lubricate the o-rings of the Lift Plate and the ID of the Housing with a light coat of oil or grease.

⚠WARNING Excessive oil or grease may prevent a positive seal from forming.

1.1.7. Lift and suspend the Torque Tool assembly over the Housing.

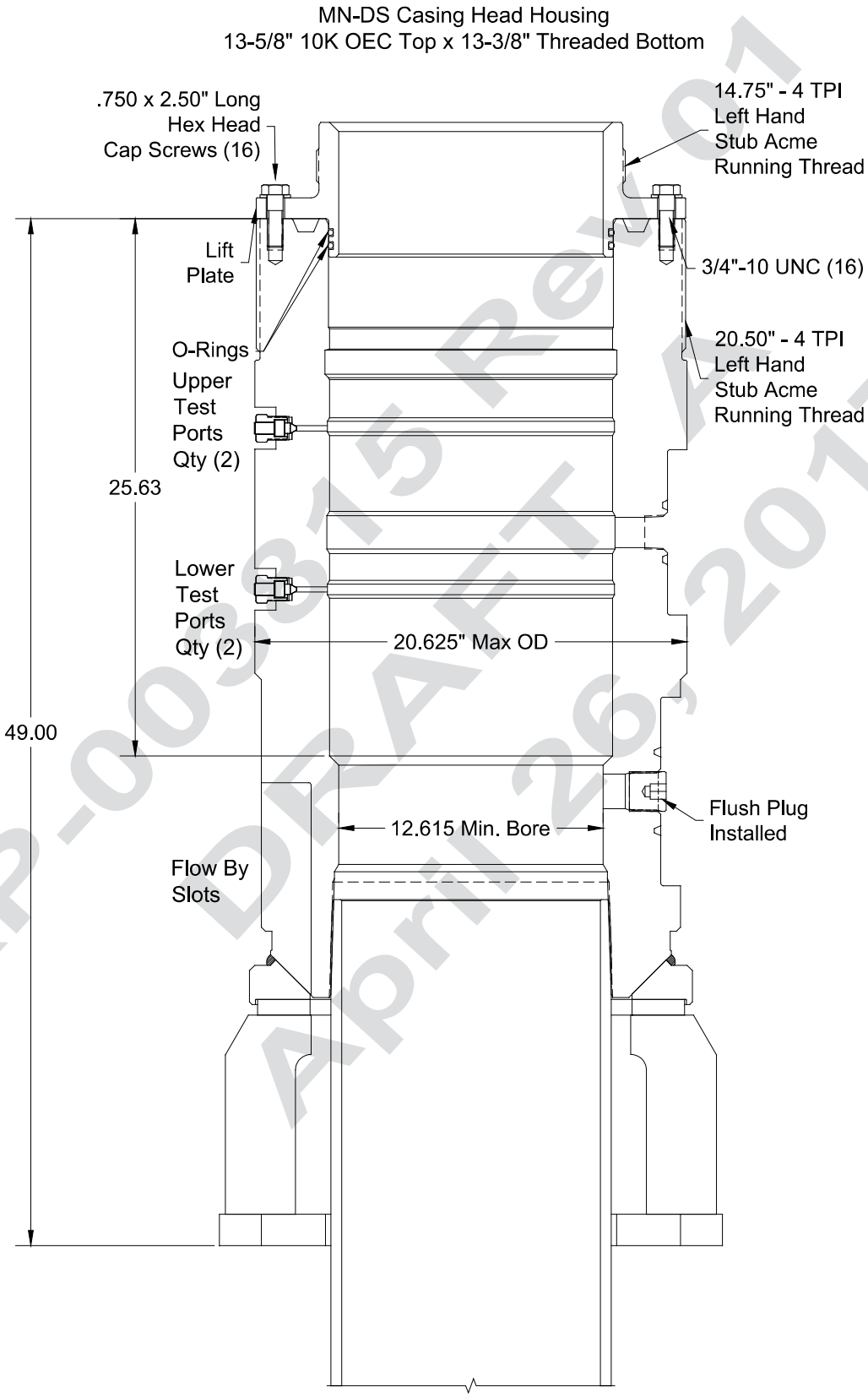
1.1.8. Lower the Torque Tool assembly into the Housing and align the capscrew holes on the Lift Plate and the threaded holes on the Housing.

1.1.9. Run in all (16) capscrews to a positive stop to hold the Torque Tool assembly and the Housing together.

NOTE Capscrews will be made up and torqued offline per API 6A (referenced in the torque chart at the back of this manual).

OFFLINE

Stage 1.0 — 13-3/8" Casing



Stage 1.0 — 13-3/8" Casing

1.1.10. Carefully lower the Housing assembly until the mating threads of the 13-3/8" casing and the pin threads of the pup joint make contact. Make up the connection to the thread manufacturer's recommended optimum torque.

NOTE Max torque 20,000 ft/lbs.

1.1.11. Pick up and release Casing from floor slips. Turn and orient outlets as required.

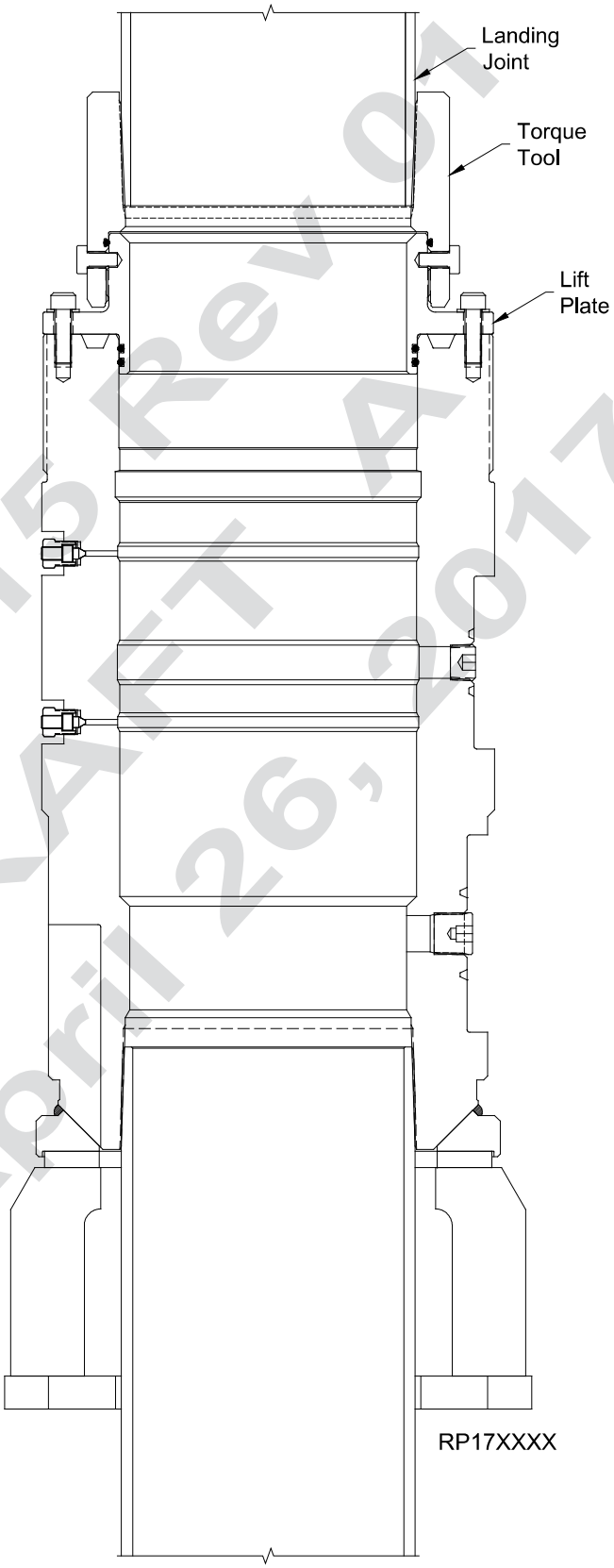
1.1.12. Carefully lower the Housing assembly and land as required.

1.1.13. Rig should chain down landing joint during cement to prevent the Housing from rising during the cement operations.

NOTE Make sure landing joint remains level after it is chained down.

1.1.14. With the Housing properly landed and oriented, cement the casing as required.

NOTE Cement returns may be taken through the Flow-by Slots of the Housing.



Stage 1.0 — 13-3/8" Casing

1.1.15. With cementing complete, remove the Torque Tool assembly from the top of the Housing by removing the capscrews and washers of the Lift Plate and lifting straight up.

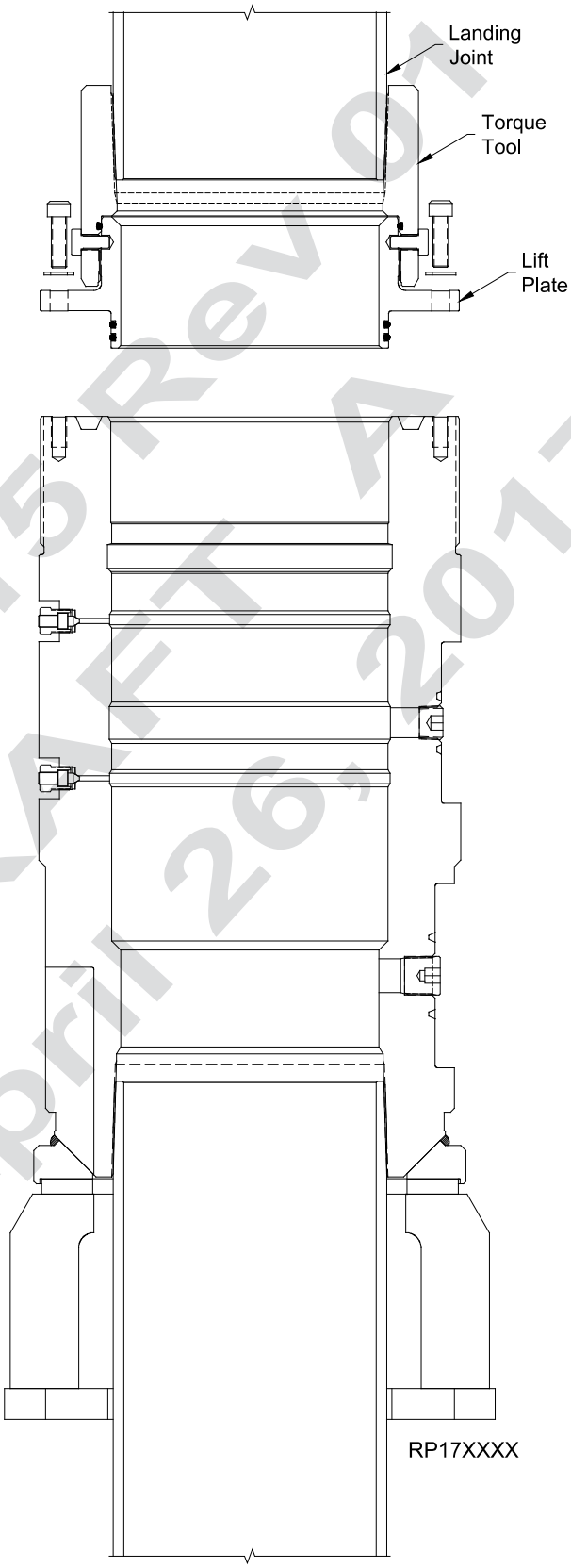
1.1.16. Retrieve the Torque Tool assembly to the rig floor.

1.1.17. Remove all (8) Torque Pins from the Torque Tool.

1.1.18. Turn the landing joint clockwise to remove the Torque Tool from the Lift Plate, approximately 6-1/2 to 7 turns.

NOTE Running Tool may be made up to landing joint permanently.

1.1.19. Clean, grease and store the Lift Plate and Torque Tool as required.



Stage 1.0 — 13-3/8" Casing

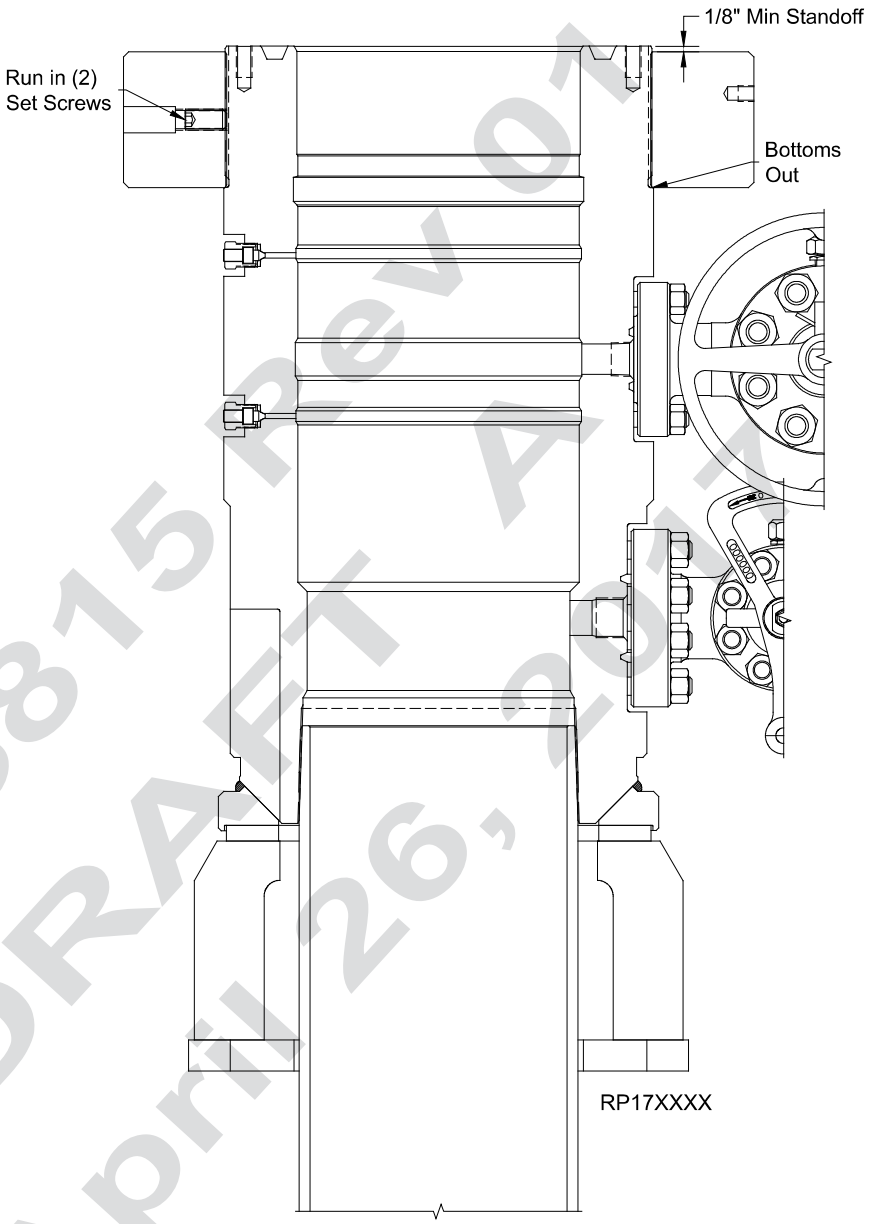
1.1.20. Install the Threaded Flange to the top of the Casing Head Housing.

⚠ CAUTION

Ensure and verify Threaded Flange is properly installed to the Casing Head.

1. **Rotate the threaded flange counterclockwise (left hand thread) to a positive stop and bottom out threaded flange on Casing Head flange shoulder.**
2. **Verify make up dimension. Dimension from the top of the threaded flange to the top of the casing head must be 1/8" or greater.**

Threaded flange must remain shouldered out during installation.



1.1.21. Remove Flush Plugs and install upper and lower Housing outlet equipment.

1.1.22. Install VR Plugs, and test the outlet valves to:

- Lower Valves to 5,000 psi
- Upper Valves to 10,000 psi

1.1.23. Remove VR Plugs, and close Upper and Lower outlet valves.

Stage 2.0 — 9-5/8" Casing

2.1. Test the BOP Stack

NOTE **Immediately after making up the BOP Stack and periodically during the drilling of the hole for the next casing string, the BOP Stack (connections and rams) must be tested.**

WARNING ***Previously used BOP Test Plug must be inspected for damage due to wear. Where warranted such as highly deviated wells the Test Plug must be checked periodically to insure integrity.***

2.1.1. Make up the BOP Stack using a spare ***BX-159 ring gasket***.

⚠ CAUTION

Ensure and verify Threaded Flange is properly installed to the Casing Head.

1. **Rotate the threaded flange counter-clockwise (left hand thread) to a positive stop and bottom out threaded flange on Casing Head flange shoulder.**
2. **Verify make up dimension. Dimension from the top of the threaded flange to the top of the casing head must be 1/8" or greater.**

Threaded flange must remain shouldered out during installation.

2.1.2. Examine the ***Test Plug (Item ST2).*** Verify the following:

- seal is in place and undamaged
- 1/2" pipe plug is installed, if required
- all threads are clean and undamaged

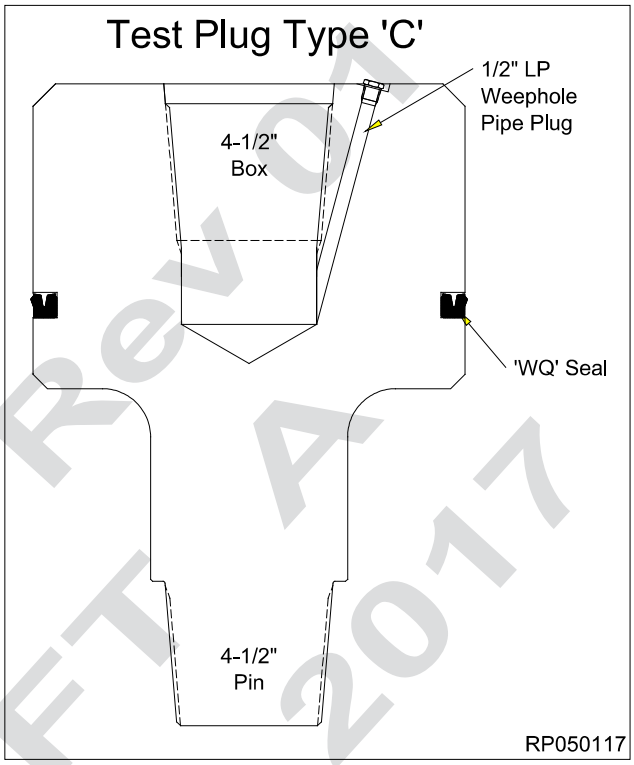
2.1.3. Orient the Tool as illustrated.

2.1.4. Make up a joint of drill pipe to the top of the Tool.

WARNING **A minimum of one joint of Drill Pipe is required on the bottom of the BOP Test Plug to ensure BOP Test plug remains centralized.**

2.1.5. Lubricate the seal of the Tool with a light coat of oil or grease.

WARNING **Excessive oil or grease may prevent a positive seal from forming.**



Stage 2.0 — 9-5/8" Casing

2.1.6. Open the lowermost annulus valve of the Housing and drain fluid to land the Test Plug. Leave valve open.

2.1.7. Slowly lower the Tool through the BOP Stack, measure and record, until it lands on the load shoulder in the Housing.

NOTE Distance from the Housing load shoulder to the face of the BOP flange is 25.63".

2.1.8. Close the BOP rams on the drill pipe and test to ***10,000 psi maximum.***

2.1.9. Monitor the annulus valve for signs of pressure.

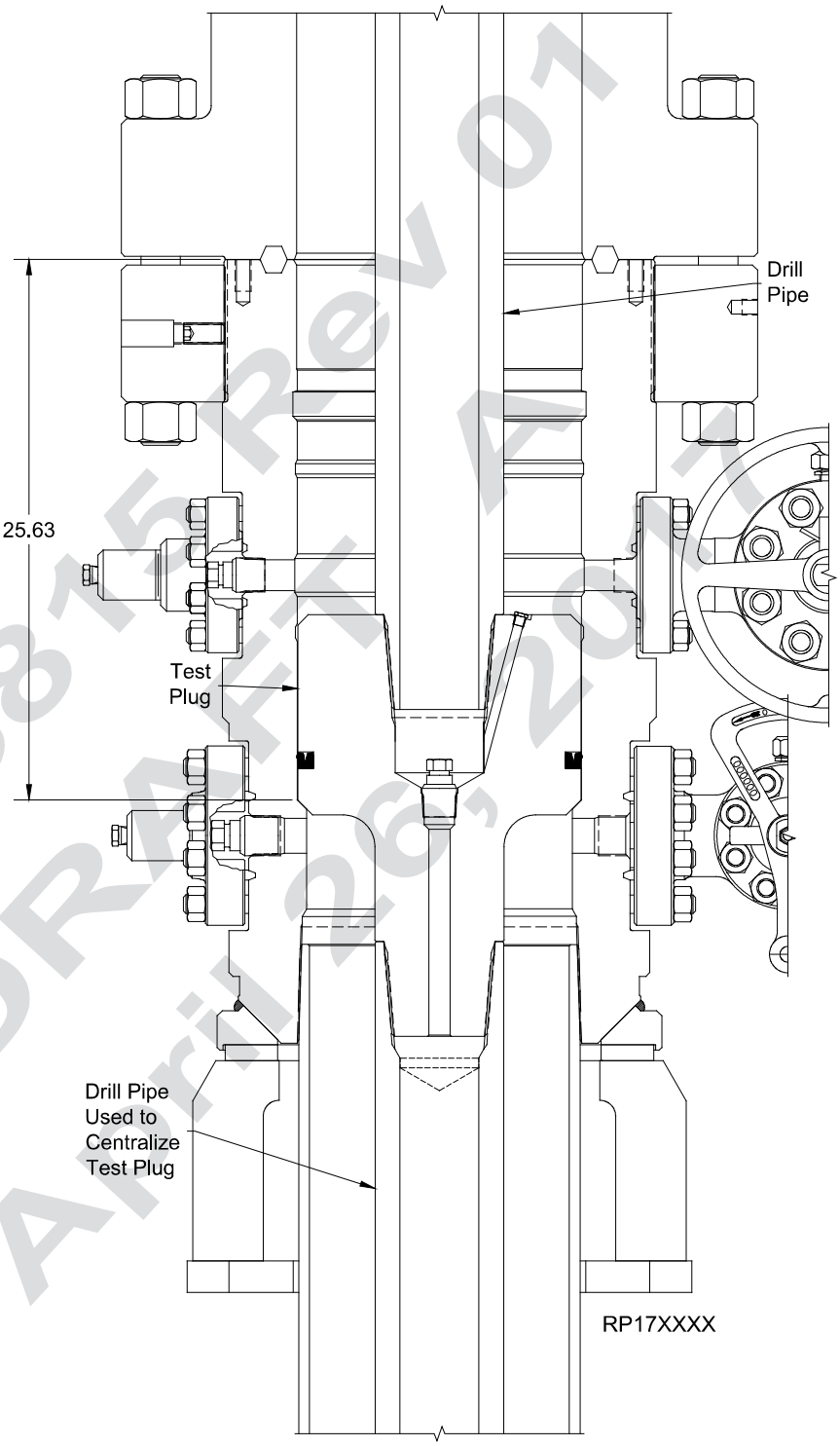
2.1.10. After a satisfactory test is achieved, release pressure, close the annulus valve and open the rams.

2.1.11. Remove as much fluid from the BOP as possible.

2.1.12. Retrieve the Test Plug slowly to avoid damage to the seal.

NOTE It may be necessary to open the annulus valve when starting to retrieve the Test Plug to relieve any vacuum that may occur. Leaving annulus valve open during testing insures safety of surface casing.

2.1.13. Close lower annulus valve.



Stage 2.0 — 9-5/8" Casing

NOTE Always use a Wear Bushing while drilling to protect the load shoulder from damage by the drill bit or rotating drill pipe. The Wear Bushing must be retrieved prior to running the casing.

WARNING Previously used Wear Bushings must be inspected for damage and significant reduction in wall thickness due to wear. Where warranted such as highly deviated wells the Wear Bushing must be checked periodically to insure integrity.

2.2. Run the Wear Bushing Before Drilling

2.2.1. Examine the ***Wear Bushing Running Tool (Item ST3).*** Verify the following:

- all threads are clean and undamaged
- bore is clean and free of debris
- pup joint is properly installed for tonging

2.2.2. Orient the Tool as illustrated.

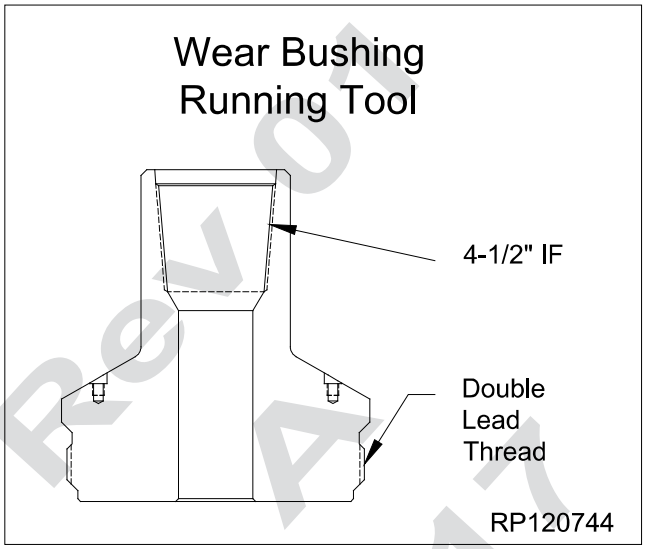
2.2.3. Examine the ***Wear Bushing (Item ST4).*** Verify the following:

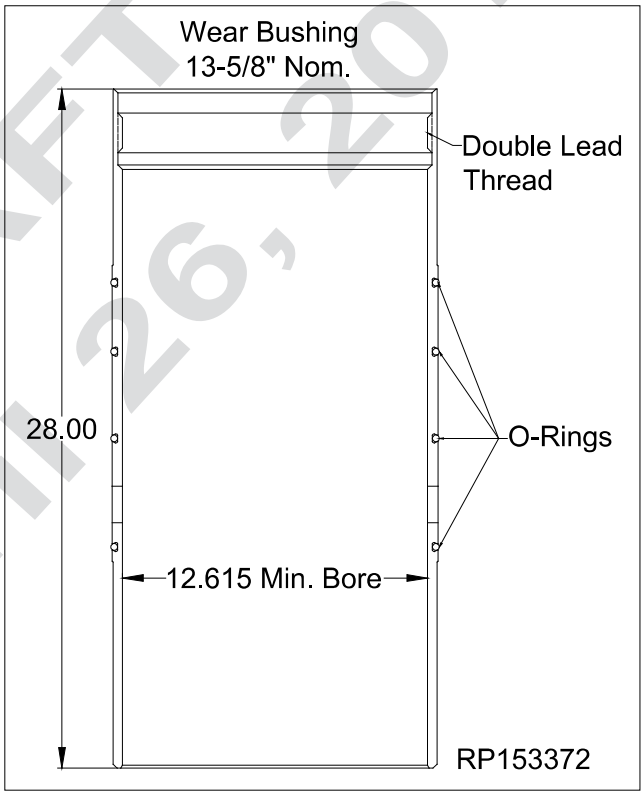
- bore is clean and free of debris
- threads are clean and free of debris
- o-ring seals are in place, clean and undamaged

2.2.4. Orient the Wear Bushing as illustrated.

WARNING Do NOT cut o-rings.

CAUTION This Wear Bushing has no mechanical retention device. Care must be exercised when tripping out the hole to avoid dislodging the Wear Bushing which could compromise safety if it becomes lodged in the BOP.





Stage 2.0 — 9-5/8" Casing

2.2.5. Lubricate the o-ring seals of the Wear Bushing with a light coat of oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.

2.2.6. Make up a joint of drill pipe to the top of the Tool.

2.2.7. Lower the Tool into the Wear Bushing and turn the drill pipe counterclockwise until thread 'jump' can be felt, then clockwise to a positive stop to thread the Tool into the Wear Bushing.

WARNING Do NOT overtighten the Tool/ Wear Bushing connection.

2.2.8. Carefully lower the Tool/ Wear Bushing assembly through the BOP, measure and record, until it lands on the load shoulder of the Housing.

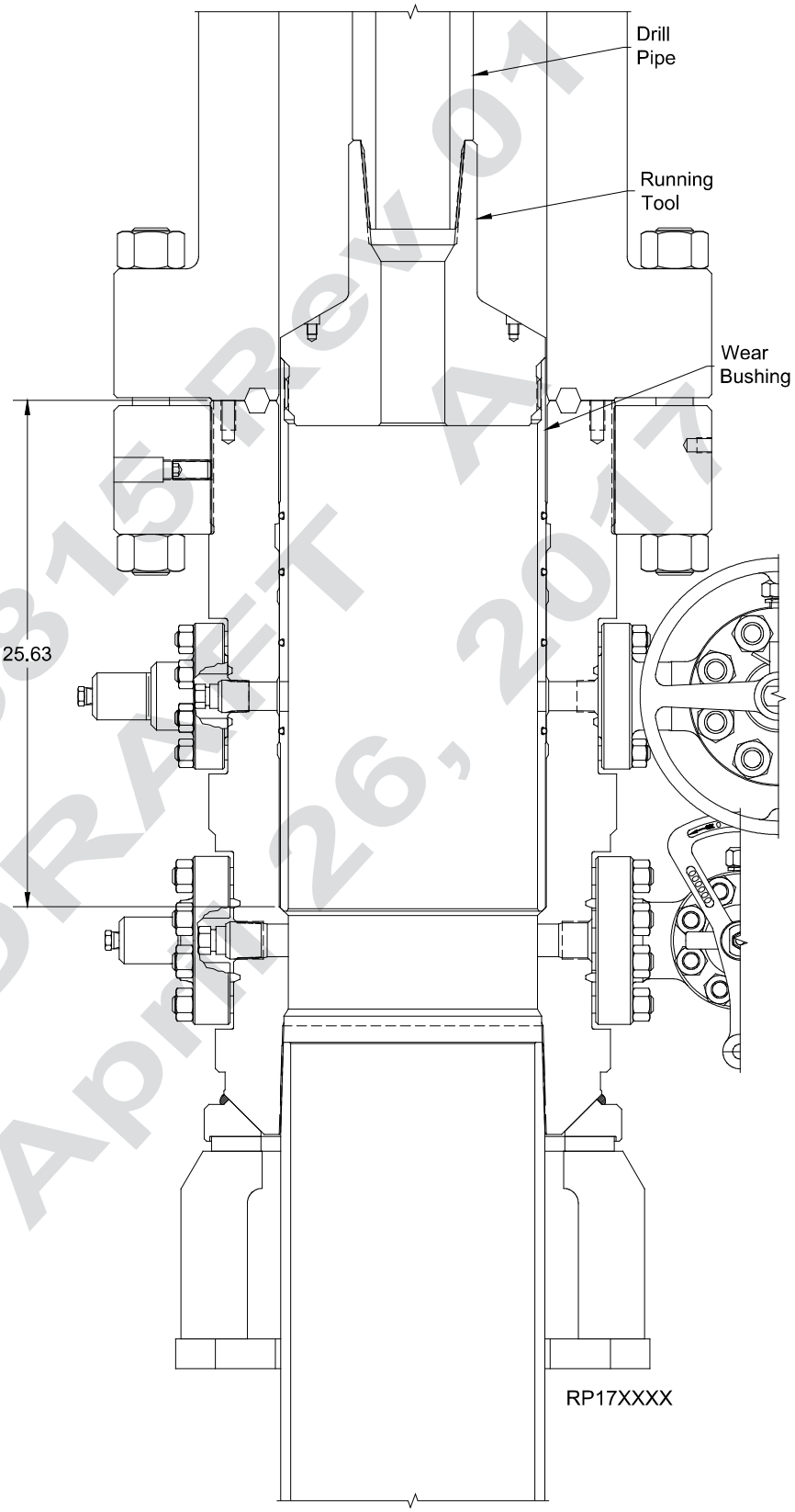
NOTE Distance from the Housing load shoulder to the face of the BOP flange is 25.63".

2.2.9. Disengage the Tool from the Wear Bushing by turning the drill pipe counterclockwise and lifting straight up.

2.2.10. Remove the Tool from the drill string.

2.2.11. Clean, grease, and store the Tool as required.

2.2.12. Drill as required.



Stage 2.0 — 9-5/8" Casing

2.3. Retrieve the Wear Bushing After Drilling

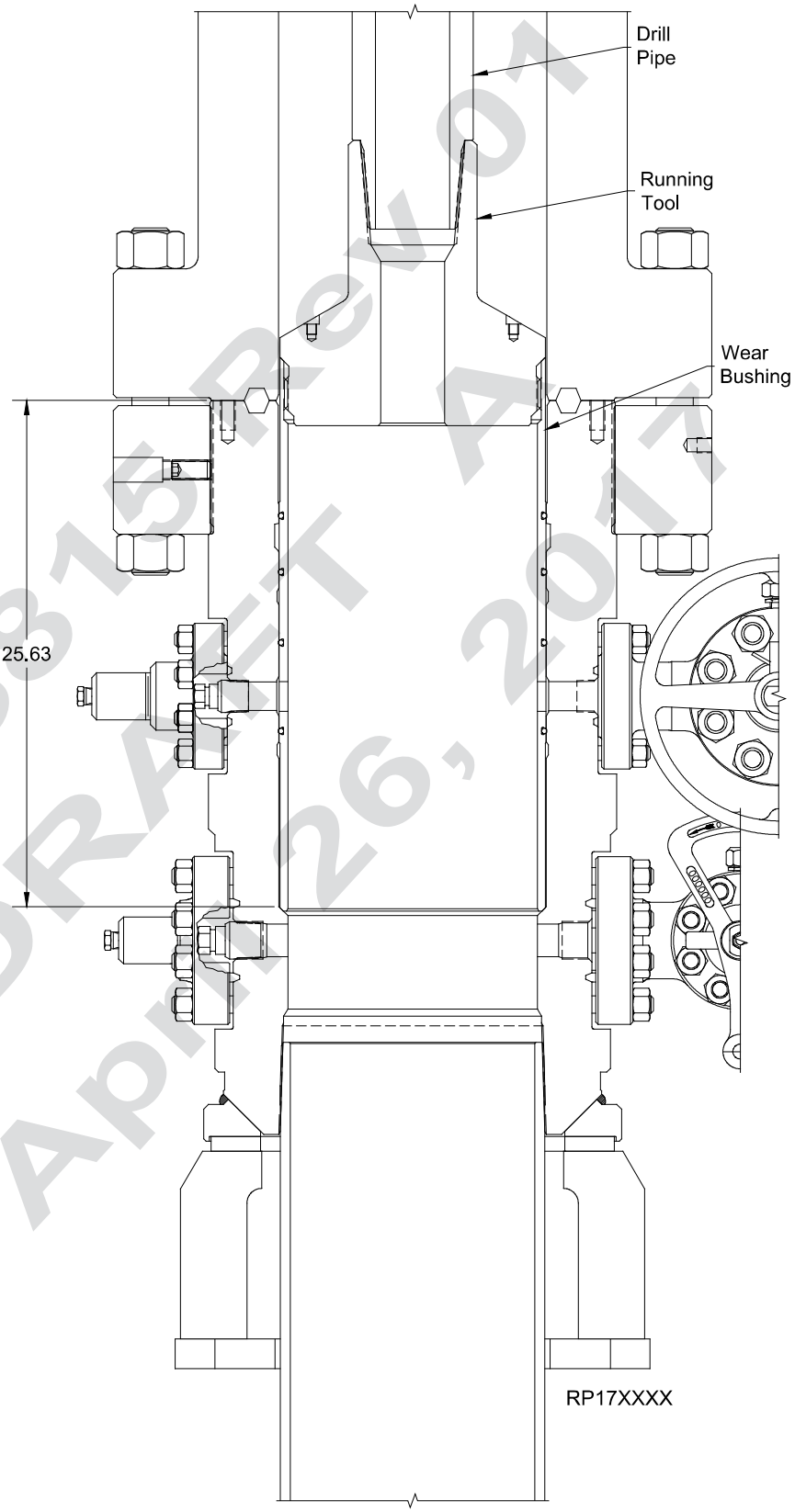
2.3.1. Make up the Tool to the drill pipe with the threads down.

2.3.2. Slowly lower the Tool into the Wear Bushing.

2.3.3. Turn the Tool counter clock-wise until thread jump can be felt. Slack off all weight to make sure the Tool is down. Then turn clockwise to a positive stop.

2.3.4. Slowly retrieve the Wear Bushing to the rig floor and remove it and the Tool from the drill string.

2.3.5. Clean, grease and store the Tool and Wear Bushing as required.



Stage 2.0 — 9-5/8" Casing

Landing of Mandrel Hangers

Cameron service personnel must verify that the mandrel hanger is landed properly on the load shoulder in the wellhead. This can be accomplished by one of three methods.

- Visually observe the scribe line mark around mandrel hanger running tool through upper side outlet valve.
- Conduct a dry run and mark the dedicated landing joint prior to running the casing or tubing.
- Calculate the distance from the rig floor to the landing shoulder and confirm that the hanger has traveled the required distance.

2.4. Hang Off the Casing

NOTE In the event the 9-5/8" casing should become stuck, and the Mandrel Hanger is unable to be used, refer to Section 2.5.

2.4.1. Run the 9-5/8" casing and space out appropriately.

2.4.2. Hang off the last joint of casing to be run in the floor slips at height that will enable easy handling and make up of the Hanger and landing joint.

2.4.3. Examine the ***Casing Hanger Running Tool (Item ST5).*** Verify the following:

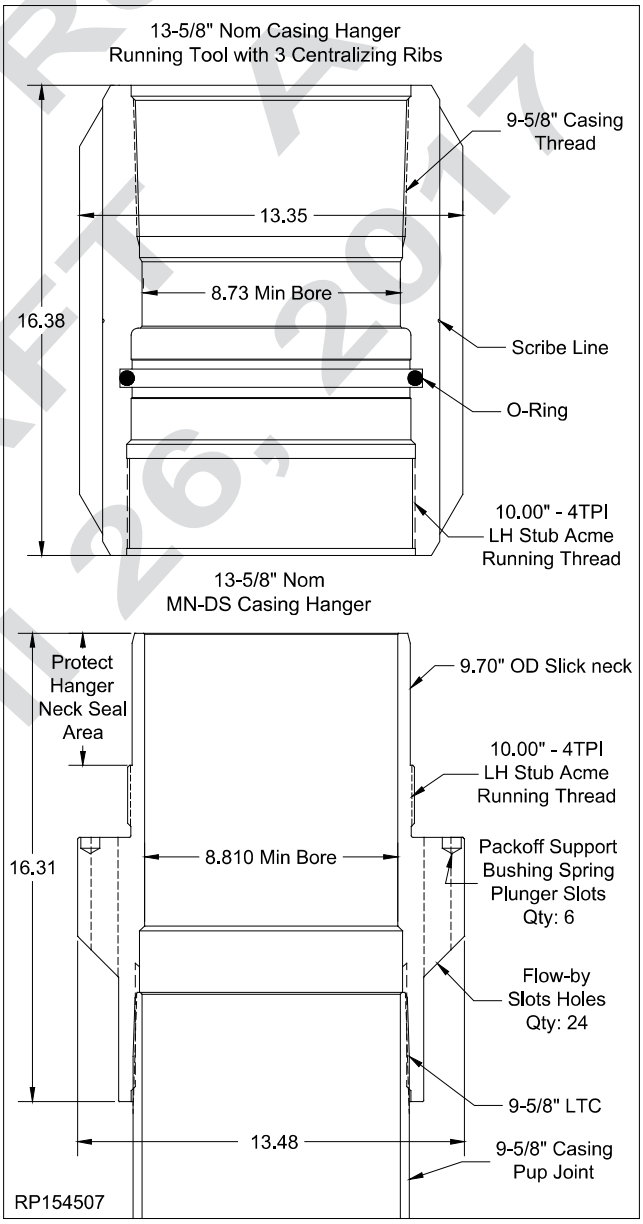
- bore is clean and free of debris
- all threads are clean and undamaged
- internal seal is properly installed, clean and undamaged
- scribe line is properly identified with paint as required

2.4.4. Orient the Tool as illustrated.

2.4.5. Examine the ***Casing Hanger (Item A16).*** Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged
- neck seal area is clean and undamaged
- casing pup joint is properly installed
- flow-by slots are clean and free of debris

2.4.6. Orient the Hanger as illustrated.



Stage 2.0 — 9-5/8" Casing

2.4.7. Make up a landing joint to the top of the Running Tool.

2.4.8. Lubricate the running threads of both the Tool and the Hanger and the seal of the Tool with a light coat of oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.

2.4.9. Lift and suspend the Tool over the Hanger.

2.4.10. Lower the Tool onto the Hanger until the mating threads make contact.

2.4.11. While balancing the weight, turn the Tool clockwise until the thread 'jump' can be felt then counterclockwise to a positive stop. Approximately 8-1/2 turns.

WARNING Do NOT torque the connection.

⚠ CAUTION

Do not use Top Drive to engage/ disengage the Running Tool. Using Top Drive will permanently damage the equipment running threads and will require damaged part to be replaced.

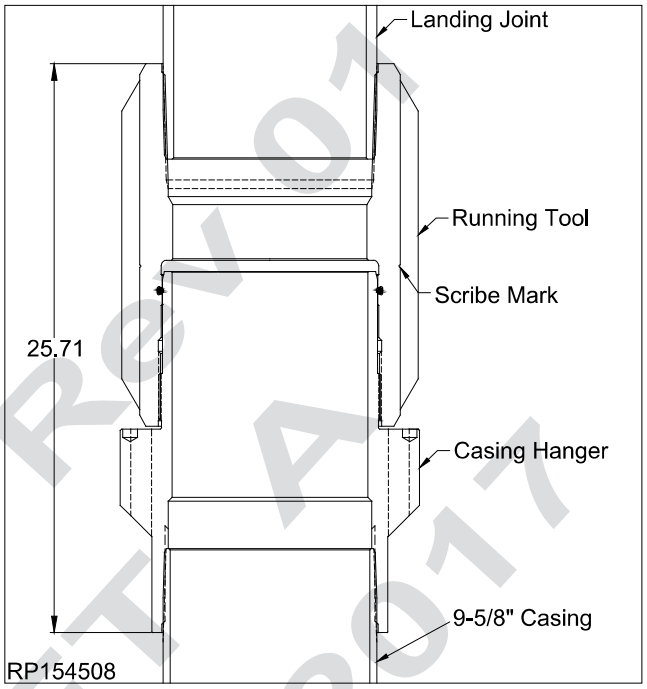
2.4.12. Back the Tool off 1/2 a turn clockwise to keep the threads from binding up.

2.4.13. Lift the Hanger above the casing hung off in the floor.

2.4.14. Lower the Hanger assembly until the mating threads of the casing and the pin threads of the pup joint make contact.

NOTE When making up the Hanger to the casing do not use the seal neck area for back up.

2.4.15. While balancing the weight, turn the Hanger assembly counterclockwise until the thread 'jump' can be felt then clockwise to the thread manufacturer's recommended optimum torque.



Stage 2.0 — 9-5/8" Casing

2.4.16. Open the lowermost side outlet valve of the Housing.

2.4.17. Release the casing from the floor slips and lower it into the well, measure and record, until the Hanger lands on the load shoulder in the Housing.

NOTE Distance from the Housing load shoulder to the face of the BOP flange is 25.63".

2.4.18. Ensure Hanger is centered in well bore.

2.4.19. Slack off all weight on the casing.

2.4.20. Verify through the open outlet on the MN-DS Housing that the Hanger has landed properly. Ensure the scribe line on the Tool is in the middle of the uppermost outlet of the MN-DS Housing.

2.4.21. Cement as required.

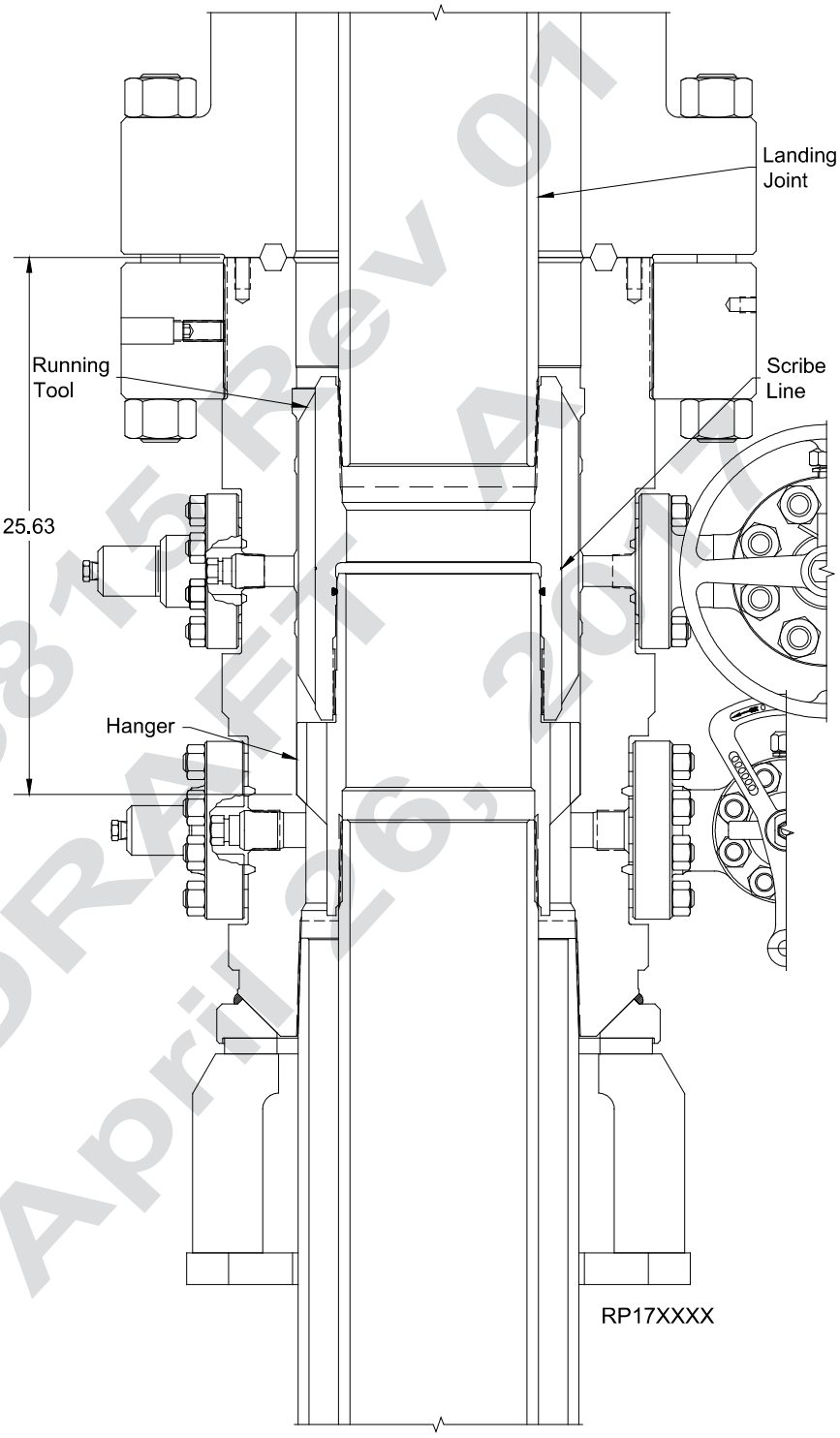
NOTE Cement returns may be taken through the flow-by slots of the Hanger and out of the BOP Stack.

2.4.22. With cementing completed, turn the landing joint clockwise 8-1/2 turns to release the Tool from the Hanger.

NOTE Only use chain tongs to turn the landing joint. Do NOT use top drive or CRT as this will damage the Hanger and Tool threads.

2.4.23. Retrieve the Tool to the rig floor.

2.4.24. Clean, grease and store the Tool as required.



Stage 2.0 — 9-5/8" Casing

SAFETY NOTE: Always wear proper PPE (Personal Protective Equipment) such as safety shoes, safety glasses, hard hat, gloves, etc. to handle and install equipment.

NOTE

1. **Reconfirm the Casing OD and grade. Remove and clean loose scale from Casing OD.**
2. **Verify Slip Bowl taper is smooth, clean with no corrosion and damage free.**
3. **Disassembly of the Hanger to re-orient the slips is not required.**

2.5. Hang Off the Casing (Emergency)

NOTE The following procedure should be followed ONLY if the casing should become stuck. If the Mandrel Casing Hanger was used, skip this stage.

2.5.1. Run the Casing and cement as required.

NOTE Ensure that the Casing is centralized. Hanger clearances are small and centering must be accurate.

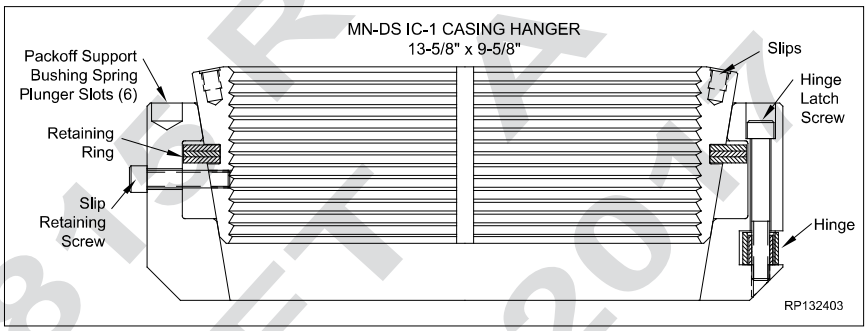
2.5.2. Drain the BOP and Housing bowl through the lowermost valve of the Housing. Leave the valve open until the Casing Hanger is set.

2.5.3. Ensure the well is safe and under control.

NOTE Ensure hang off weight desired is picked up before installing slips around casing.

2.5.4. Separate the BOP Stack from Housing and suspend it above the Housing high enough to facilitate installation of the Slip Casing Hanger.

2.5.5. Washout as required.



2.5.6. Examine the ***MN-DS-IC-1 Slip Type Casing Hanger (Item E1).*** Verify the following:

- segments are clean, undamaged and secure
- all screws are in place and snug

Stage 2.0 — 9-5/8" Casing

2.5.7. Remove the latch screw and separate the Hanger halves.

2.5.8. Place a slip plate on the Housing flange against the casing to support the Hanger.

2.5.9. Ensure the casing is centered in well bore.

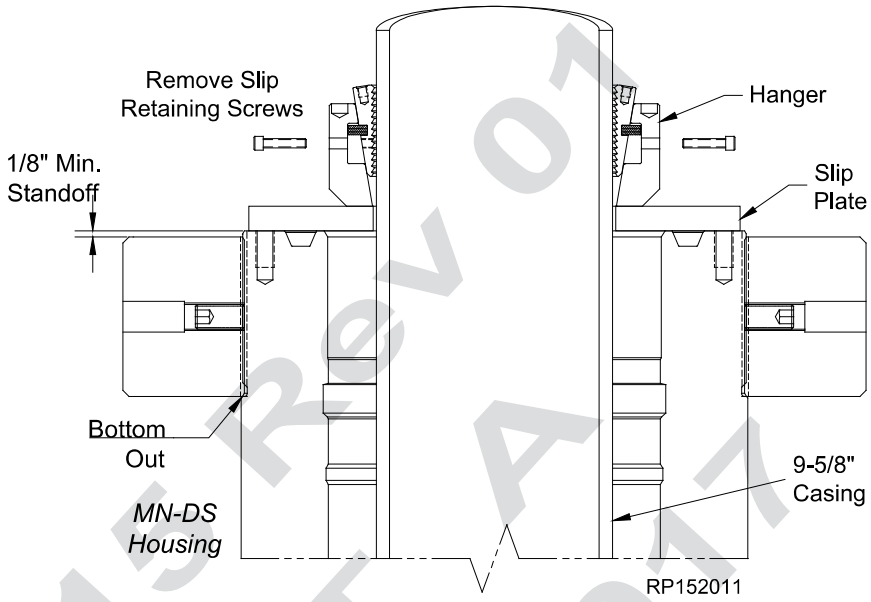
2.5.10. Wrap the Hanger around the casing and replace the latch screw.

2.5.11. Remove the four slip retainer screws on the OD of the slip bowl. These screws hold the slips in retracted position. Slips will **NOT** set unless these screws are removed before Hanger is placed in the Housing.

2.5.12. Grease the Hanger's body.

2.5.13. Remove the slip plate and carefully lower the Hanger into the Housing bowl, using a cat-line to center the casing, if necessary. Measure and record.

WARNING Do NOT drop the Casing Hanger!



Stage 2.0 — 9-5/8" Casing

2.5.14. When the Hanger is down pull tension on the casing to the desired hanging weight (no minimum weight is required).

2.5.15. Slack off the casing.

NOTE A sharp decrease on the weight indicator will signify that the Hanger has taken weight and is supporting the Casing.

2.5.16. Rough cut the casing approximately 5-1/2" above the top flange of the Housing and move the BOP and excess casing out of the way.

2.5.17. Using an internal cutter, final cut the casing at 15-1/4" +/-1/8" below the Housing flange.

2.5.18. Place a 3/8" x 3/16" bevel on the casing stub and remove all burrs and sharp edges.

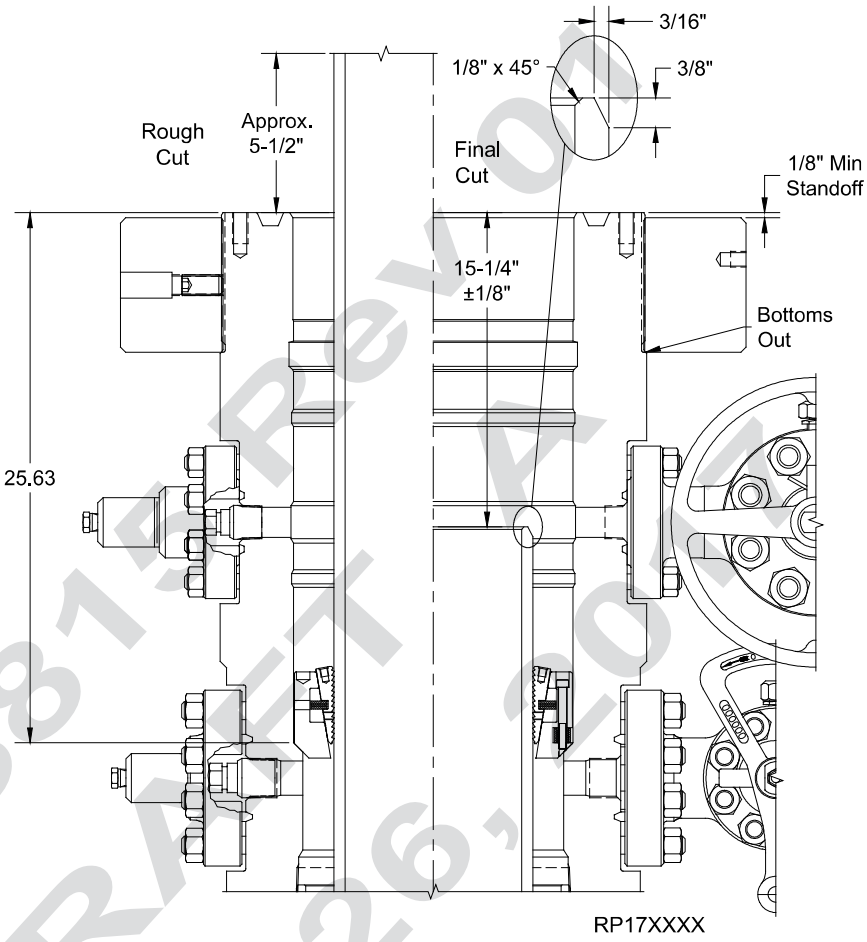
NOTE There must not be any rough edges on the casing or the seals of the Packoff will be damaged.

2.5.19. Remove and discard the used ring gasket from the Housing flange.

2.5.20. Clean the mating ring grooves of the Housing and BOP Stack.

2.5.21. Install the spare ***BX-159 Ring Gasket*** in the Housing ring groove.

2.5.22. Reconnect the BOP Stack to the Housing using the ***Studs and Nuts (Item A20)*** and tightening the studs and nuts in an alternating cross pattern to the torque referenced in the chart in the back of this manual.



⚠ CAUTION

Ensure and verify Threaded Flange is properly installed to the Casing Head.

1. **Rotate the threaded flange counterclockwise (left hand thread) to a positive stop and bottom out threaded flange on Casing Head flange shoulder.**
2. **Verify make up dimension. Dimension from the top of the threaded flange to the top of the casing head must be 1/8" or greater.**

Threaded flange must remain shouldered out during installation.

Stage 2.0 — 9-5/8" Casing

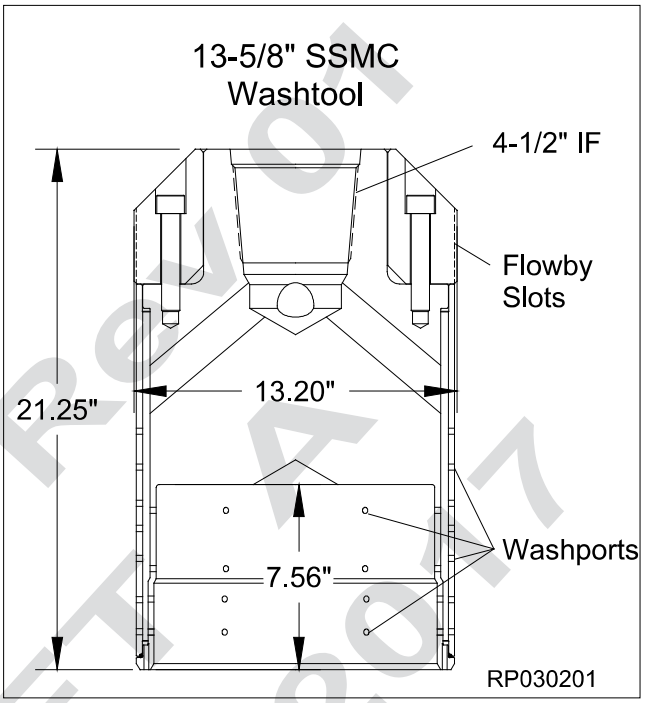
2.6. Washout the Housing

2.6.1. Examine the ***Wash Tool (Item ST6).*** Verify the following:

- bore is clean and free of debris
- threads are clean and undamaged
- washports are clean and unobstructed

2.6.2. Orient the wash tool with the box connection up.

2.6.3. Make up a joint of drill pipe to the top of the Tool.



Stage 2.0 — 9-5/8" Casing

2.6.4. Ensure lowermost outlet valve or Housing is open.

2.6.5. Carefully lower the Tool into the well until it lands on the top of the 9-5/8" Casing Hanger. Measure and Record.

2.6.6. Lift the Tool approximately 2" and supply pressure through the drill pipe. At the same time the pressure is being supplied, turn the Tool.

NOTE The maximum pressure rating for the Wash Tool is 1,000 PSI, at the flow rate of 75 GPM.

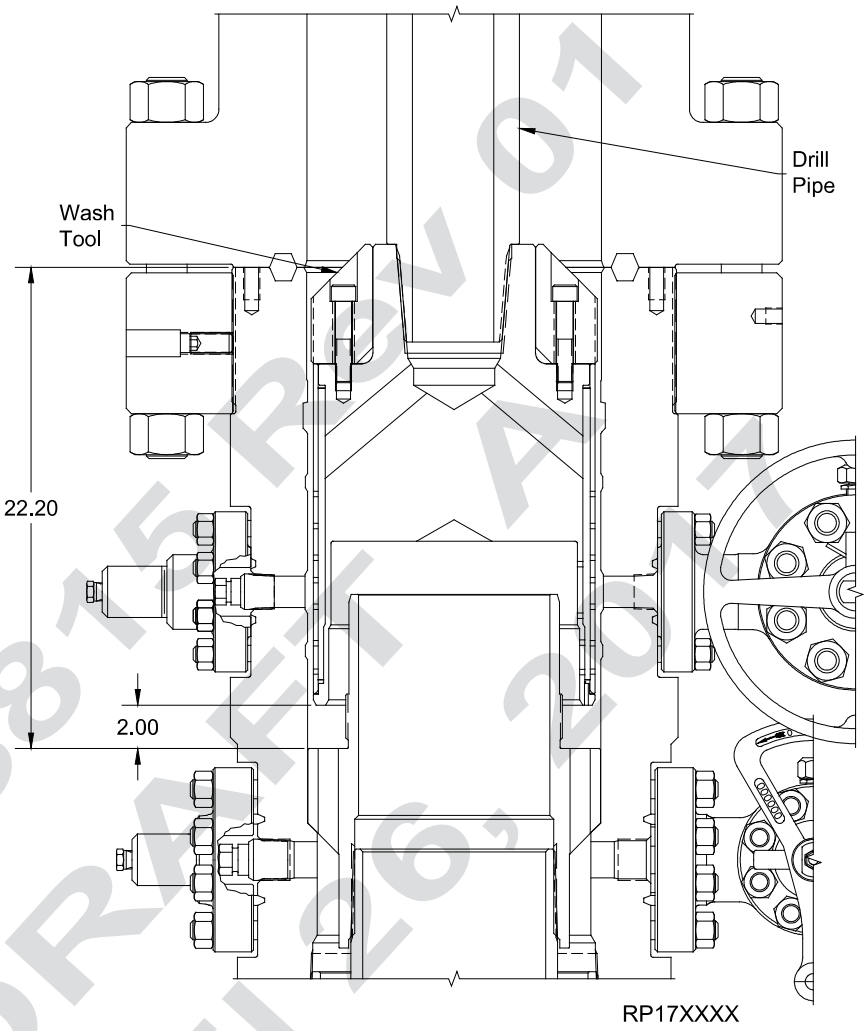
NOTE Do NOT reciprocate the Wash Tool.

2.6.7. Monitor the outlet valve for returns.

2.6.8. Once the returns are clean and free of debris, stop the rotation and the pump.

2.6.9. Retrieve the Tool to the rig floor.

2.6.10. Clean, grease and store the Tool as required.



Stage 2.0 — 9-5/8" Casing

2.7. Install the Packoff Support Bushing

2.7.1. Examine the ***Packoff Support Bushing Running Tool (Item ST7).*** Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged
- required pin x pin crossover stub is properly installed

2.7.2. Orient the Running Tool as illustrated.

2.7.3. Examine the ***Packoff Support Bushing (Item A17)***. Verify the following:

- bore is clean and free of debris
- all elastomer seals are in place, clean and undamaged
- all threads are clean and undamaged
- lockring is in place
- scribe line is properly identified with paint as required
- ensure spring plunger pins on the inside of the Packoff Support Bushing are properly installed and spring loaded pins retract properly.

2.7.4. Orient the Packoff Support Bushing as illustrated.

2.7.5. Lubricate the external running threads of the Packoff Support Bushing and threads of the Running Tool with a light coat of oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.

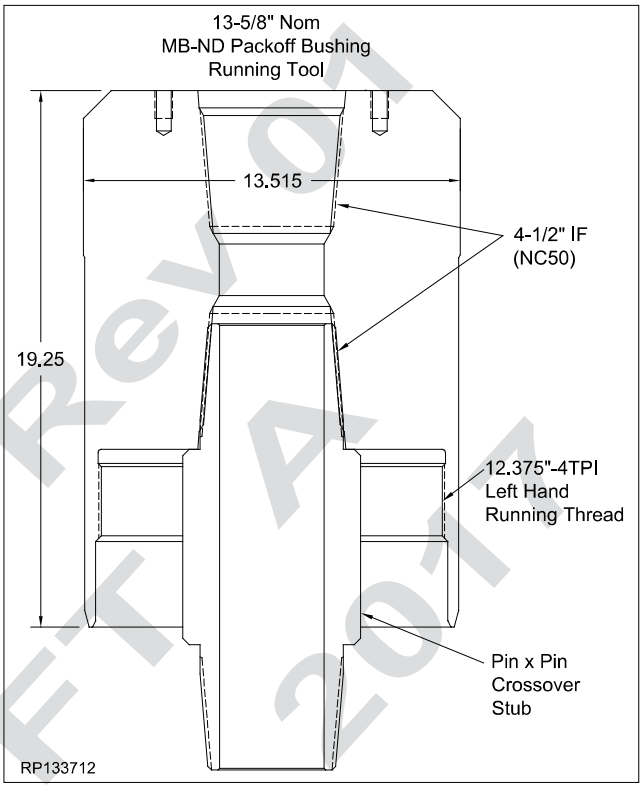
2.7.6. Run drill pipe or heavy weight collars through the rotary table and hang off in the floor slips. This will be used for weight to set the Packoff Support Bushing into position.

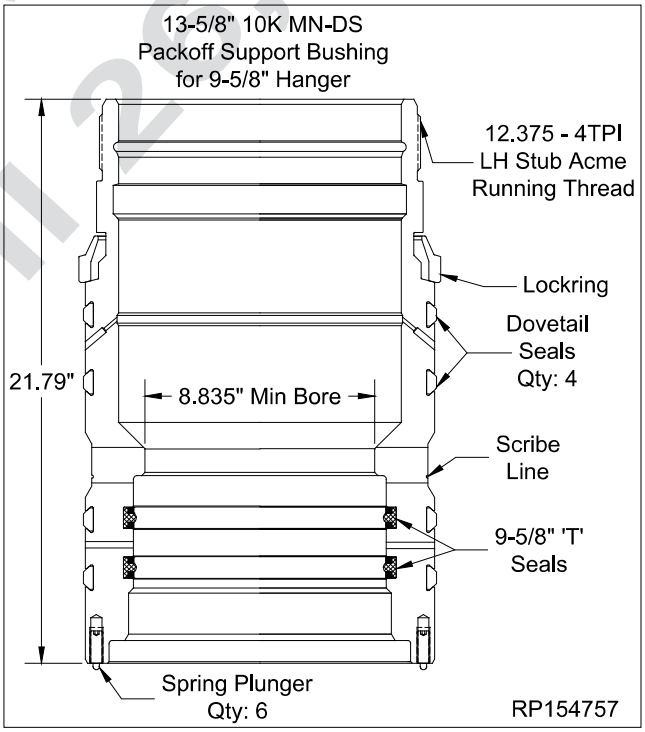
NOTE Heavy weight drill pipe or drill collars are used to aid in landing the Packoff Support Bushing. Weight required to run the Packoff Support Bushing into the Housing is approximately 10,000 lbs.

2.7.7. Make up a stand of drill pipe to the top of the Tool.

2.7.8. Install a ***Lockring Installation Tool (Item ST14)*** onto the lockring of the Support Bushing.

NOTE See APPENDIX 1 for Optional Lock ring Installation Tool on the back of this procedure.

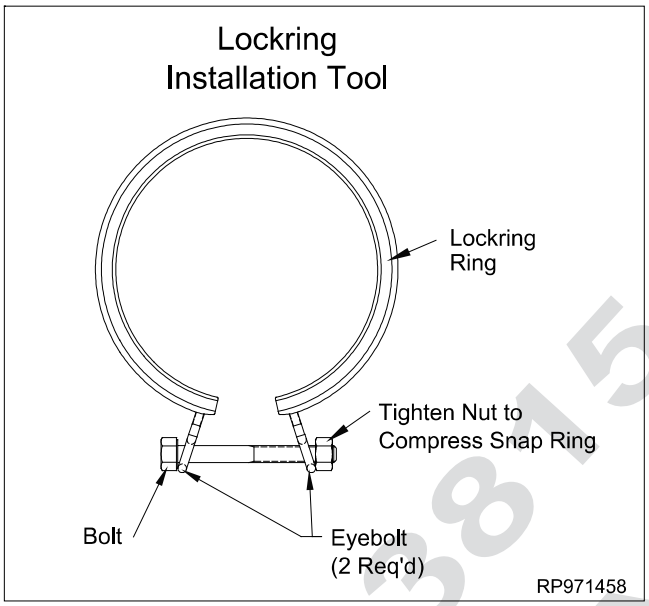




Stage 2.0 — 9-5/8" Casing

2.7.9. Fully compress the lockring.

NOTE The Lockring Installation Tool will assist in minimizing the length of time that the lockring is compressed.



2.7.10. Carefully lower the Running Tool onto the Pack-off Support Bushing Assembly until the threads make contact.

2.7.11. Make up the connection by first turning the Tool clockwise to align the threads then counterclock-wise until the Tool engages the lockring.

NOTE Approximately 8 turns are required for full make-up. Write down the number of turns to make up the Tool to the Packoff Support Bushing in the Field Service Report.

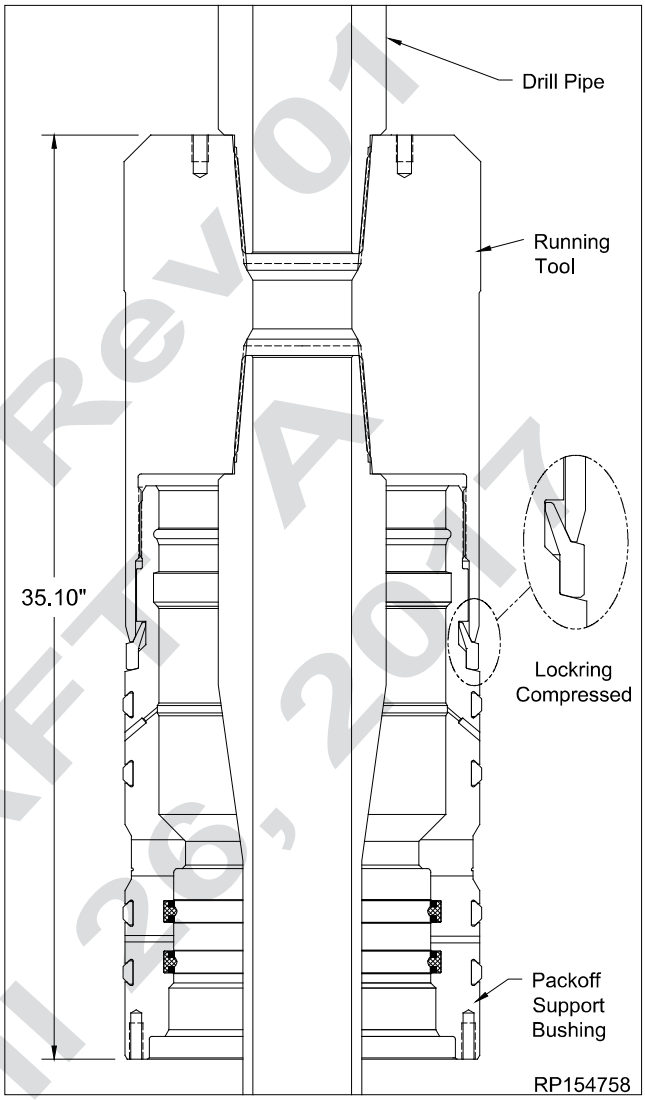
2.7.12. Once the lockring is engaged remove the Lockring Installation Tool.

NOTE Ensure the Lockring is flush or below of the OD of the Packoff Support Bushing.

2.7.13. Lift and suspend the assembly over the drill pipe hung off in the rig floor.

2.7.14. Lower the assembly onto the threads of the drill pipe and make up the connection.

WARNING Do NOT damage the internal seals of the Packoff Support Bushing!



2.7.15. Lubricate the ID of the 'T' seals and the OD of the dovetail seals with a light coat of oil or grease. Do NOT use pipe dope.

WARNING Excessive oil or grease may prevent a positive seal from forming.

2.7.16. Open the uppermost and lowermost valves of the Housing.

NOTE The uppermost valve is to remain open during the setting of the Seal Assembly.

Stage 2.0 — 9-5/8" Casing

2.7.17. Center and lower assembly through the BOP Stack, measure and record, until the Support Bushing lands on the Hanger. Mark the landing joint.

NOTE Distance from the Mandrel Casing Hanger landing shoulder or the top of the Emergency Casing Hanger to the face of the BOP flange is 22.20".

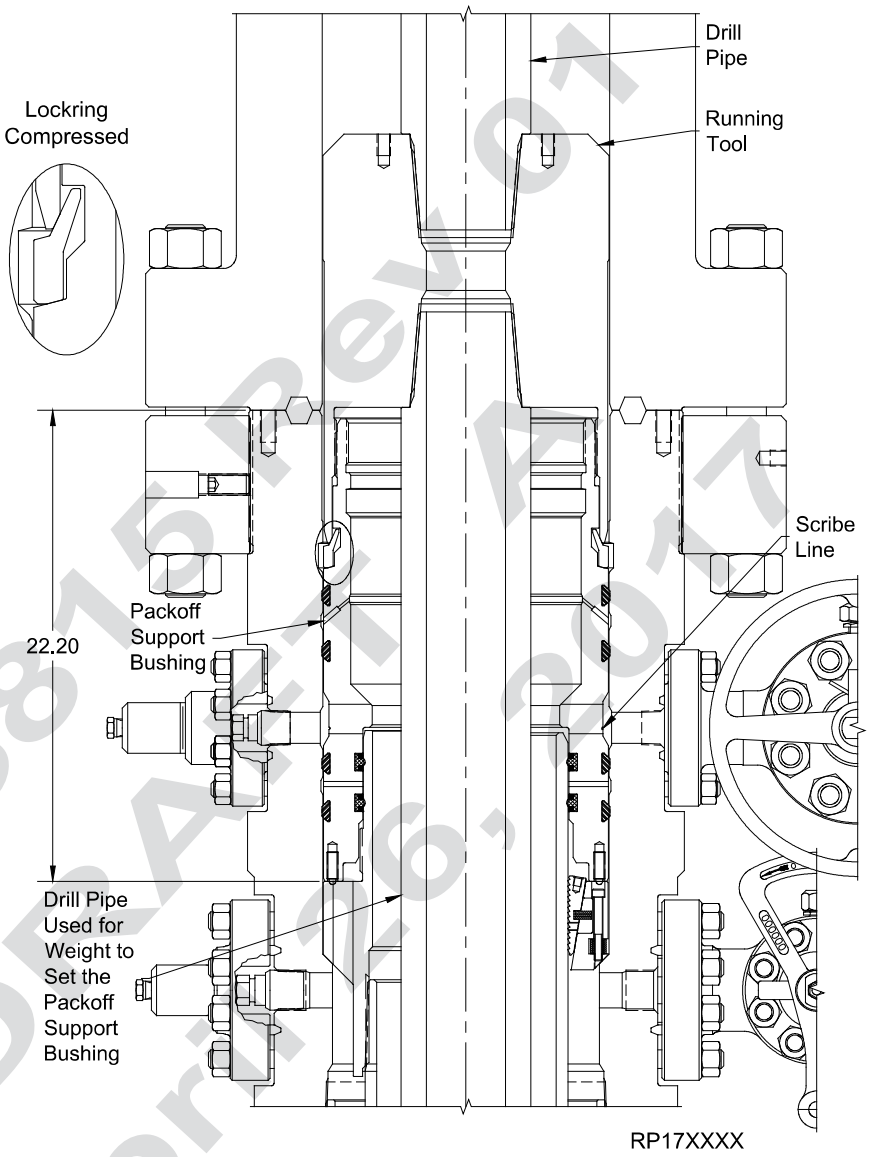
2.7.18. Compare and confirm dimension against BOP stack drilling adapter and Housing.

2.7.19. Verify the Packoff Support Bushing has landed properly through the uppermost outlet valve of the Housing:

- using a flash light, verify the scribe line is visible in the center of the port

2.7.20. Turn the landing joint counterclockwise until the (6) Spring Plunger pins engage the Hanger mating slots. When the pins engage the Hanger, STOP turning when a positive stop is felt.

NOTE Test between the lower seals of the Packoff Support Bushing will be conducted after the Lockdown Ring has been properly engaged/ set into the Housing.



Stage 2.0 — 9-5/8" Casing

2.8. Set the Packoff Support Bushing Lockdown Ring

NOTE ***Confirm the Packoff Support Bushing has properly landed on Mandrel or Emergency Casing Hanger by (1) confirming dimension (2) viewing through the upper open annulus valve of the Housing. The scribe line should be in the center of the outlet bore.***

2.8.1. Make a horizontal mark on the landing joint to monitor the number of turns.

2.8.2. Using chain tongs, back out the Tool 3-1/2 turns clockwise to allow the Locking ring to expand into its mating groove in the Housing.

NOTE **Horizontal mark should raise no more than .875".**

WARNING **Do NOT attempt to back out more than 3 tuns.**

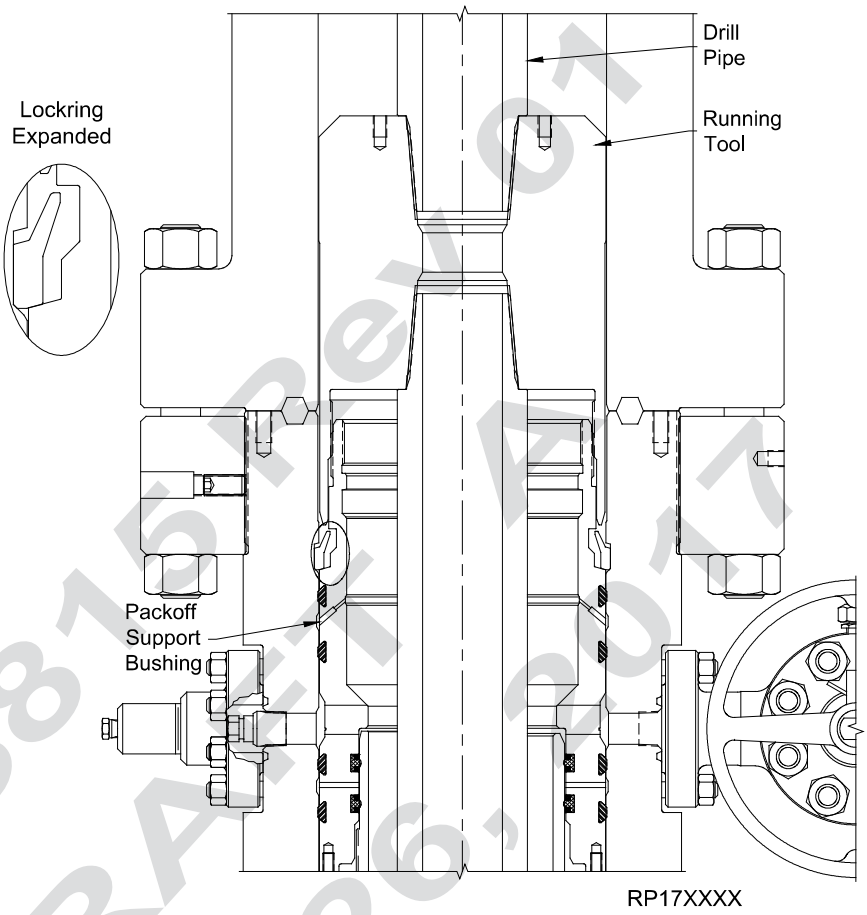
⚠ CAUTION

Clear out personnel from rig floor during over pull test. Precaution must be taken for personnel verifying the over pull.

⚠ CAUTION

There should be maximum of 1/8" vertical movement during over pull. If vertical movement is greater than 1/8" verify the position of the Packoff Support Bushing by checking the location of the scribe line relative to the upper side outlets. If the scribe line has risen more than 1/8", drive the Packoff Support Bushing back down until it lands as per step 2.7.17.

2.8.3. Perform an over pull 50,000 lbs over block weight to confirm the lockring has properly engaged.



2.8.4. Once a successful over pull has been achieved, slack off over pull and ensure elevators are well clear of the drill pipe tool joint.

NOTE If initial over pull test is unsuccessful, do not immediately collapse the lockring for a second installation attempt. Conduct the following steps prior to Support Bushing retrieval:

- Ensure Packoff Support Bushing Running Tool is backed off 3-1/2 turns.
- Re-apply the installation load (10,000 - 20,000 lbs) to force the Packoff and Lockring down into the groove of the housing.
- Re-attempt 50,000 lbs over pull test.

⚠ CAUTION

If a successful over pull test is not achieved after three installation attempts, follow steps 2.11.3 and 2.11.4. to fully retract the lockring and remove the Packoff Support Bushing. Retrieve the Packoff Support Bushing and lockring to the rig floor for trouble shooting.

NOTE **Dovetail seals must be replaced prior to re-installing the Packoff Support Bushing.**

Stage 2.0 — 9-5/8" Casing

2.9. Test Between the Lower Seals of the Packoff Support Bushing

2.9.1. Locate the lowermost test port on the OD of the Housing and remove the fitting.

2.9.2. Attach a hydraulic test pump to the open test port and inject test fluid into the Packoff Support Bushing to ***5,000 psi or 80% of casing collapse—whichever is less.***

NOTE ***If Emergency Hanger was installed do not exceed 80% of casing collapse.***

NOTE **Contact the Drilling Supervisor to determine the collapse pressure of the specific grade and weight of the casing used.**

⚠WARNING **Do NOT over pressurize!**

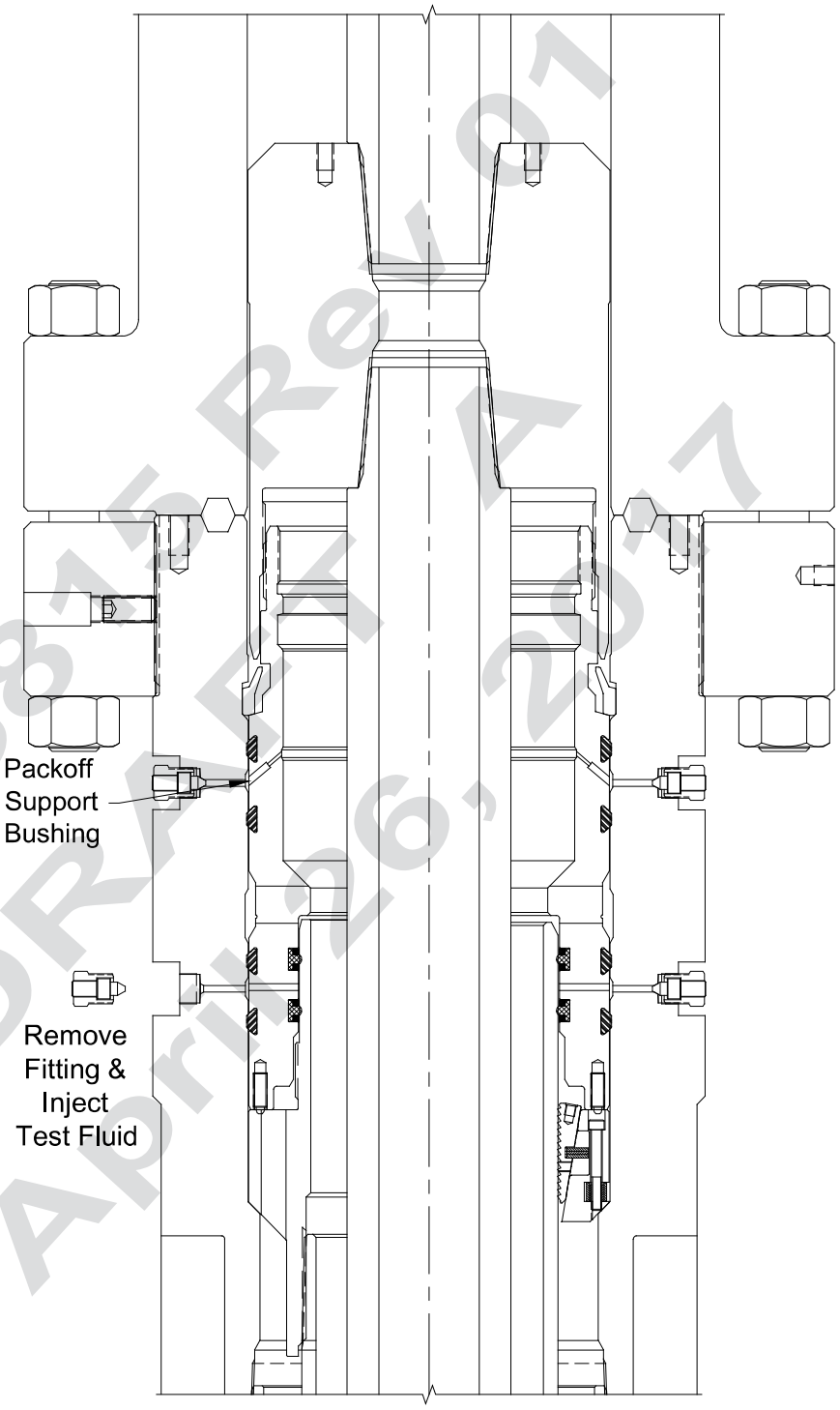
2.9.3. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.

2.9.4. Once a satisfactory test is achieved, carefully bleed off all test pressure, remove the test pump and re-install the fitting.

2.9.5. Release the Tool from the Packoff Support Bushing by turning the drill pipe (with chain tongs) clockwise approximately 4-1/2 turns or until it comes free from the Seal Assembly.

2.9.6. Retrieve the Tool to the rig floor and remove it from landing joint.

2.9.7. Clean, grease and store the Tool as required.



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Stage 2.0 — 9-5/8" Casing

2.10. Test Between the Upper Seals of the Packoff Support Bushing

WARNING ***Previously used BOP Test Plugs must be inspected for damage due to wear. Where warranted such as highly deviated wells the Test Plugs must be checked periodically to insure integrity.***

2.10.1. Examine the ***Test Plug (Item ST8).*** Verify the following:

- both upper and lower seals are in place and undamaged
- 1/2" pipe plug is removed
- all threads are clean and undamaged

NOTE **Ensure the 1/2" LP pipe plug is removed**

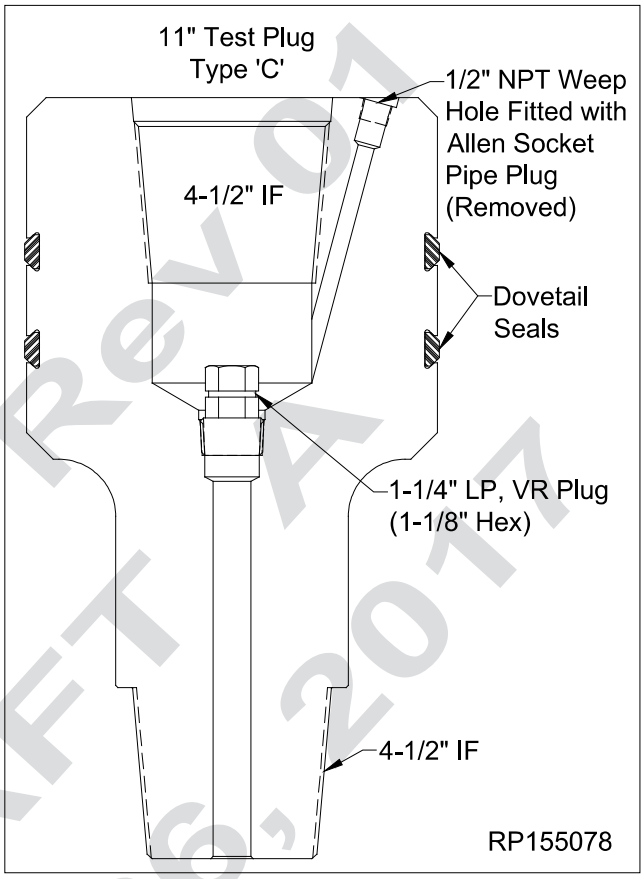
2.10.2. Orient the Tool as illustrated.

2.10.3. Make up a joint of drill pipe to the top of the Tool.

WARNING **A minimum of one joint of Drill Pipe is required on the bottom of the BOP Test Plug to ensure BOP Test plug remains centralized.**

NOTE **A minimum weight of 1,500 lbs is required per dovetail seal to land the Test Plug.**

2.10.4. Lubricate the dovetail seal of the Tool with a coat of light oil or grease.



Stage 2.0 — 9-5/8" Casing

2.10.5. Open the upper annulus valve of the Housing, and drain fluid to land the Test Plug. Leave valve open.

2.10.6. Slowly lower the Tool through the BOP Stack, measure and record, until it lands on the load shoulder in the Packoff.

NOTE Distance from the Pack-off Support Bushing load shoulder to the face of the BOP Flange is 12.90".

2.10.7. Locate the uppermost test port on the OD of the Housing and remove the fitting.

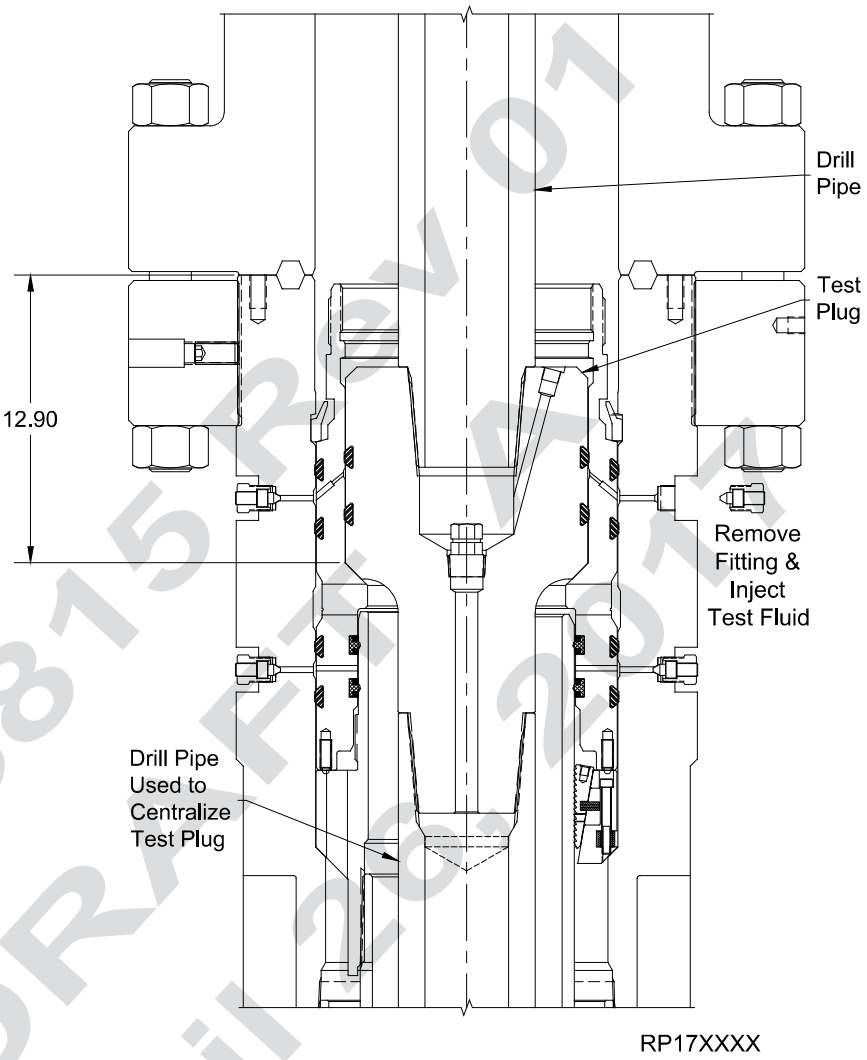
2.10.8. Attach a hydraulic test pump to the open test port and inject test fluid into the Packoff Support Bushing to ***10,000 psi maximum***.

2.10.9. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.

2.10.10. Once a satisfactory test is achieved, carefully bleed off all test pressure, remove the test pump and re-install the fitting.

2.10.11. Retrieve the Test Plug slowly to avoid damage to the seal.

2.10.12. Drain BOP stack.



Stage 2.0 — 9-5/8" Casing

⚠ CAUTION

The following procedure should be followed **ONLY** in the event Retrieval of the Packoff Support Bushing is necessary. If the Packoff Support Bushing Assembly was properly landed, skip this procedure.

2.11. Retrieval of Packoff Support Bushing Assembly

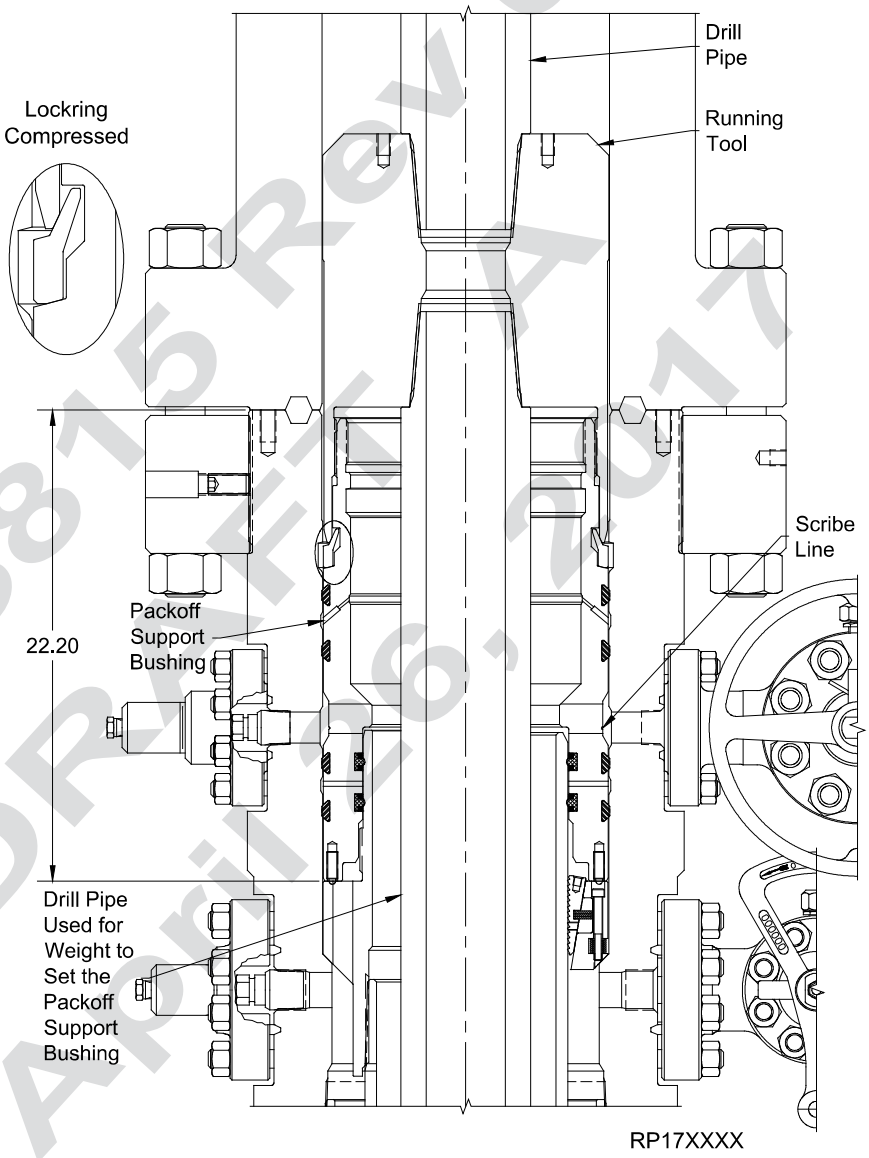
2.11.1. Make up a joint of drill pipe to the top of the ***Packoff Support Bushing Running Tool (Item ST7).***

2.11.2. Lower the Tool through BOP stack and land on top of Packoff Support Bushing.

2.11.3. Turn the Tool counterclockwise approximately 8 turns or the number of turns documented per Section 2.7, until the Tool fully engages the lockring and a firm stop is encountered. Back off from this point a maximum 1/8 of a turn.

⚠ CAUTION

Do not use Top Drive to engage/ disengage the Running Tool. Using Top Drive will permanently damage the equipment running threads and will require damaged part to be replaced.



2.11.5. Retrieve the Packoff Support Bushing by pulling vertically (approximately 15,000 to 20,000 lbs).

⚠WARNING If overpull exceeds this value, repeat counter-clockwise rotation until a firm stop is encountered and repeat overpull.

2.11.6. To remove Packoff Support Bushing from the Tool, install the ***Lockring Tool (Item ST14)*** and fully compress the lockring.

NOTE Dovetail seals must be replaced prior to re-installing the Packoff Support Bushing.

Stage 3.0 — 7" Casing

3.1. Test the BOP Stack

NOTE Immediately after making up the BOP stack and periodically during the drilling of the hole for the next casing string, the BOP stack (connections and rams) must be tested.

WARNING Previously used BOP Test Plugs must be inspected for damage due to wear. Where warranted such as highly deviated wells the Test Plugs must be checked periodically to insure integrity.

3.1.1. Examine the ***Test Plug (Item ST8).*** Verify the following:

- both upper and lower seals are in place and undamaged
- 1/2" pipe plug is removed
- all threads are clean and undamaged

NOTE Ensure the 1/2" LP pipe plug is removed

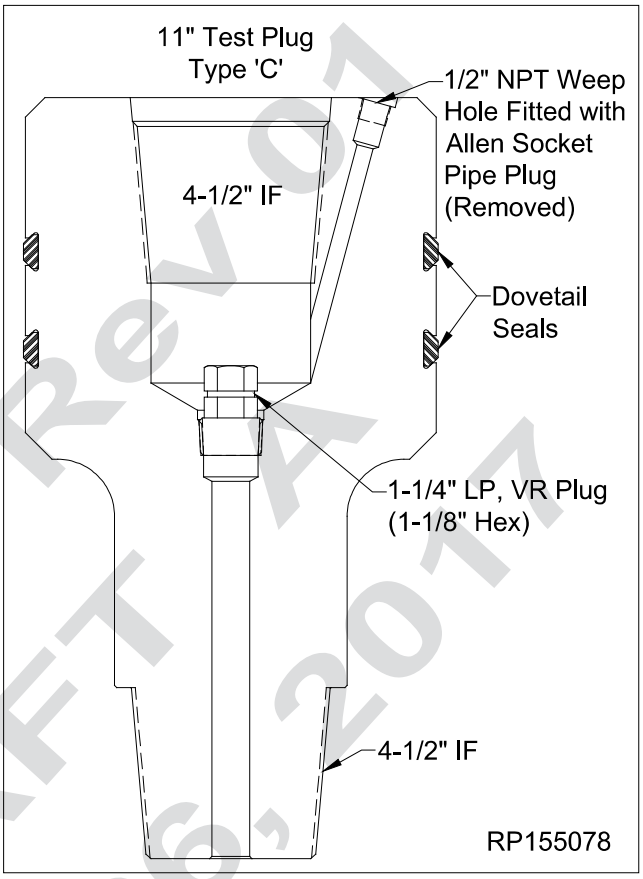
3.1.2. Orient the Tool as illustrated.

3.1.3. Make up a joint of drill pipe to the top of the Tool.

WARNING A minimum of one joint of Drill Pipe is required on the bottom of the BOP Test Plug to ensure BOP Test plug remains centralized.

NOTE A minimum weight of 1,500 lbs is required per dovetail seal to land the Test Plug.

3.1.4. Lubricate the dovetail seal of the Tool with a coat of light oil or grease.



Stage 3.0 — 7" Casing

3.1.5. Open the upper annulus valve of the Housing, and drain fluid to land the Test Plug. Leave valve open.

3.1.6. Slowly lower the Tool through the BOP Stack, measure and record, until it lands on the load shoulder in the Packoff.

NOTE Distance from the Pack-off Support Bushing load shoulder to the face of the BOP Flange is 12.90".

3.1.7. Close the BOP rams on the drill pipe and test to ***10,000 psi maximum.***

3.1.8. Monitor the annulus valve for signs of pressure.

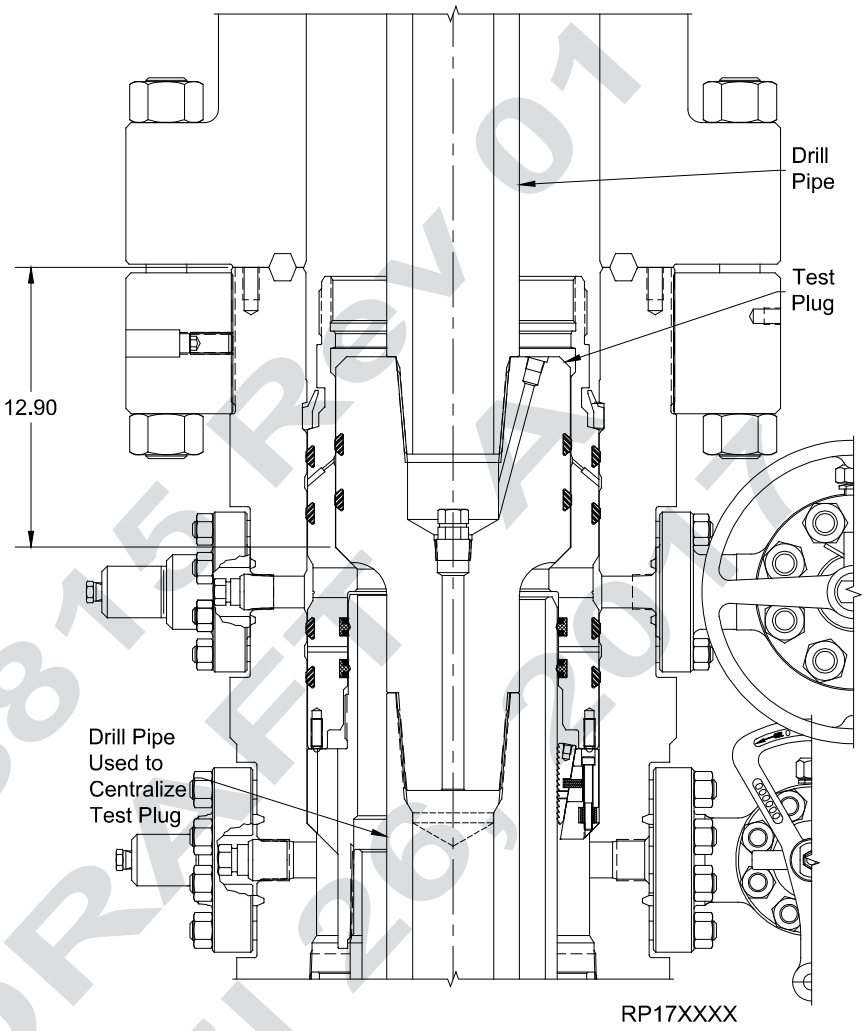
3.1.9. After a satisfactory test is achieved, release pressure and open the annulus valve.

3.1.10. Retrieve the Test Plug slowly to avoid damage to the seal.

NOTE It may be necessary to open the annulus valve when starting to retrieve the Test Plug to relieve any vacuum that may occur. Leaving annulus valve open during testing insures safety of surface casing.

3.1.11. Drain BOP stack.

3.1.12. Close upper annulus valve.



Stage 3.0 — 7" Casing

NOTE **Always use a Wear Bushing while drilling to protect the load shoulder from damage by the drill bit or rotating drill pipe. The Wear Bushing must be retrieved prior to running the casing.**

WARNING ***Previously used Wear Bushings must be inspected for damage and significant reduction in wall thickness due to wear. Where warranted such as highly deviated wells the Wear Bushing must be checked periodically to insure integrity.***

3.2. Run the Wear Bushing Before Drilling

3.2.1. Examine the ***Running Tool (Item ST9).*** Verify the following:

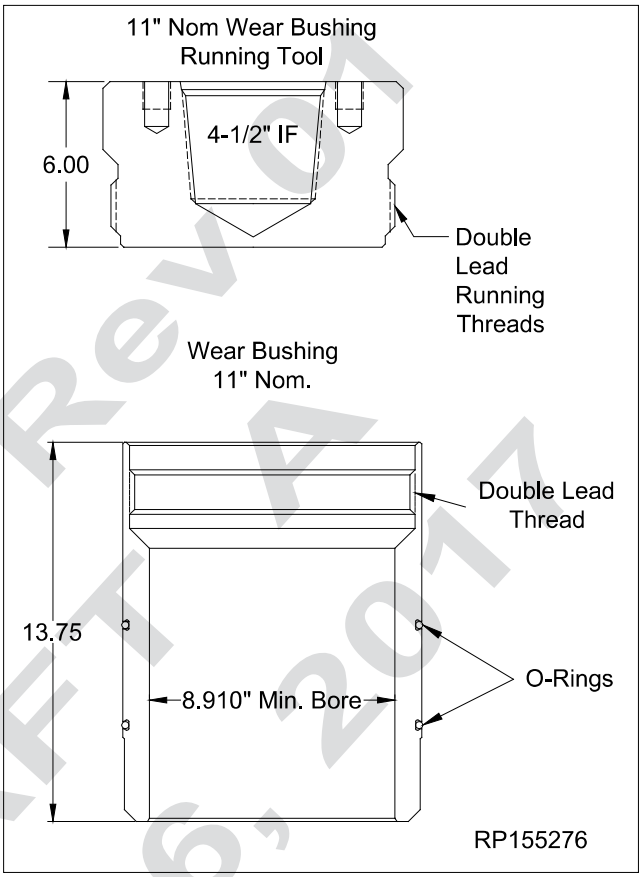
- all threads are clean and undamaged

3.2.2. Orient the Tool with the lift lugs down.

3.2.3. Examine the ***Wear Bushing (Item ST10).*** Verify the following:

- bore is clean and free of debris
- o-rings are properly installed, clean and undamaged

3.2.4. Orient the Wear Bushing as illustrated.



WARNING **Do NOT cut o-rings.**

CAUTION **This Wear Bushing has no mechanical retention device. Care must be exercised when tripping out the hole to avoid dislodging the Wear Bushing which could compromise safety if it becomes lodged in the BOP.**

Stage 3.0 — 7" Casing

3.2.5. Lubricate the o-ring seals of the wear bushing with a light coat of oil or grease.

3.2.6. Make up a joint of drill pipe to the top of the Tool.

3.2.7. Lower the Tool into the Wear Bushing and turn the drill pipe counterclockwise until thread 'jump' can be felt, then clockwise to a positive stop, to thread the Tool into the Wear Bushing.

WARNING Do NOT overtighten the Tool/ Wear Bushing connection.

3.2.8. Carefully lower the Tool/ Wear Bushing assembly through the BOP, measure and record, until it lands on the load shoulder of the Packoff Support Bushing.

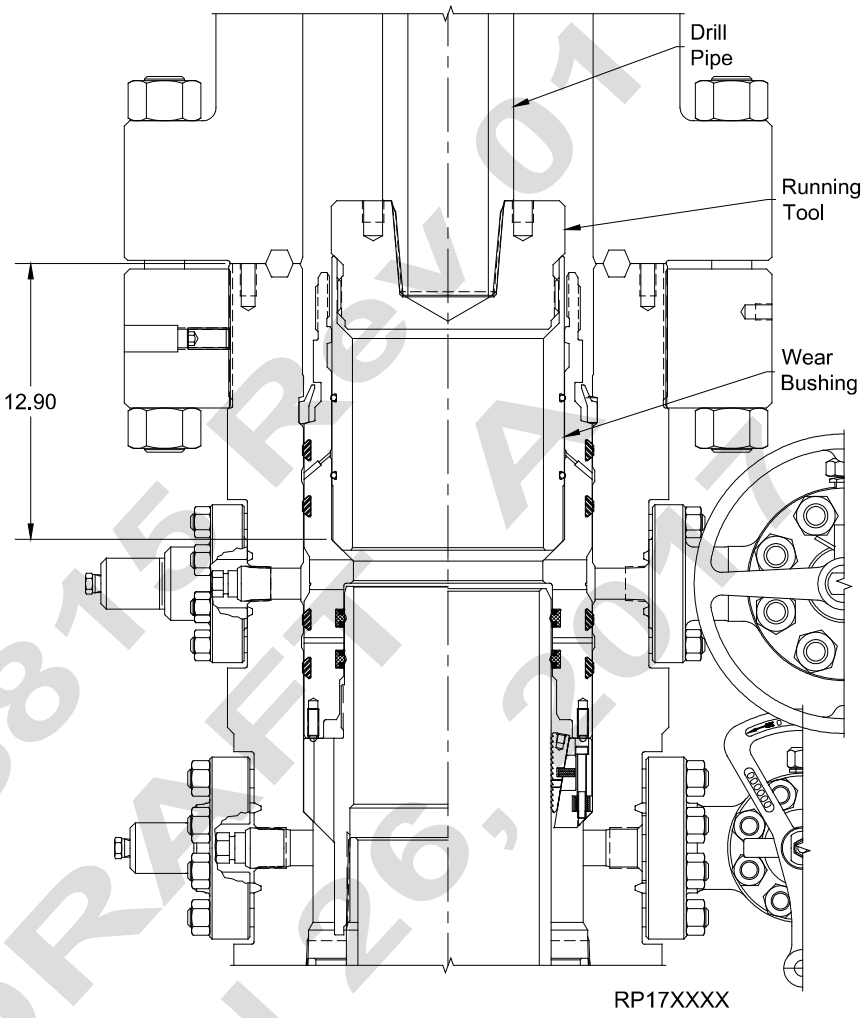
NOTE Distance from the Packoff Support Bushing load shoulder to the face of the BOP flange is 12.90".

3.2.9. Remove the Tool from the Wear Bushing by turning the drill pipe counterclockwise and lift straight up.

3.2.10. Remove the Tool from the drill string.

3.2.11. Clean, grease, and store the Tool as required.

3.2.12. Drill as required.



Stage 3.0 —7" Casing

3.3. Retrieve the Wear Bushing After Drilling

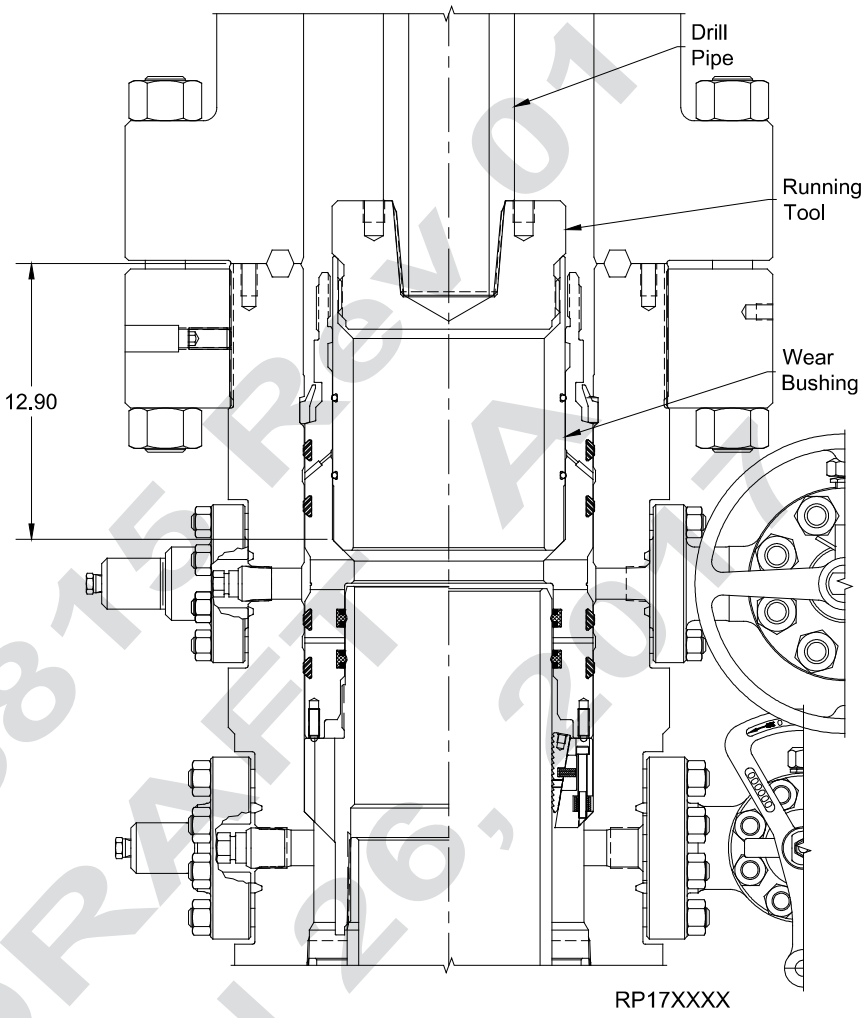
3.3.1. Make up the Tool to the drill pipe.

3.3.2. Slowly lower the Tool into the Wear Bushing.

3.3.3. Turn the Tool counterclockwise until thread 'jump' can be felt, slack off all weight then turn clockwise to a positive stop.

3.3.4. Slowly retrieve the Wear Bushing to the rig floor and remove it and the Tool from the drill string.

3.3.5. Clean, grease and store the Tool and Wear Bushing.



Stage 3.0 — 7" Casing

Landing of Mandrel Hangers

Cameron service personnel must verify that the mandrel hanger is landed properly on the load shoulder in the wellhead. This can be accomplished by one of three methods.

- Visually observe the scribe line mark around mandrel hanger running tool through upper side outlet valve.
- Conduct a dry run and mark the dedicated landing joint prior to running the casing or tubing.
- Calculate the distance from the rig floor to the landing shoulder and confirm that the hanger has traveled the required distance.

3.4. Hang Off the Casing

NOTE In the event the 7" casing should become stuck, and the Mandrel Hanger is unable to be used, refer to Section 3.13.

3.4.1. Run the 7" casing and space out appropriately.

3.4.2. Hang off the last joint of casing to be run in the floor slips at height that will enable easy handling and make up of the hanger and landing joint.

NOTE Steps 3.4.3-3.4.12 may be conducted offline in the shop and shipped to location as one assembly.

3.4.3. Examine the ***Running Tool (Item ST11).*** Verify the following:

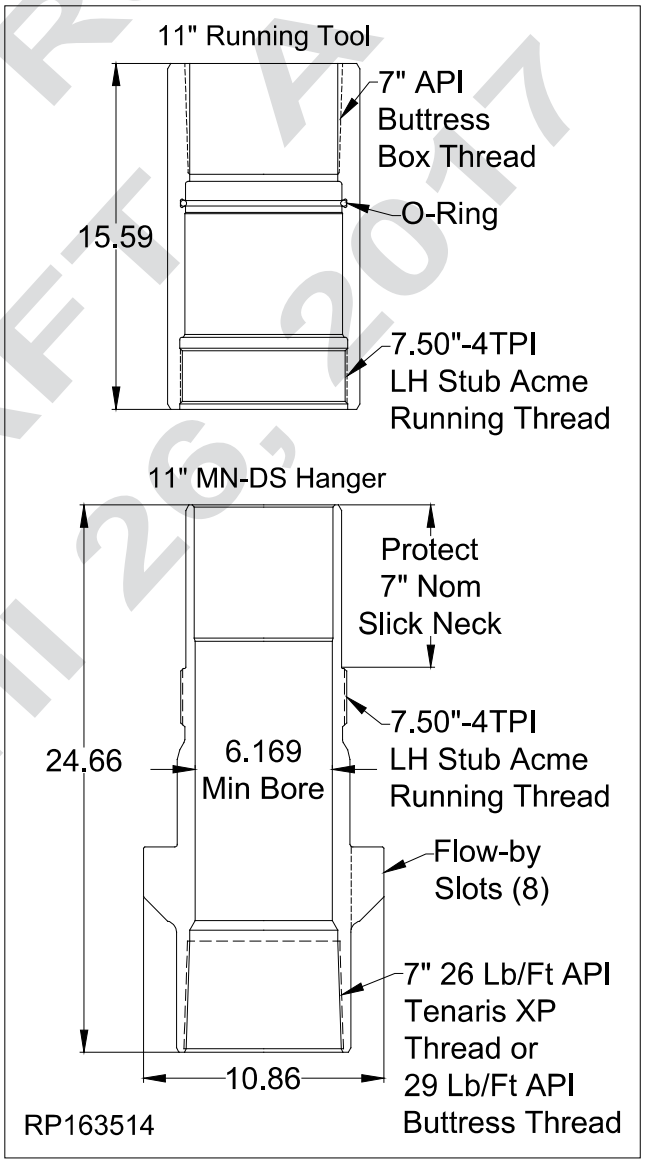
- bore is clean and free of debris
- all threads are clean and undamaged
- o-ring is properly installed and undamaged

3.4.4. Orient the Running Tool as illustrated.

3.4.5. Examine the ***Casing Hanger (Item A18).*** Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged
- flow-by slots are clean and free of debris
- casing pup joint is properly installed.

3.4.6. Orient the Hanger as illustrated.



Stage 3.0 — 7" Casing

3.4.7. Make up a landing joint to the top of the Running Tool.

3.4.8. Lubricate the running threads of both the Tool and the Hanger and also the seal of the Tool with a coat of light oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.

3.4.9. Lift and suspend the Tool over the Hanger.

3.4.10. Lower the Tool onto the Hanger until the mating threads make contact.

3.4.11. While balancing the weight, turn the Tool clockwise until the thread 'jump' can be felt then counterclockwise to a positive stop (approximately 10 turns) then back off the Tool clockwise 1/2 turn.

WARNING DO NOT torque the connection.

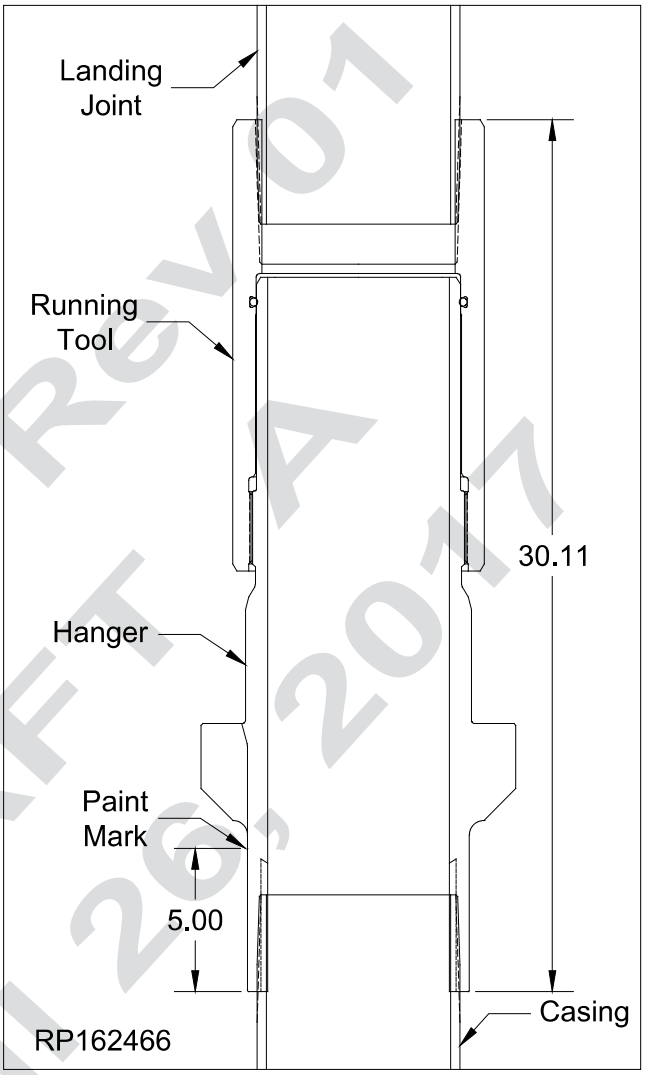
3.4.12. Lift the Hanger above the casing hung off in the floor.

3.4.13. Lower the Hanger assembly until the mating threads of the 7" casing and the pin threads of the pup joint make contact.

NOTE When making up the Hanger to the casing do not use the seal neck area for back up.

3.4.14. While balancing the weight, turn the assembly counterclockwise until the thread 'jump' can be felt then clockwise to the thread manufacturer's recommended optimum torque.

3.4.15. Make a paint mark all the way around the Hanger at 5.00" from the bottom of the Hanger for landing verification.



Stage 3.0 — 7" Casing

3.4.16. Open the uppermost side outlet valve of the Housing.

3.4.17. Release the casing from the floor slips and lower it into the well, measure and record, until the Hanger lands on the load shoulder of the Packoff.

NOTE Distance from the Pack-off Support Bushing load shoulder to the face of the BOP flange is 12.90".

3.4.18. Make sure Hanger is centered in well bore.

3.4.19. Slack off all weight on the casing.

3.4.20. Verify the through the open outlet the Hanger has landed properly.

NOTE Scribed line on the Hanger should be just above the middle of the uppermost outlet of the MN-DS Housing.

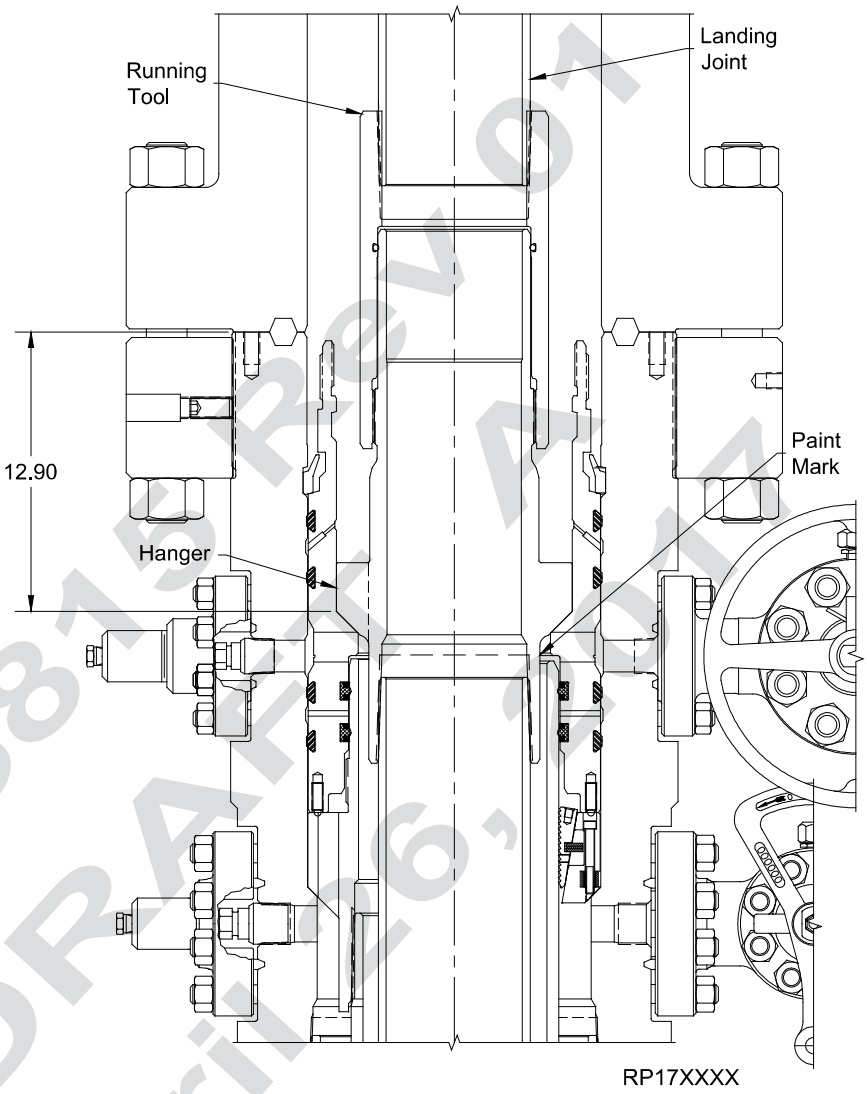
3.4.21. Cement the casing as required.

NOTE Cement returns may be taken through the flow-by slots of the Hanger/Running Tool and out of the BOP Stack.

3.4.22. With cementing completed, turn the landing joint clockwise to release the Tool from the Hanger, approximately 10 turns.

3.4.23. Retrieve the Tool to the rig floor.

3.4.24. Clean, grease and store the Tool as required.



Stage 3.0 — 7" Casing

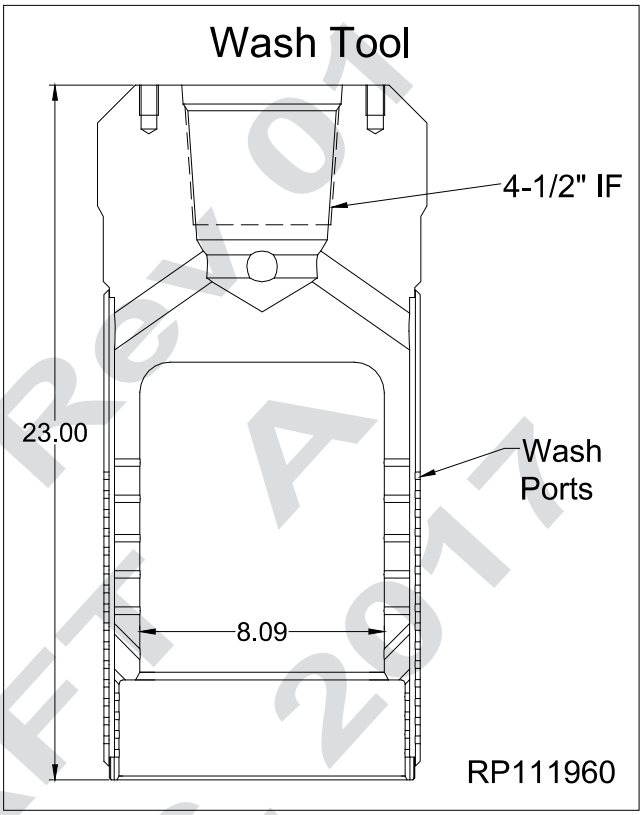
3.5. Washout the Housing

3.5.1. Examine the ***Wash Tool (Item ST12).*** Verify the following:

- bore is clean and free of debris
- threads are clean and undamaged
- washports are clean and unobstructed

3.5.2. Orient the wash tool as illustrated.

3.5.3. Make up a joint of drill pipe to the top of the Tool.



Stage 3.0 — 7" Casing

3.5.4. Ensure uppermost outlet valve on the Housing is open.

3.5.5. Carefully lower the Tool into the well, measure and record, until it lands on the top of the 7" Casing Hanger.

3.5.6. Lift the Tool approximately 2" and supply pressure through the drill pipe. At the same time the pressure is being supplied, turn the Tool.

NOTE The maximum pressure rating for the Wash Tool is 1,000 PSI at the flow rate of 75GPM.

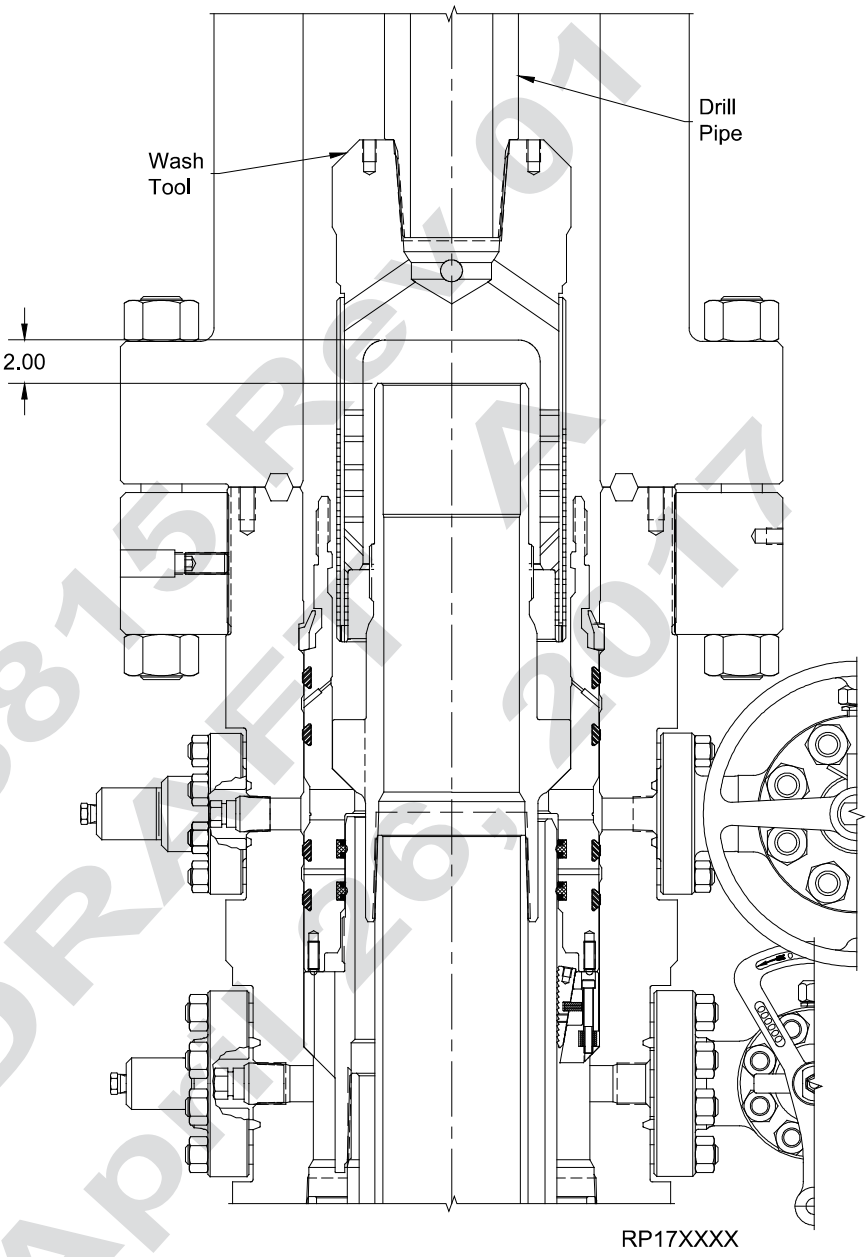
NOTE Do NOT reciprocate the Wash Tool.

3.5.7. Monitor the outlet valve for returns.

3.5.8. Once the returns are clean and free of debris, stop the rotation and the pump.

3.5.9. Retrieve the Tool to the rig floor.

3.5.10. Clean, grease and store the Tool as required.



Stage 3.0 — 7" Casing

3.6. Install the Seal Assembly

3.6.1. Examine the ***Seal Assembly Running Tool (Item ST13)***. Verify the following:

- bore is clean and free of debris
- all threads are clean and undamaged

3.6.2. Orient the Running Tool as illustrated.

3.6.3. Examine the ***Seal Assembly (Item A19)***. Verify the following:

- bore is clean and free of debris
- all elastomer seals are in place, clean and undamaged
- all threads are clean and undamaged
- lockring is in place
- ensure spring plunger pins on the inside of the Seal Assembly are properly installed and spring loaded pins retract properly.

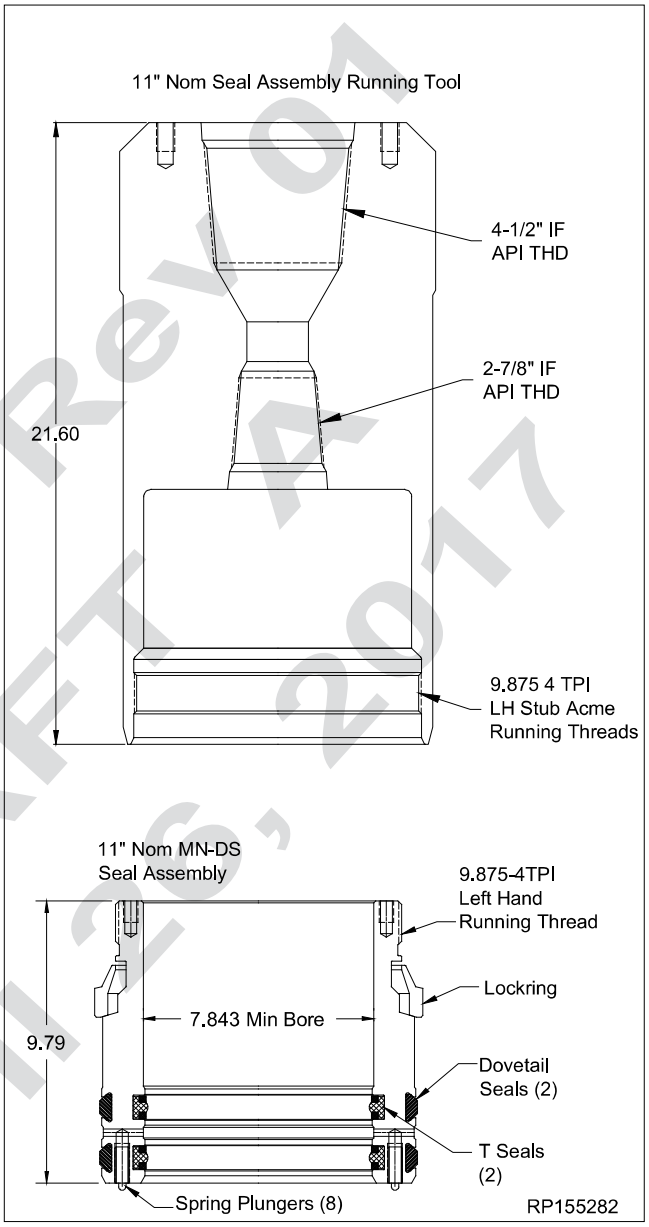
3.6.4. Orient the Seal Assembly as illustrated.

3.6.5. Lubricate the running threads of the Seal Assembly and threads of the Running Tool with a light coat of oil or grease.

3.6.6. Run drill pipe or heavy weight collars through the rotary table and hang off in the floor slips. This will be used for weight to set the Seal assembly into position. If running heavy weight pipe, measure OD of all pipe and connection to make sure pipe will drift casing.

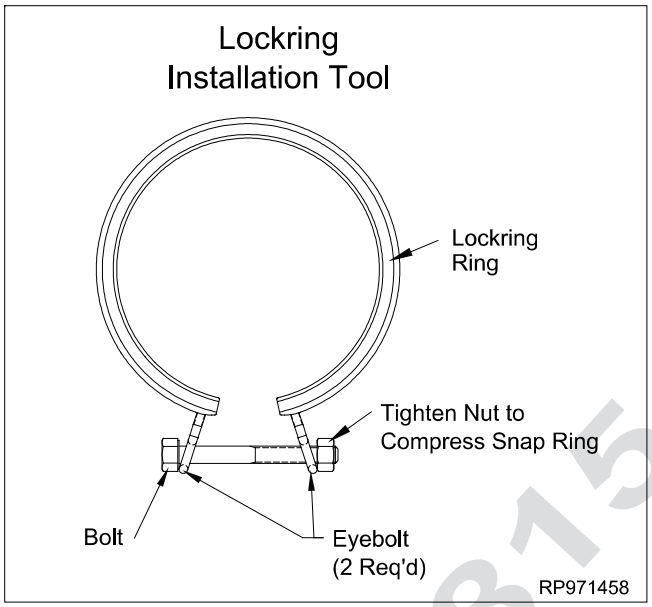
NOTE Heavy weight drill pipe or drill collars are used to aid in landing the Seal Assembly. Weight required to run the Seal Assembly into the Housing is approximately 3,000 lbs.

3.6.7. Make up a joint of drill pipe to the top of the Running Tool.



Stage 3.0 — 7" Casing

3.6.8. Install a ***Lockring Installation Tool (Item ST14)*** onto the lockring of the Seal Assembly.



NOTE See APPENDIX 1 for optional Lockring Installation Tool on the back of this procedure.

3.6.9. Fully compress the lockring.

NOTE The Lockring Installation Tool will assist in minimizing the length of time that the lockring is compressed.

3.6.10. Carefully lower the Running Tool onto the Seal Assembly until the threads make contact.

3.6.11. Make up the connection by first turning the Tool clockwise to align the threads then counterclockwise until the Tool engages the lockring.

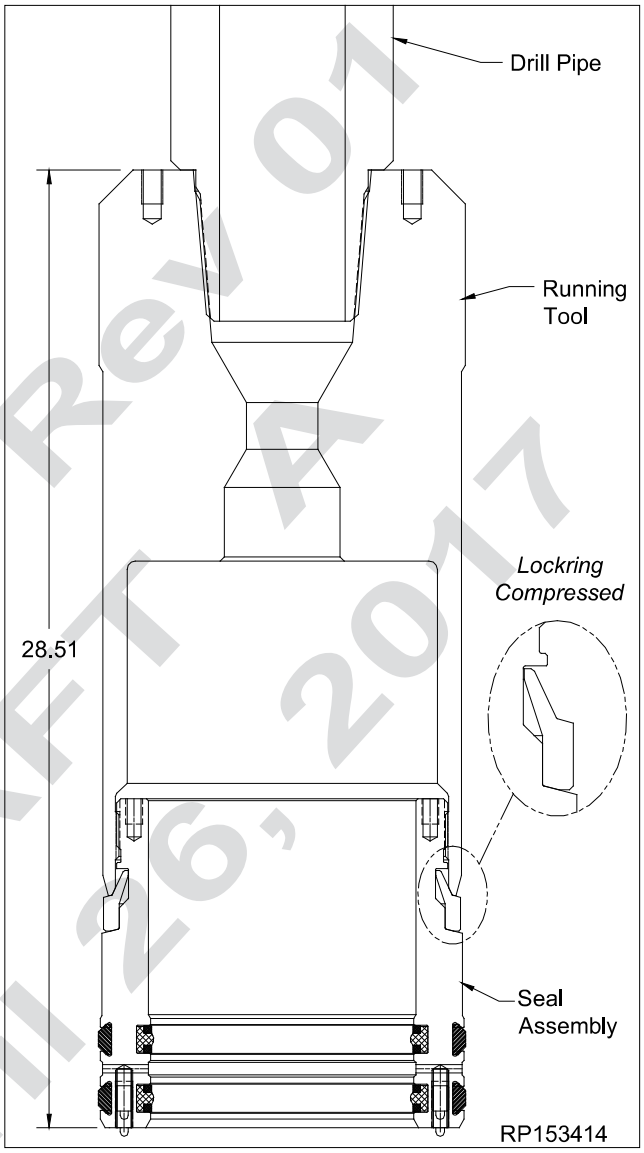
NOTE Approximate 6-1/2 turns are required for full make-up. Write down the number of turns to make up the Tool to the Seal Assembly in the Field Service Report.

3.6.12. Once the lockring is engaged remove the Lockring Installation Tool.

NOTE Ensure the lockring is flush or below the OD of the Seal Assembly.

3.6.13. Lubricate the ID of the 'T' seals and the OD of the dovetail seals with a light coat of oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.



3.6.14. Lift and suspend the Seal Assembly over the drill pipe hung off in the rig floor.

3.6.15. Lower the Seal Assembly onto the threads of the drill pipe and make up the connection.

WARNING Do NOT damage the internal seals of the Packoff Support Bushing assembly.

3.6.16. Open the uppermost side outlet valves on the Housing.

NOTE The uppermost side outlet valve is to remain open during the setting of the Seal Assembly.

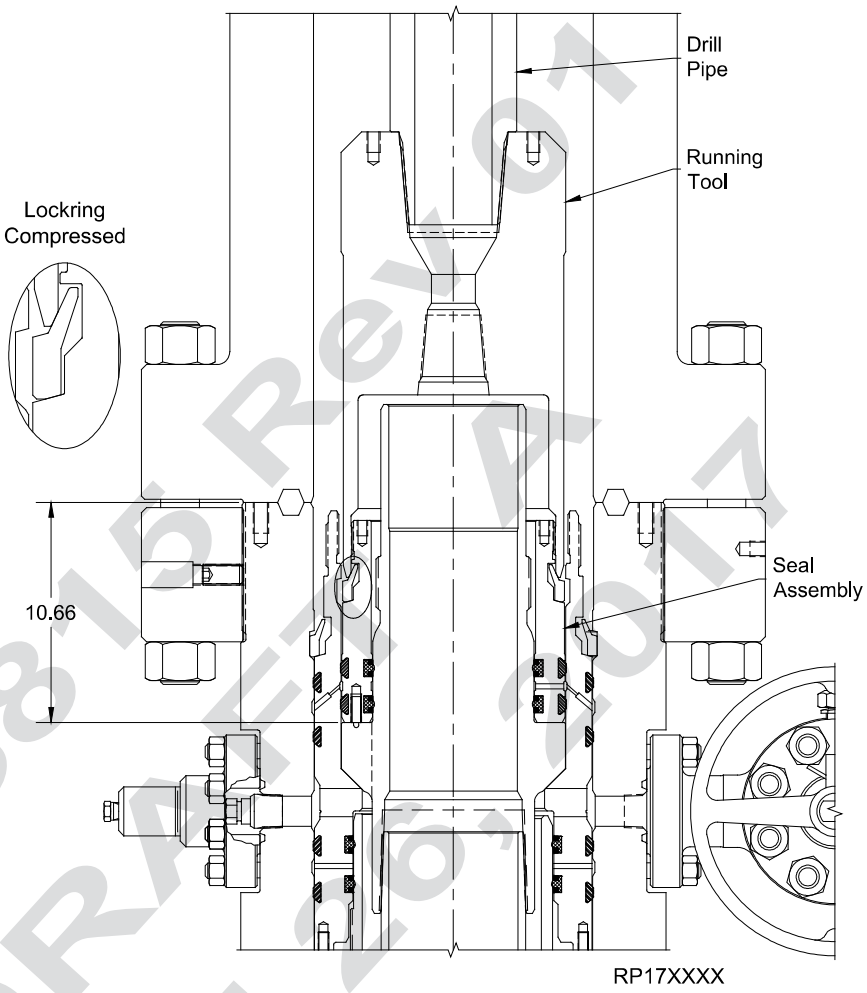
Stage 3.0 — 7" Casing

3.6.17. Center and lower the assembly through the BOP Stack and Housing, measure and record, until the Seal Assembly lands on the Casing Hanger.

NOTE Distance from the Mandrel Casing Hanger landing shoulder to the face of the BOP flange is 10.66".

3.6.18. Turn the landing joint counterclockwise until the (8) Spring Plunger pins engage the Hanger mating slots. When the pins engage the Hanger, STOP turning when a positive stop is felt.

NOTE Test between the seals of the Seal Assembly will be conducted after the Lockdown Ring has been properly engaged/ set into the Packoff Support Bushing.



Stage 3.0 — 7" Casing

3.7. Set the Seal Assembly Lockdown Ring

NOTE ***Confirm the Seal Assembly has properly landed on Mandrel Casing Hanger.***

3.7.1. Make a vertical mark on the landing joint to monitor the number of turns.

3.7.2. Using chain tongs, back out the Tool 3 turns clockwise to allow the Locking ring to expand into its mating groove in the Packoff Support Bushing.

NOTE **Horizontal mark should raise no more than .75".**

WARNING DO NOT ATTEMPT TO BACK OUT MORE THAN 3 TURNS.

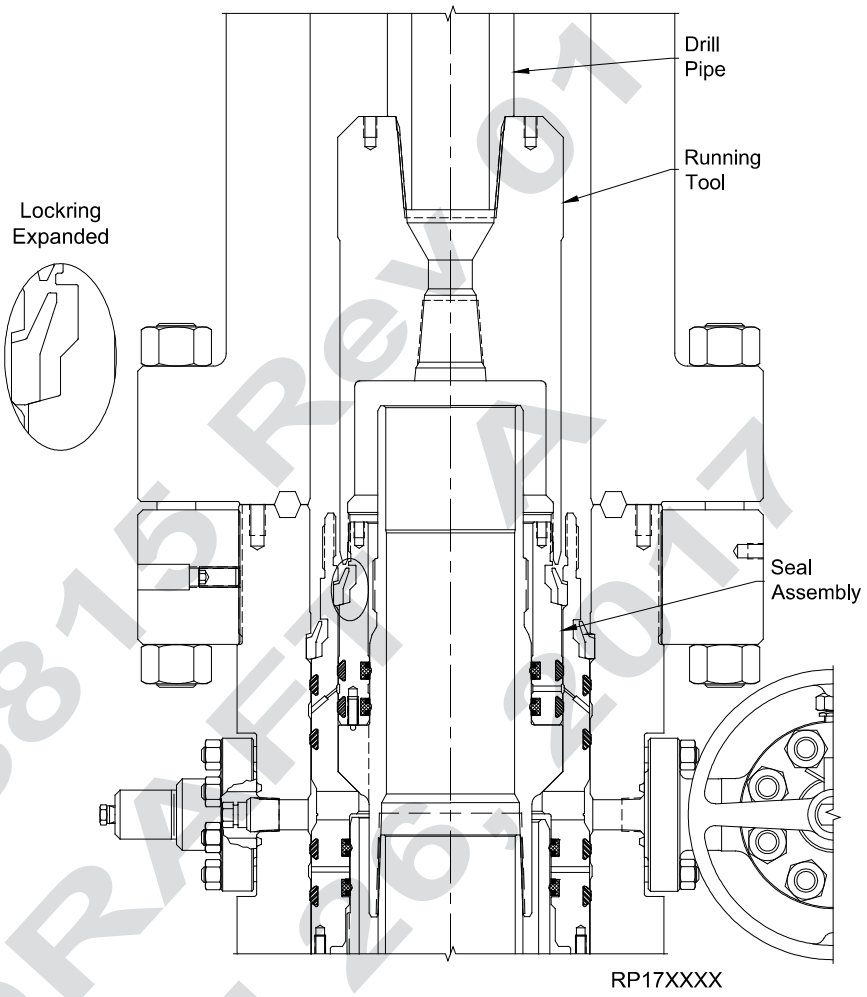
3.7.3. Perform an over pull 50,000 lbs to confirm the lockring has properly engaged.

⚠ CAUTION

Clear out personnel from rig floor during overpull test. Precautions must be taken for personnel verifying the overpull.

⚠ CAUTION

There should be minimum upper movement on the landing joint at any point during the overpull. Actual nominal lockring clearance is 1/8". If vertical movement is greater, check and verify if Seal Assembly has been lifted off from its land off position. If such situation arises, collapse lockring and retrieve Seal Assembly to rig floor to troubleshoot.



NOTE If initial over pull test is unsuccessful, do not immediately collapse the lockring for a second installation attempt. Conduct the following steps prior to Support Bushing retrieval:

- Ensure Packoff Support Bushing Running Tool is backed off 3-1/2 turns.
- Re-apply the installation load (10,000 - 20,000 lbs) to force the Packoff and Lockring down into the groove of the housing.
- Re-attempt 50,000 lbs over pull test.

⚠ CAUTION

If a successful over pull test is not achieved after three installation attempts, follow steps 4.6.3 and 4.6.4 to fully retract the lockring and remove the Packoff Support Bushing. Retrieve the Packoff Support Bushing and lockring to the rig floor for trouble shooting.

NOTE **Dovetail seals must be replaced prior to re-installing the Packoff Support Bushing.**

Stage 3.0 — 7" Casing

3.8. Testing Between the 9-5/8" Packoff Upper Seals & 7" Packoff Seals (ID & OD)

3.8.1. Locate the upper test port on the Housing and remove fitting from the port.

3.8.2. Attach a hydraulic test pump to the open test port and inject fluid into the seal assembly to the ***10,000 psi maximum.***

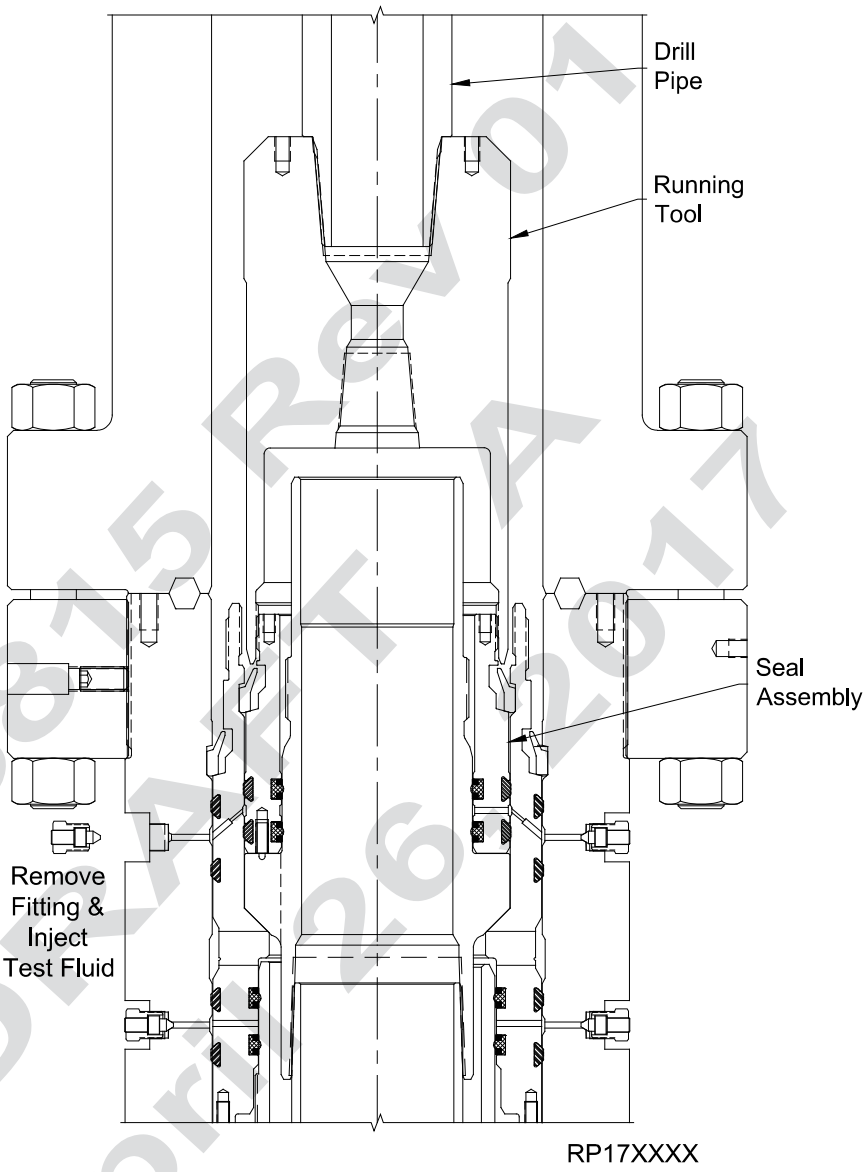
WARNING Do NOT over pressurize!

3.8.3. Hold and monitor the test pressure for 15 minutes or as required by the Drilling Supervisor.

3.8.4. After a satisfactory test is achieved, carefully bleed off the test pressure, remove the test pump, re-install fitting in the open port.

3.8.5. Retrieve the Tool by turning the drill pipe (with chain tongs) clockwise approximately 3-1/2 turns or until it comes free from the Seal Assembly. A straight lift will retrieve the Tool.

3.8.6. Remove the Tool from the drill string. Clean, grease, and store the Tool as required.



Stage 3.0 — 7" Casing

⚠ CAUTION

The following procedure should be followed **ONLY** in the event Retrieval of the Seal Assembly is necessary. If the Seal Assembly was properly landed, skip this procedure.

3.9. Retrieval of Seal Assembly

3.9.1. Make up a joint of drill pipe to the top of the ***Seal Assembly Running Tool (Item ST13).***

3.9.2. Lower the Running Tool through BOP stack and land on top of Seal Assembly.

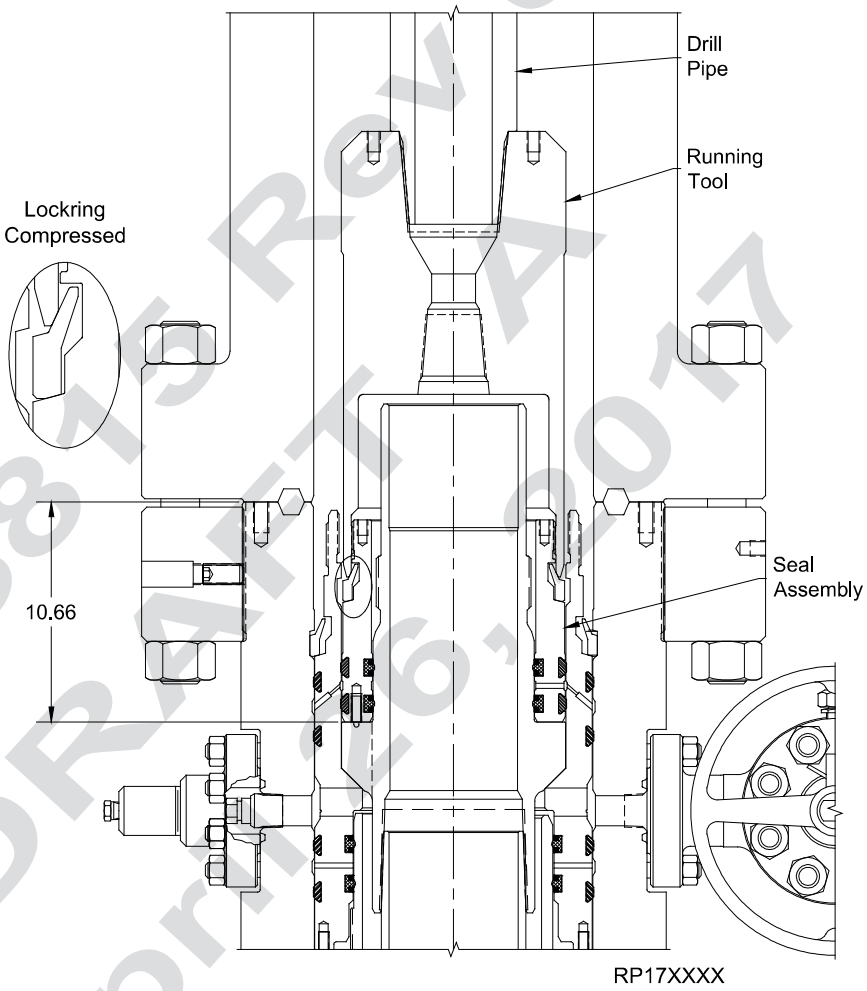
3.9.3. Turn the Tool counterclockwise approximately 6-1/2 turns or the number of turns documented per section 4.3, until the tool fully engages the lockring and a firm stop is encountered. Back off from this point a maximum 1/8 of a turn.

3.9.4. Retrieve the Seal Assembly by pulling vertically (approximately 3,000 lbs).

⚠WARNING If overpull exceeds this value, repeat counter-clockwise rotation until a firm stop is encountered and repeat overpull.

3.9.5. To remove Seal Assembly from the running tool, install ***Lockring Installation Tool (Item ST14)*** and fully compress the Lockring.

NOTE Dovetail seals must be replaced prior to re-installing the Seal assembly.



NOTE DRAFT Publication is for Review ONLY. NOT approved for System Installation. NOT approved for field usage. NOT approved for distribution. If you obtain a DRAFT copy - it is your responsibility to verify SAP revision level or contact Houston Engineering to ensure document has been approved and released.

Stage 3.0 — 7" Casing

3.10. Install the Bit Guide

3.10.1. Examine the ***Combination Tool (Item ST15).*** Verify the following:

- lift lugs are intact and undamaged
- all threads are clean and undamaged
- o-ring seals are in place and undamaged

3.10.2. Orient the Tool as illustrated.

3.10.3. Make up a joint of drill pipe to the top of the Tool.

WARNING Make sure the lift lugs are down and the elastomer is up when latching into the Bit Guide.

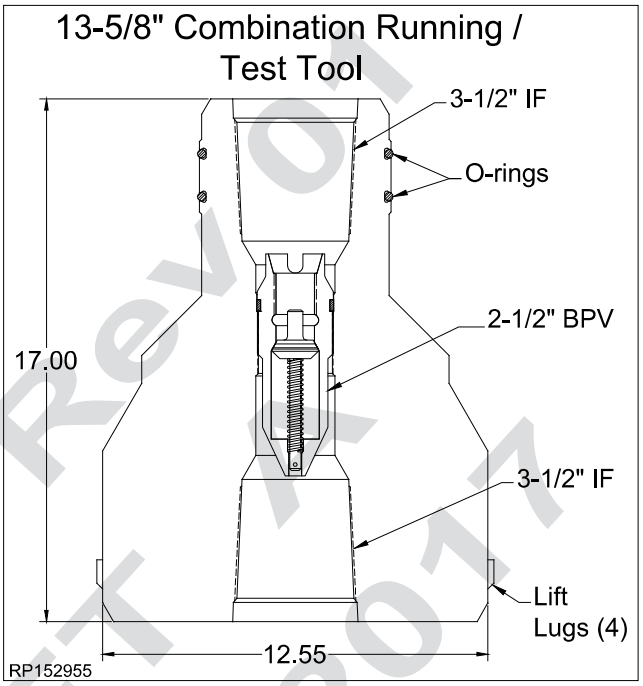
3.10.4. Examine the ***Bit Guide (Item ST16).*** Verify the following:

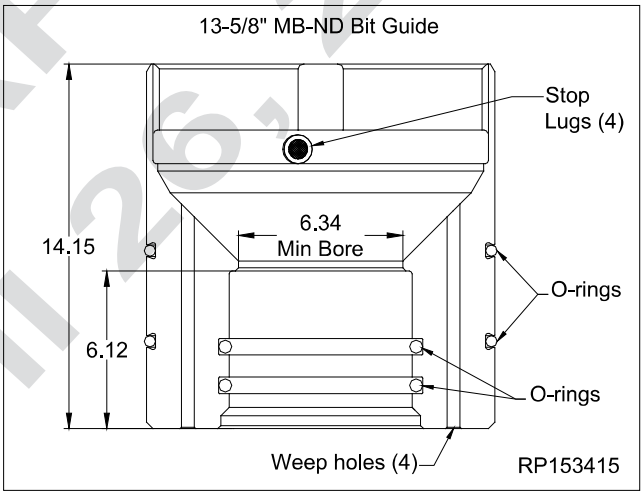
- bore is clean and free of debris
- stop lugs are properly installed
- j-slots are clean and free of debris
- o-ring seals are in place and undamaged

3.10.5. Orient the Bit Guide as illustrated.

3.10.6. Lubricate OD of Bit Guide and O-ring seals with a light coat of oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.



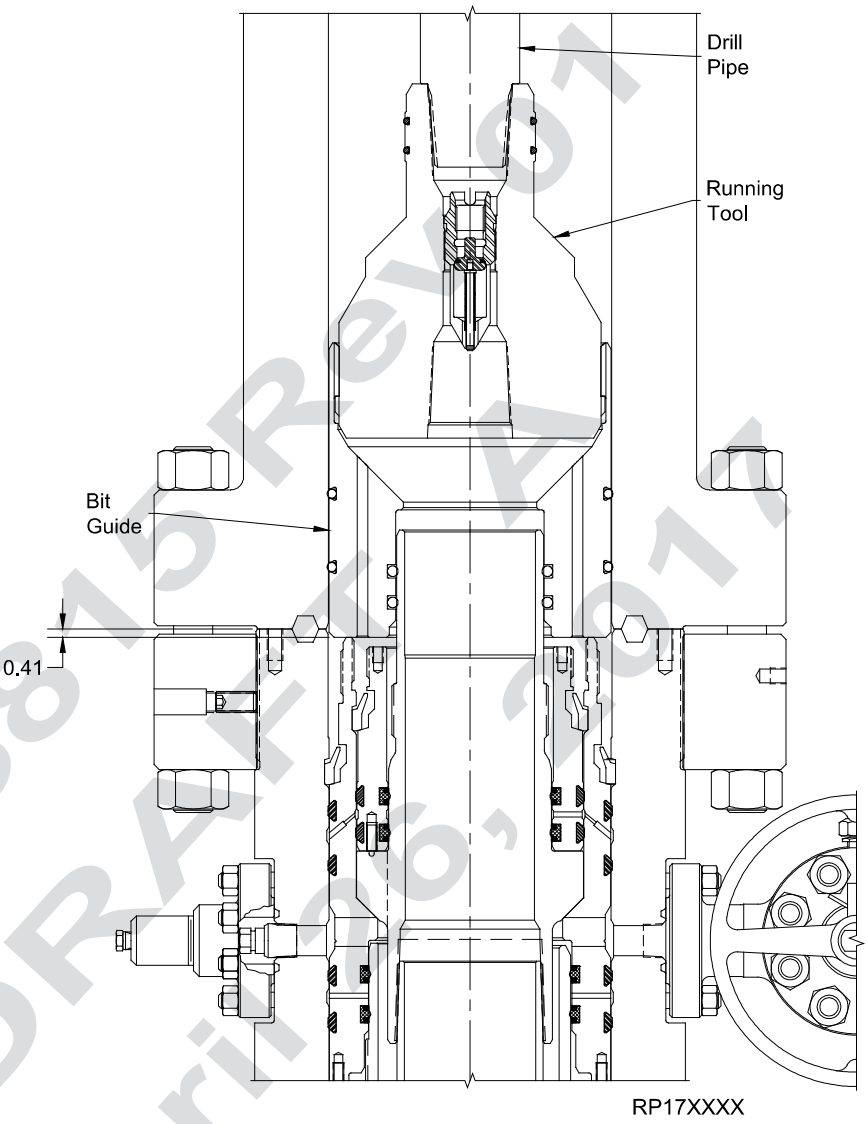


Stage 3.0 — 7" Casing

3.10.7. Lower the Tool into the Bit Guide and turn the drill pipe 1/4 turn clockwise.

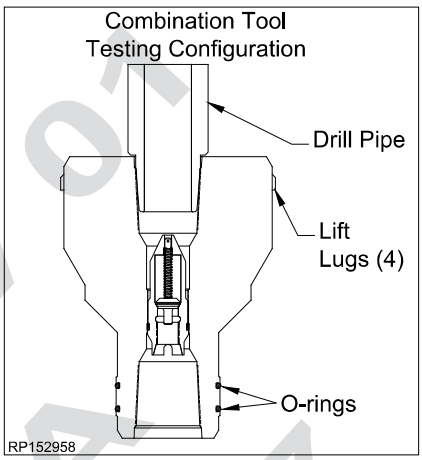
3.10.8. Slowly lower the Bit Guide assembly through the BOP stack, measure and record, until it lands on top of the Packoff Support Bushing.

3.10.9. Disengage the Tool from the Bit Guide by turning the drill pipe counterclockwise 1/4 turn and lifting straight up.



Stage 3.0 — 7" Casing

3.11. Test the Seal Assembly



3.11.1. After retrieving the Tool, remove the drill pipe out of the Tool.

3.11.2. Position the ***Combination Tool (Item ST15)*** with the lift lugs up and make up the drill pipe to the top of the Tool to the thread manufacturer's recommended shoulder torque.

NOTE Verify Combination Tool seal neck will drift ID bore of casing or Hanger prior to install. Major downtime will occur if Tool will not drift.

3.11.3. Open the uppermost annulus valve of the Housing.

3.11.4. Lower the Tool through the BOP stack, measure and record, until it lands on the Bit Guide and into the Casing Hanger.

3.11.5. Close the BOP rams on the drill pipe and test to ***10,000 psi maximum.***

⚠WARNING Do NOT over pressurize!

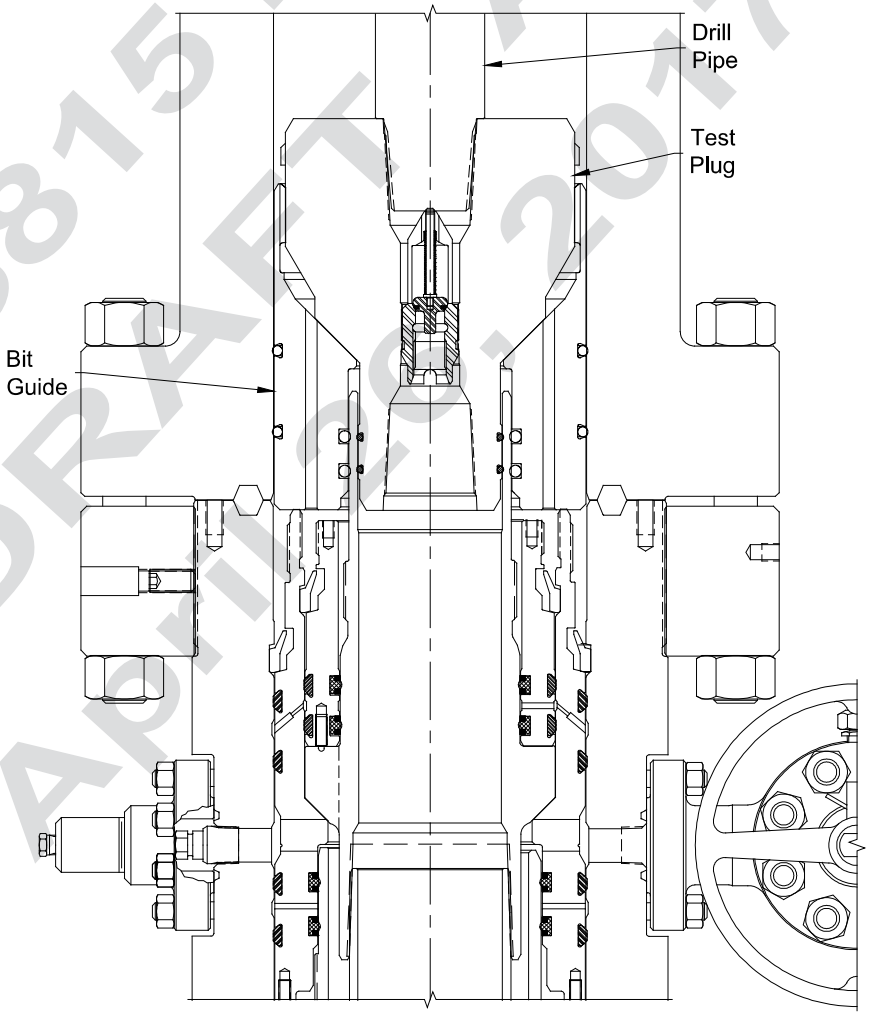
3.11.6. Monitor the open outlet for signs of leakage past the Seal Assembly.

3.11.7. After a satisfactory test is achieved, release pressure, and open the rams.

3.11.8. Slowly retrieve the Tool to the rig floor.

3.11.9. Close upper annulus valve.

3.11.10. Drill as required.



Stage 3.0 — 7" Casing

3.12. Retrieve the Bit Guide After Drilling

3.12.1. Remove the drill pipe out of the Tool.

3.12.2. Make up the Tool to the drill pipe with the lift lugs down and the elastomer up.

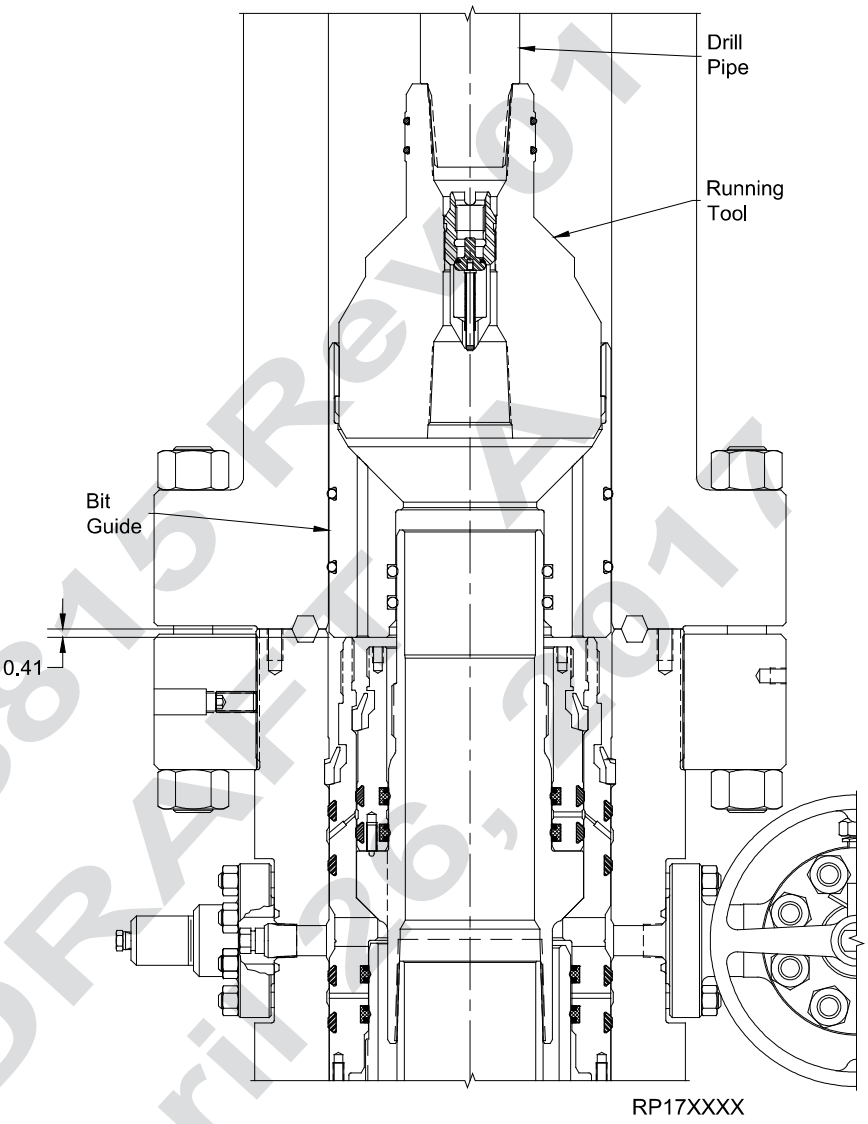
3.12.3. Slowly lower the Tool into the Bit Guide.

3.12.4. Turn the Tool clockwise until the drill pipe drops approximately 2". This indicates the lugs have aligned with the Bit Guide slots.

3.12.5. Turn clockwise 1/4 turn to fully engage the lugs in the Bit Guide.

3.12.6. Slowly retrieve the Bit Guide and remove it and the Tool from the drill string.

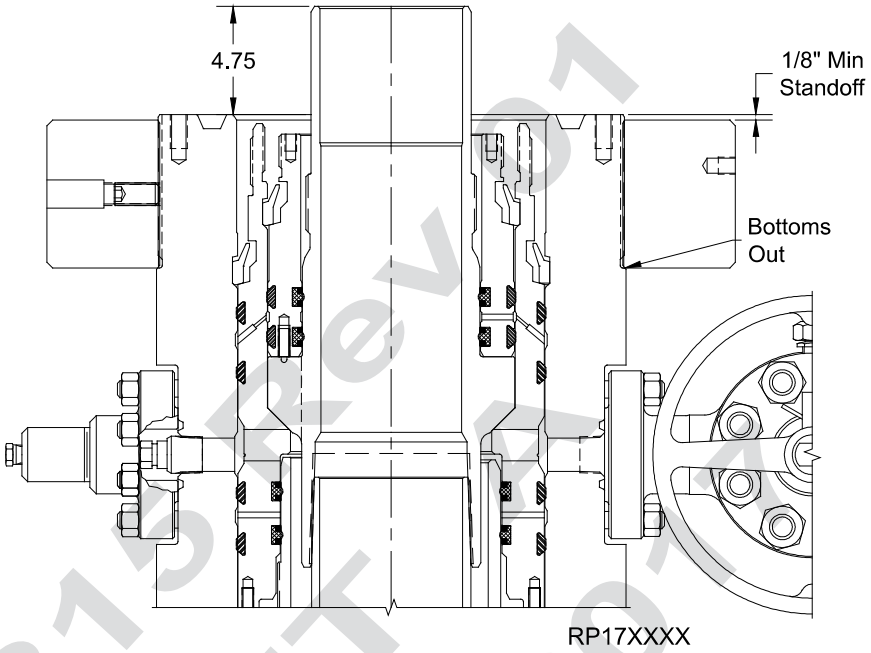
3.12.7. Clean, grease and store the Tool and Bit Guide as required.



Stage 3.0 — 7" Casing

3.12.8. With the well safe and secure, nipple down the BOP stack.

3.12.9. Masure and record Hanger neck/ standoff height.



⚠ CAUTION

Ensure and verify Threaded Flange is properly installed to the Casing Head.

1. **Rotate the threaded flange counterclockwise (left hand thread) to a positive stop and bottom out threaded flange on Casing Head flange shoulder.**
2. **Verify make up dimension. Dimension from the top of the threaded flange to the top of the casing head must be 1/8" or greater.**

Threaded flange must remain shouldered out during installation.

Stage 3.0 — 7" Casing

SAFETY NOTE: Always wear proper PPE (Personal Protective Equipment) such as safety shoes, safety glasses, hard hat, gloves, etc. to handle and install equipment.

NOTE

1. **Reconfirm the Casing OD and grade. Remove and clean loose scale from Casing OD.**
2. **Verify Slip Bowl taper is smooth, clean with no corrosion and damage free.**
3. **Disassembly of the Hanger to re-orient the slips is not required.**

3.13. Hang Off the Casing (Emergency)

NOTE **The following procedure should be followed ONLY if the casing should become stuck. If the Mandrel Casing Hanger was used, skip this stage.**

NOTE **Since the IC-2 Casing Hanger is an automatic, weight energized Hanger, it is necessary to ensure there is adequate casing weight to create an annular seal.**

3.13.1. Run the casing through the BOP to the required depth and cement the hole as required.

3.13.2. Drain the Casing Head bowl through its side outlet.

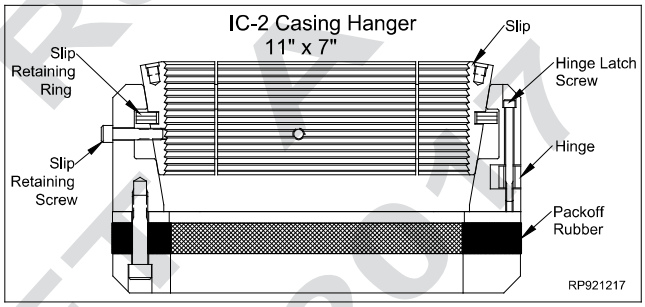
3.13.3. Measure Slip Bowl from load shoulder to top of Housing and record.

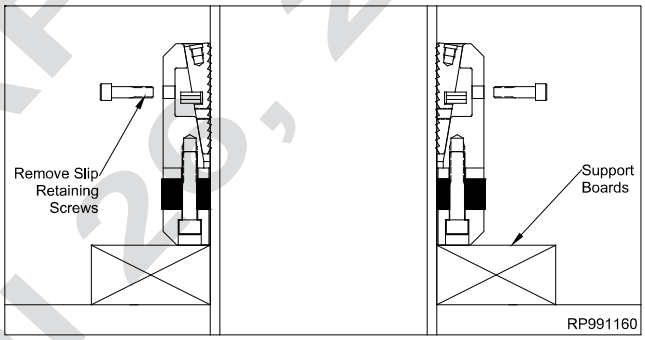
3.13.4. There are two methods used to install the Casing Hanger:

- from the rig floor through a full opening BOP stack, provided no casing collars are between the rig floor and the Head
- underneath the BOP stack, provided the well is safe and under control. This option allows the Hanger bowl to be inspected and thoroughly washed prior to the Hanger Installation.

3.13.5. Examine the ***Casing Hanger (Item E2).*** Verify the following:

- the packoff rubber is clean and undamaged
- all screws are in place and intact
- slips are intact, clean, and undamaged
- seal element is not compressed beyond the OD of the Hanger





3.13.6. Remove the latch screw to open the Hanger.

WARNING **Do NOT over open the Hanger. This can damage the Packoff Rubber.**

3.13.7. Place two boards of equal size against the casing to support the Hanger.

3.13.8. Wrap the Hanger around the casing and replace the latch screws.

3.13.9. Verify that the seal element is not compressed beyond the OD of the Hanger. If it is, loosen the cap screws in the bottom of the Hanger. The seal **MUST NOT BE COMPRESSED** prior to slacking off casing weight onto the Hanger.

3.13.10. Remove the slip retaining screws.

3.13.11. Grease the Hanger body and packoff rubber.

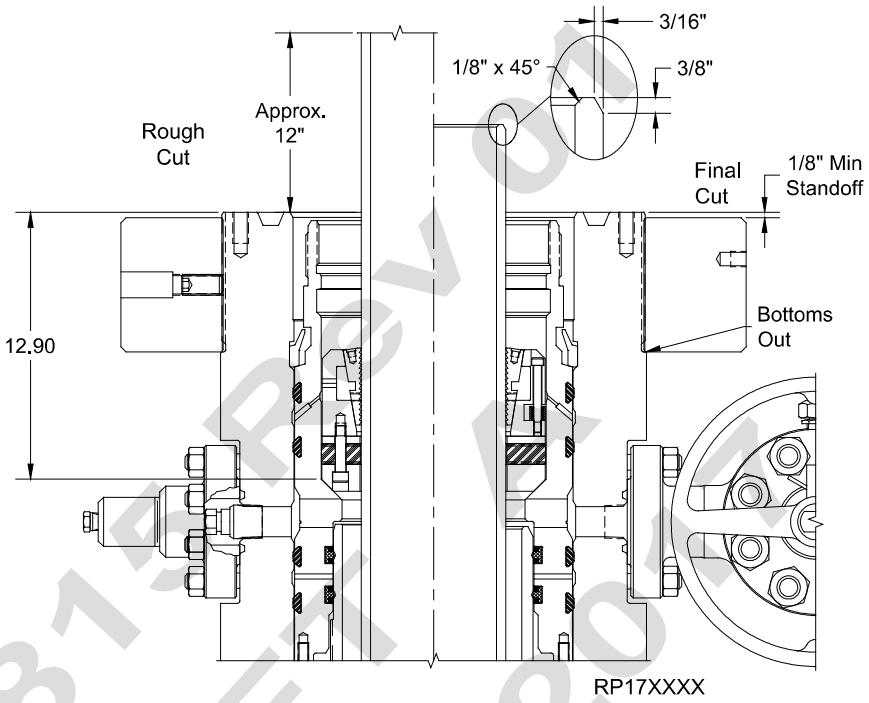
Stage 3.0 — 7" Casing

3.13.12. Remove the boards and carefully lower the Hanger into the Housing, using a cat-line to center the casing, if necessary. Measure and record.

3.13.13. Once slips are landed, measure from top of Housing to verify that slip bowl is on the load shoulder prior to putting weight on the slips.

3.13.14. When the Hanger is down, pull tension on the casing to the desired hanging weight + 1-1/2" then slack off.

NOTE A sharp decrease on the weight indicator will signify that the Hanger has taken weight and at what point.



3.13.15. Rough cut the casing at approximately 12" above the flange of the Housing.

3.13.16. Move the BOP and excess casing out of the way.

NOTE Always physically measure the exact cutoff height by measuring the bottom bore of the next component to be installed and subtract 1/4" from this dimension, prior to making the final cutoff.

3.13.17. Final cut the casing at 4-1/4" ±1/8" above the top of the Housing flange. Place a 3/8" x 3/16" bevel on the casing stub and remove all burrs and sharp edges.

NOTE The ID edge of the casing may be ground slightly to allow drill pipe and casing collars to pass smoothly.

Stage 3.0 — 7" Casing

3.14. Install the TA Cap

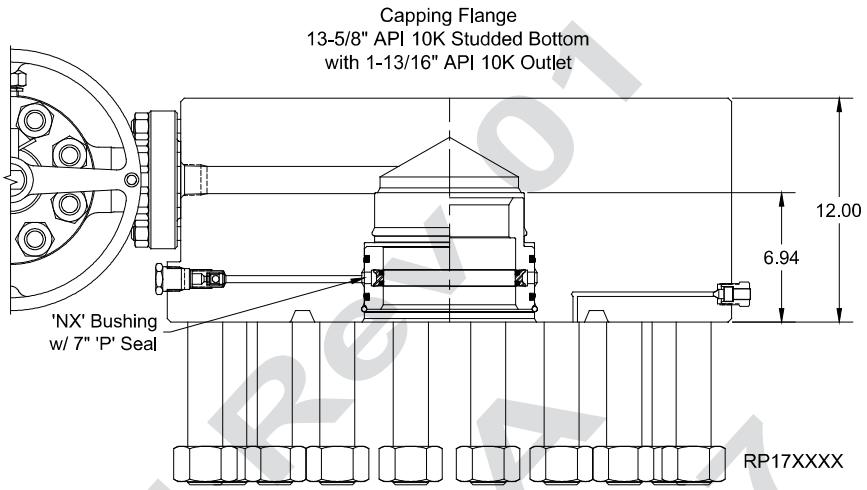
3.14.1. Examine the ***TA Cap (Item B1)***. Verify the following:

- bore is clean and free of debris
- seal areas are clean and undamaged
- all peripheral equipment is intact and undamaged
- ***'NX' Bushing (Item C2 or E3)*** is properly installed, clean and undamaged

3.14.2. Orient the TA Cap as illustrated.

3.14.3. Clean the mating ring grooves of the Housing and TA Cap. Lubricate each groove, the ID of the TA Cap and the OD of the Hanger neck/ casing stub with a light coat of oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.

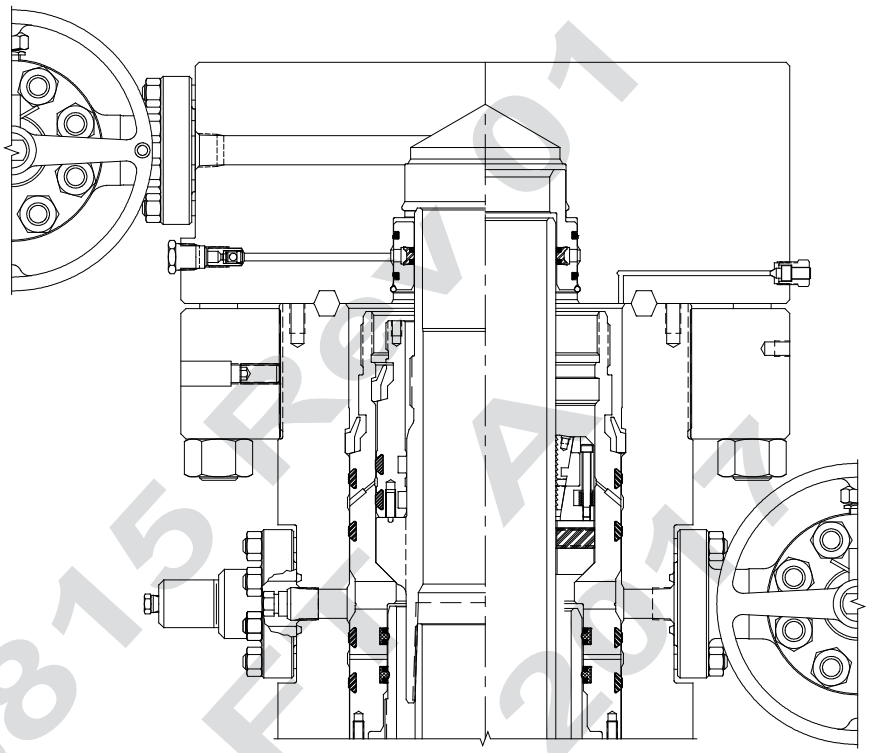


Stage 3.0 — 7" Casing

3.14.4. Install a new ***BX-159 Ring Gasket (Item A20)*** into the ring groove of the Housing.

3.14.5. Orient the TA Cap per customer's requirements and carefully lower the TA Cap over the casing stub until it lands on the ring gasket.

3.14.6. Make up the connection using the ***studs and nuts provided with the TA Cap*** and tighten the connection in an alternating cross fashion to the torque referenced in the chart in the back of this manual.



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⚠ CAUTION

Ensure and verify Threaded Flange is properly installed to the Casing Head.

1. **Rotate the threaded flange counterclockwise (left hand thread) to a positive stop and bottom out threaded flange on Casing Head flange shoulder.**
2. **Verify make up dimension. Dimension from the top of the threaded flange to the top of the casing head must be 1/8" or greater.**

Threaded flange must remain shouldered out during installation.

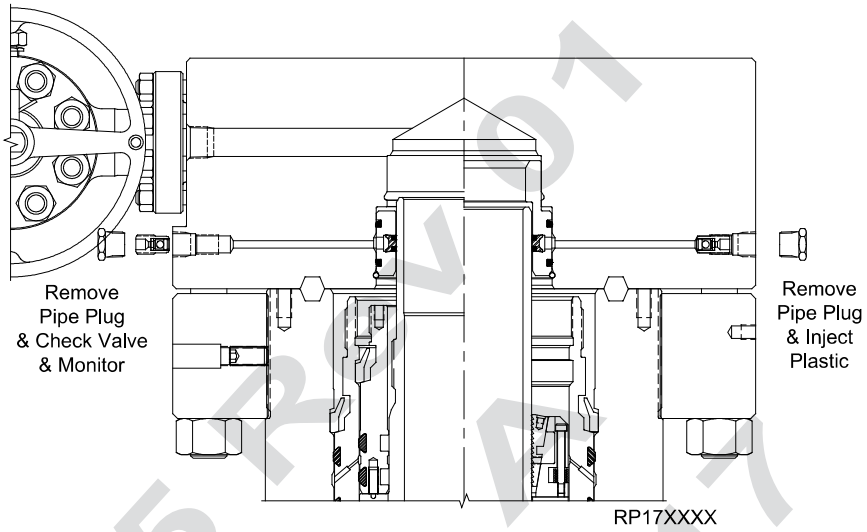
Stage 3.0 — 7" Casing

3.15. Energize the 'NX' Bushing 'P' Seal

CAUTION Extreme care and time must be used when injecting plastic packing into 'NX' Bushing with thin-walled cross-sections. Pump plastic packing slowly and allow additional time for pressure to stabilize between pump iterations on the hydraulic pump.

WARNING

SEE RP-000589 PROCEDURE FOR PACKING INJECTION AND ENERGIZING THE 'P' SEALS



3.16. Test the Connection

3.16.1. Locate the port on the OD of the TA Cap for testing the connection and remove the fitting.

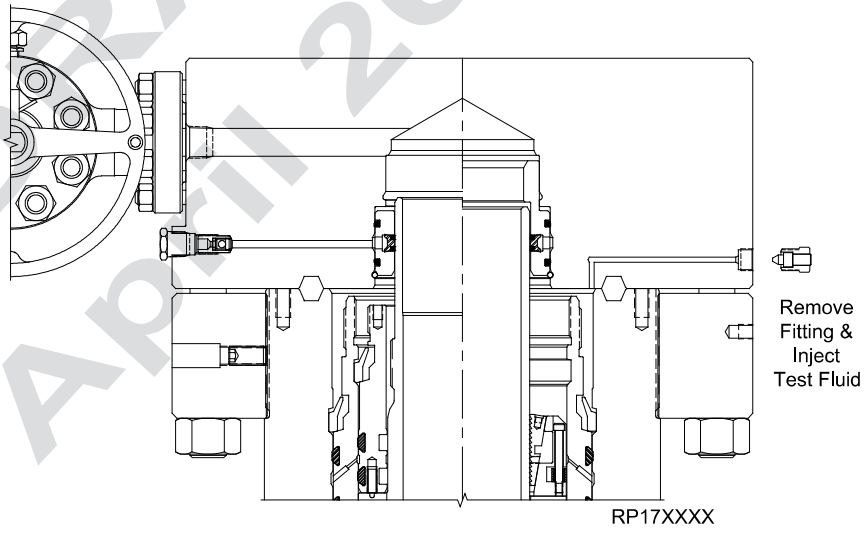
3.16.2. Install a test pump to the open port and inject test fluid to ***10,000 psi or 80% of casing collapse—whichever is less.***

NOTE If Emergency Hanger was installed, do not exceed 80% of casing collapse.

NOTE Contact the Drilling Supervisor to determine the collapse pressure of the specific grade and weight of the casing used.

WARNING Do NOT over pressurize.

3.16.3. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.



3.16.4. Once a satisfactory test is achieved, carefully bleed off all test pressure and remove the test pump.

3.16.5. Re-install the fitting.

Stage 3.0 — 7" Casing

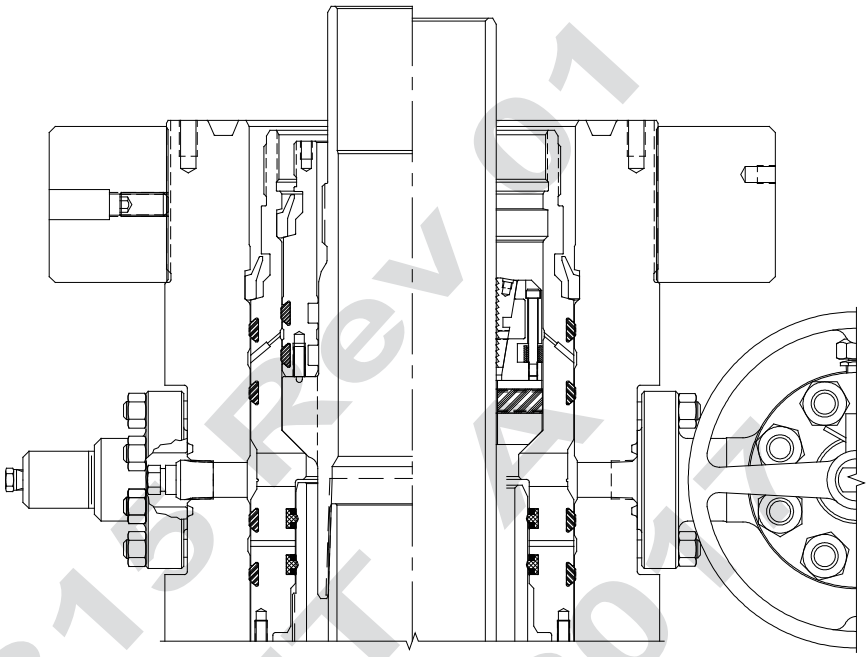
3.17. Remove the TA Cap

NOTE Verify the well is safe and secure and that there is no trapped pressure in the well.

3.17.1. With the well safe and secure, nipple down the TA Cap.

3.17.2. With the appropriate lifting device, lift the TA Cap straight up and retrieve to the rig floor.

3.17.3. Inspect the Hanger neck/ casing stub for signs of damage and report immediately.



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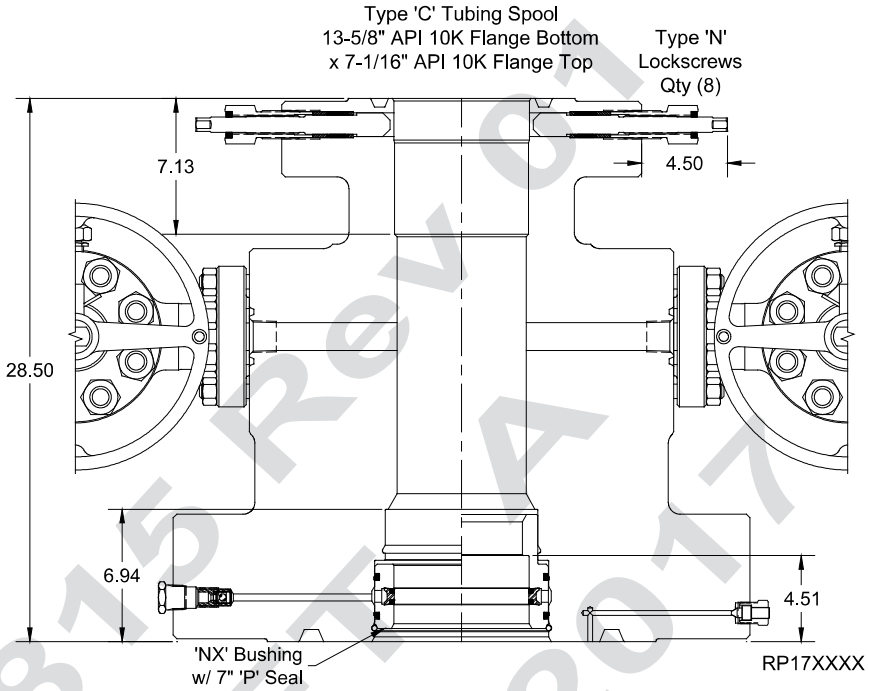
Stage 3.0 — 7" Casing

3.18. Install the Tubing Spool

3.18.1. Examine the ***Tubing Spool (Item C1).*** Verify the following:

- bore is clean and free of debris
- ***'NX' Bushing (Item C2 or E3)*** is properly installed and undamaged
- ring grooves and seal areas are clean and undamaged
- peripheral equipment is intact and undamaged
- all lockscrews are retracted from the bore as indicated



WARNING All Lockscrews *MUST* achieve positions as indicated. Otherwise contact Surface Engineering for guidance.

3.18.2. Lubricate the ID of the 'P' seal or 'T' seals (depending on the Bushing installed) and the OD of the casing stub with a light coat of oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.

Stage 3.0 — 7" Casing

3.18.3. Install a new ***Ring Gasket BX-159 (Item A21)*** into the ring groove of the MN-DS Housing.

3.18.4. Lift and suspend the Tubing Spool over the casing stub, ensuring it is level. Align the spool outlets as required. Align the bolts of the Spool as required (two hole).

3.18.5. Carefully lower the Tubing Spool and land it on the Housing flange.

WARNING Do NOT damage the 'P' seal or its sealing ability will be impaired.

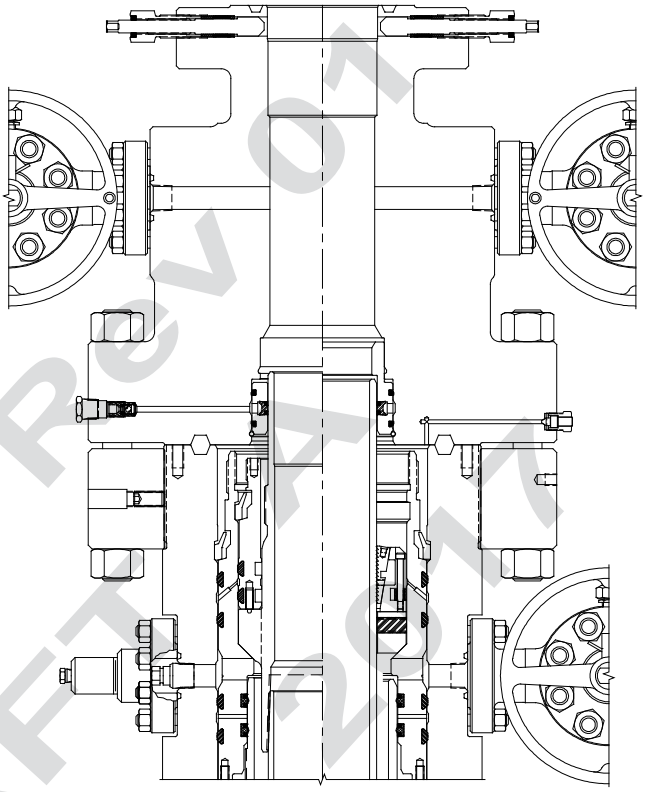
3.18.6. Make up the connection using the ***studs and nuts (Item A20)*** in an alternating cross fashion to the torque referenced in the chart in the back of this manual.

⚠ CAUTION

Ensure and verify Threaded Flange is properly installed to the Casing Head.

1. **Rotate the threaded flange counter-clockwise (left hand thread) to a positive stop and bottom out threaded flange on Casing Head flange shoulder.**
2. **Verify make up dimension. Dimension from the top of the threaded flange to the top of the casing head must be 1/8" or greater.**

Threaded flange must remain shouldered out during installation.



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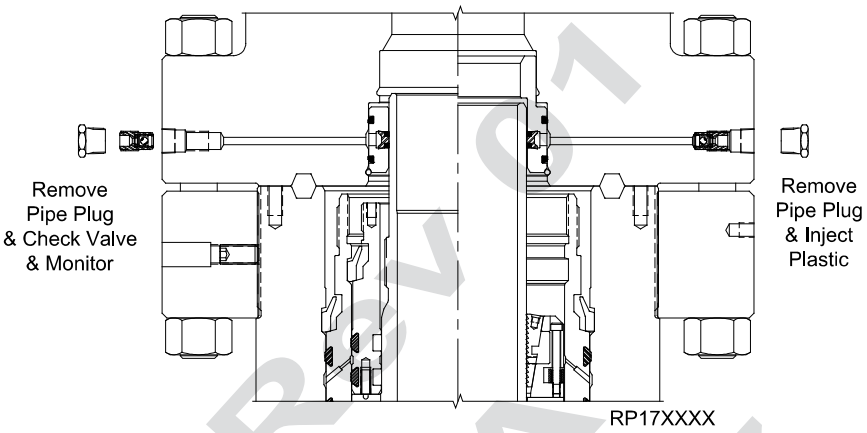
Stage 3.0 — 7" Casing

3.19. Energize the 'NX' Bushing 'P' Seal

CAUTION Extreme care and time must be used when injecting plastic packing into 'NX' Bushing with thin-walled cross-sections. Pump plastic packing slowly and allow additional time for pressure to stabilize between pump iterations on the hydraulic pump.



WARNING

SEE RP-000589

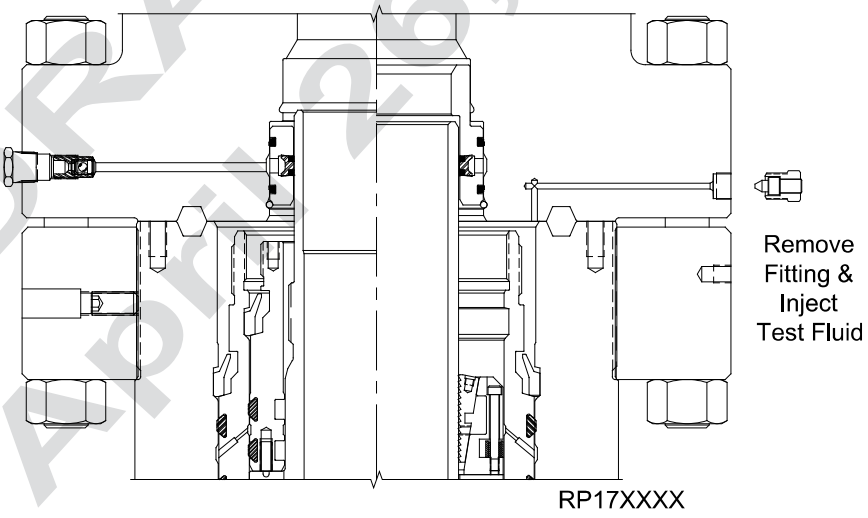
PROCEDURE FOR PACKING INJECTION AND ENERGIZING THE 'P' SEALS

3.20. Test the Connection

3.20.1. Locate the port on the bottom flange of the Tubing Spool for testing the connection and remove the fitting.

3.20.2. Install a test pump into the port and inject test fluid to ***10,000 psi or 80% of casing collapse—whichever is less.***

NOTE If Emergency Hanger was installed, do not exceed 80% of casing collapse.



NOTE Contact the Drilling Supervisor to determine the collapse pressure of the specific grade and weight of the casing used.

WARNING Do NOT over pressurize.

3.20.3. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.

3.20.4. Once a satisfactory test is achieved, carefully bleed off the test pressure and remove the test pump.

3.20.5. Re-install the fitting.

NOTE Not all injection and testing port configurations are the same and should be handled accordingly.

Stage 3.0 — 7" Casing

3.21. Install the Lower Master Valve

3.21.1. Examine the ***Lower Master Valve.*** Verify the following:

- bore is clean and free of debris
- ring groove are clean and undamaged
- drift diameter

3.21.2. Orient the Lower Master Valve as required.

3.21.3. Clean the mating ring grooves of the Tubing Spool and the Lower Master Valve. Lubricate each groove with a light coat of oil or grease.

WARNING Excessive oil or grease may prevent a positive seal from forming.

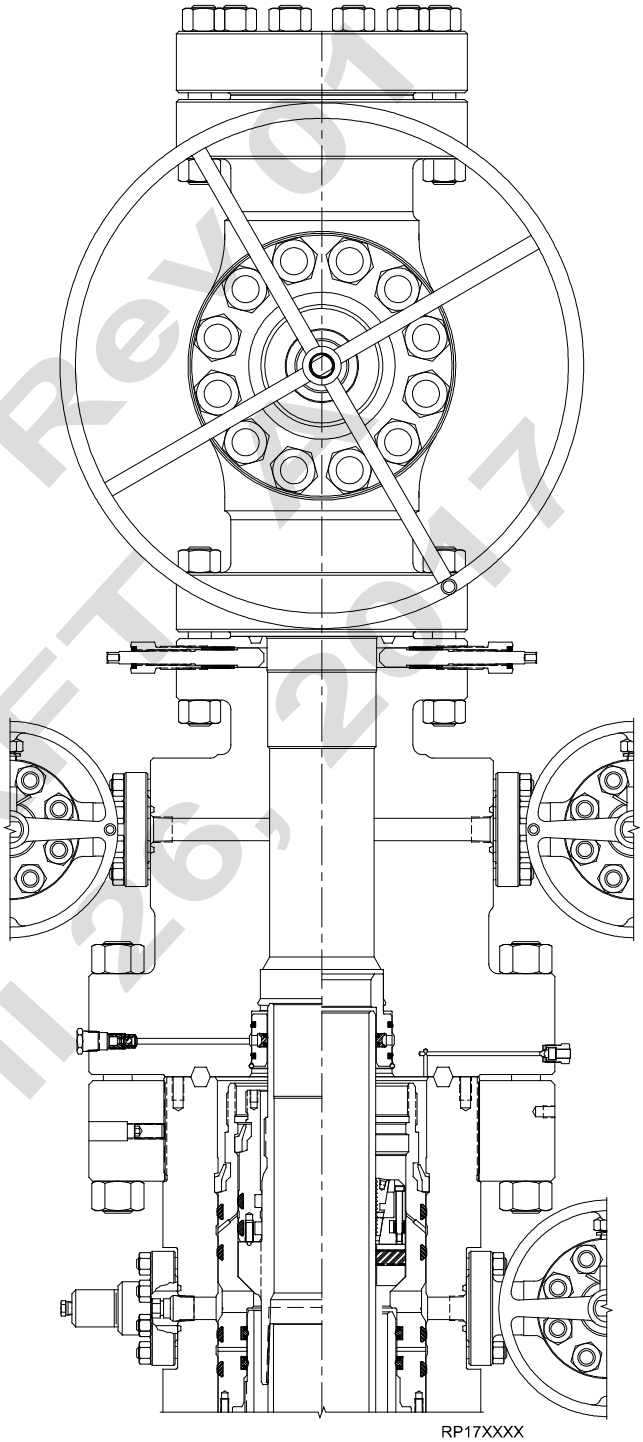
3.21.4. Install a new ***Ring Gasket BX-156 (Item C8)*** into the ring groove of the Tubing Spool.

3.21.5. With the appropriate lifting device, lift and suspend the Lower Master Valve over the Tubing Spool, ensuring assembly is level. Align the bolts as required (two hole).

3.21.6. Slowly and carefully lower the Lower Master Valve until it lands on the Tubing Spool ring gasket.

3.21.7. Make up the connection using the ***studs and nuts (Item C9)*** in an alternating cross fashion to the torque referenced in the chart in the back of this manual.

3.21.8. Test as required.



RP17XXXX

Recommended Procedure for Field Welding Pipe to Wellhead Parts for Pressure Seal

The following procedure is a direct extraction (except for the numeric footnote designators) from the Fourteenth Edition of API 6A[1]. Editorial footnotes have been added to provide additional information that may be of benefit when developing procedures for specific field welding applications. The recommended procedure and footnotes are for general information purposes and it should be mentioned that Cameron is not responsible for determining or administering any field welding practices. The organization performing the welding should qualify their welding procedure(s) and welder(s) in accordance with applicable codes and standards[2]. The success of any field weld should be verified by subsequent hydrostatic test at the direction of the customer.

B.1 Introduction and Scope. - The following recommended procedure has been prepared with particular regard to attaining pressure-tight welds when attaching casing heads, flanges, etc., to casing. Although most of the high strength casing used (such as P-110) is not normally considered field weldable, some success may be obtained by using the following or similar procedures[3].

CAUTION In some wellheads, the seal weld is also a structural weld and can be subjected to high tensile stresses. Consideration must therefore be given by competent authority to the mechanical properties of the weld and its heat affected zone.

1. The steels used in wellhead parts and in casing are high strength steels that are susceptible to cracking when welded. It is imperative that the finished weld and adjacent metal. be free from cracks, The heat from welding also affects the mechanical properties. This is especially serious if the weld is subjected to service tension stresses.

2. **This procedure is offered only as a recommendation. The responsibility for welding lies with the user and results are largely governed by the welder's skill. Weldability of the several makes and grades of casing varies widely, thus placing added responsibility on the welder.** Transporting a qualified welder to the job, rather than using a less-skilled man who may be at hand, will, in most cases, prove economical. The responsible operating representative should ascertain the welder's qualifications and if necessary, assure himself by instruction or demonstration, that the welder is able to perform the work satisfactorily.

B.2 Welding conditions. - Unfavorable welding conditions must be avoided or minimized in every way possible, as even the most skilled welder cannot successfully weld steels that are susceptible to cracking under adverse working conditions, or when the work is rushed. Work above the welder on the drilling floor should be avoided. The weld should be protected from dripping mud, water, and oil and from wind, rain, or other adverse weather conditions. The drilling mud, water, or other fluids must be lowered in the casing and kept at a low level until the weld has properly cooled. It is the responsibility of the user to provide supervision that will assure favorable working conditions, adequate time, and the necessary cooperation of the rig personnel.

B.3 Welding. - The welding should be done by the shielded metal-arc[4] or other approved process.

B.4 Filler Metal. - After the root pass, low hydrogen electrodes or filler wires of a yield strength equal to the casing yield strength should be used[5]. The low hydrogen electrodes include classes EXX15, EXX16, EXX18, EXX28 of AWS A5.1 (latest edition): *Mild Steel Covered Arc- Welding Electrodes** and AWS A5.5 (latest edition): *Low Alloy Steel Covered Arc-Welding Electrodes**. Low hydrogen electrodes should not be exposed to the atmosphere until ready for use. Electrodes exposed to atmosphere should be dried 1 to 2 hours at 500 to 600°F *(260 to 316°C)* just before use[6].

*Available from the American Society for Testing and Materials, 1916 Race street, Philadelphia, Pa. 19103.

B.5 Preparation of Base Metal. - The area to be welded should be dry and free of any paint, grease, scale, rust or dirt.

B.6 Preheating. - Both the casing and the wellhead member should be preheated to 250-400°F *(121 to 204°C)* for a distance of at least 3 inches *(76.2 mm)* on either side of the weld location, using a suitable preheating torch. Before applying preheat, the fluid should be bailed out of the casing to a point several inches *(mm)* below the weld location. The preheat temperature should be checked by the use of heat sensitive crayons. Special attention must be given to preheating the thick sections of wellhead parts to be welded, to insure uniform heating and expansion with respect to the relatively thin casing[7].

NOTE Preheating may have to modified because of the effect of temperature on adjacent packing elements which may be damaged by exposure to temperatures 200°F ***(93°C)*** and higher. Temperature limitations of the packing materials should be determined before the application of preheat.

WARNING If Casing Head is designed with an internal o-ring bottom prep and the internal o-ring is installed, ensure the o-ring preheat temperature does not exceed 300°F

Recommended Procedure for Field Welding Pipe to Wellhead Parts for Pressure Seal

B7. Welding technique. - Use a 1/8 or 5/32 inch *(3.2 or 4.0 mm)* E6010 electrode[8] and step weld the first bead (root pass); that is, weld approximately 2 to 4 inches *(50 to 100 mm)* and then move diametrically opposite this point and weld 2 to 4 inches (50 to 100 mm). Then weld 2 to 4 inches *(50 to 100 mm)* halfway between the first two welds, move diametrically opposite this weld, and so on until the first pass is completed. The second pass should be made with a 5/32 *(4.0 mm)* low hydrogen electrode of the proper strength and may be continuous. The balance of the welding groove may then be filled with continuous passes without back stepping or lacing, using a 3/16-inch *(4.8 mm)* low hydrogen electrode. All beads should be stringer beads with good penetration, and each bead after the root pass should be thoroughly peened before applying the next bead. There should be no undercutting and welds shall be workmanlike in appearance.

NOTE ***E7018 RODS HAVE BEEN SUCCESSFULLY USED FOR ROOT PASS.***

1. Test ports should be open when welding is performed to prevent pressure build-up within the test cavity.
2. During welding the temperature of the base metal on either side of the weld should be maintained at 250°F *(121°C)* minimum.
3. Care should be taken to insure that the welding cable is properly grounded to the casing, but ground wire should not be welded to the casing or the wellhead. Ground wire should be firmly clamped to the casing, the wellhead, or fixed in position between pipe slips. Bad contact may cause sparking, with resultant hard spots beneath which incipient cracks may develop; The welding cable should not be grounded to the steel derrick, nor to the rotary-table base.

B.8 Cleaning. - All slag or flux remaining on any welding bead should be removed before laying the next bead. This also applies to the completed weld.

B.9 Defects. - Any cracks or blow holes that appear on any bead should be removed to sound metal by chipping or grinding before depositing the next bead.

B.10 Postheating. - For the removal of all brittle areas on high strength steel casing, a post heat temperature of 1050-1100°F *(566 to 593°C)*[9] is desirable. It is recognized, however, that this temperature is difficult or impossible to obtain in the field, and that the mechanical properties of the wellhead parts and the pipe may be considerably reduced by these temperatures. As a practical matter, the temperature range of 500-900°F *(260 to 482°C)* has been used with satisfactory results.

B.11 Cooling. - Rapid cooling must be avoided. To assure slow cooling, welds should be protected from extreme weather conditions (cold, rain, high winds, etc.) By the use of a blanket of asbestos[10] or other suitable insulating material. Particular attention should be given to maintaining uniform cooling of the thick sections of the wellhead parts and the relatively thin casing, as the relatively thin casing will pull away from the head or hanger if allowed to cool more rapidly. The welds should cool in air to 250°F *(121°C)* (measured with a heat sensitive crayon) prior to permitting the mud to rise in the casing.

NOTE The above procedure is presented for the convenience of our customers. Please Contact Cameron's Land Wellhead engineering Group in Houston, Texas if any additional assistance is required.

Recommended Procedure for Field Welding Pipe to Wellhead Parts for Pressure Seal

[1]API SPECIFICATION 6A - Fourteenth Edition, March 1983, Appendix B, Page 109

[2]ASME Section IX is one such code that provides guidelines for the qualification of welding procedures and welders. It specifically assigns the responsibility of qualification of welding procedures and welders to the organization with "responsible operational control" over the production welding.

[3]Many of the high strength casing grades are weldable but weldability will vary from one casing manufacturer to another even within a given casing grade. The weldability of any base metal is determined largely by its chemical composition. Casing materials, even within a given grade vary widely in their chemical makeup. This necessitates the qualification of welding procedures, not just for a particular grade but also for each different chemical makeup. When qualifying welding procedures intended for field application, it is recommended that field welding conditions be simulated as much as is possible. It is very important that the welding parameters and techniques qualified are duplicated in the field.

[4]American Welding Society designation SMAW (Shielded Metal Arc Welding), commonly referred to as "stick welding."

[5]Finding filler metals that will match the strength of the high strength casings will be very difficult if not impossible to do. For instance, E12018M is the highest strength electrode classified by AWS A5.5. It has a minimum specified yield strength of 108 ksi. That does not meet the minimum specified yield strength for P-110 or Q-125 casing. When joining carbon and low alloy materials of different strengths, it is standard practice to use a carbon steel or low alloy filler metal that will match, as a minimum, the strength of the weaker of the two materials being joined. When dealing with the high strength casings such as N-80, P-110 and Q-125, the material to which any one of these is to be joined will probably be the weaker of the two. In such cases, filler metals should be selected based on the minimum specified strength of the weaker material. It is the responsibility of the user to specify the size of weld required based on anticipated loads and strength of weld metal being used.

[6]The reason for maintaining low moisture in the electrodes is to minimize the amount of hydrogen that is liberated at the arc during welding. When welding high strength low alloy steels, hydrogen can promote delayed cold cracking in hardened weld metals and heat affected zones. One of the ways to reduce the chance of cold cracking is to minimize the hydrogen potential of the electrodes through moisture control.

[7]Internal pre-heaters for preheating the casing and wellhead member from the inside are available from Cameron and are highly recommended.

[8]E6010 electrodes contain high levels of moisture in their coating. Hydrogen which is liberated from moisture under the intense heat of the electric arc, migrates into the weld metal and heat affected zone and can promote hydrogen induced cold cracking as the weld cools down. For this reason, some companies elect not to use E6010 electrodes for the first pass, even though there are benefits from the standpoint of operator appeal and penetration. If they are used, precautions must be taken to get rid of the diffusible hydrogen before the weld cools from preheating temperatures. Given enough time at elevated temperatures, the hydrogen will diffuse out of the metal. The rate of diffusion is time and temperature dependant. Therefore, the diffusion process can be promoted through the use of high preheats, post weld stress relief, post weld soaks at or above preheat temperatures and slow cooling.

NOTE ***E7018 RODS HAVE BEEN SUCCESSFULLY USED FOR ROOT PASS***

[9]Low alloy welds that are required to meet NACE MR0175 specification must be stress relieved at 1150°F *(621°C)* minimum.

[10]For health reasons, Cameron strongly recommends **against** the use of asbestos insulating blankets . There are many good non-asbestos materials that can be used as an acceptable substitute.

Torque Chart

Recommended Makeup Torques for Flange Bolting Ft•Lbf Per API 6A: preload = .50Sy				
Bolt Size Nom OD - TPI	B7M, L7M (Sy=80 ksi)		B7, L7, 660 (Sy=105 ksi)	
	cf=0.07	cf=0.13	cf=0.07	cf=0.13
.500-13	27	45	35	59
.625-11	52	88	68	115
.750-10	90	153	118	200
.875-9	143	243	188	319
1.000-8	213	361	279	474
1.125-8	305	523	401	686
1.250-8	421	726	553	953
1.375-8	563	976	739	1280
1.500-8	733	1280	962	1680
1.625-8	934	1640	1230	2150
1.750-8	1170	2050	1530	2700
1.875-8	1440	2540	1890	3330
2.000-8	1750	3090	2300	4060
2.250-8	2500	4440	3280	5820
2.500-8	3430	6120	4500	8030
2.625-8	3970	7100	4720	8430
2.750-8	4570	8180	5420	9700
3.000-8	5930	10700	7050	12700
3.250-8	7550	13600	8970	16100
3.500-8	9430	17000	11200	20200
3.750-8	11600	21000	13800	24900
3.875-8	12800	23200	15200	27500
4.000-8	14100	25500	16700	30300

NOTE

- The information in this table is based on API-6A's recommended torque for a given bolt size. The information is presented for the convenience of the user and is based on assumptions of certain coefficients of friction (cf). The coefficients of friction are based on approximations of the friction between the studs and nuts, as well as the nuts and flange face. A coefficient friction of 0.13 assumes the threads and nut bearing surfaces are bare metal and are well lubricated with thread compound. A coefficient of friction of 0.07 assumes the thread and nuts are coated with a fluoropolymer material.

- Lubrication

  It is essential that threads and nut faces be well lubricated with an appropriate grease prior to assembly. Cameron clamps and fast clamps require lubrication on the hub-clamp contact area. Acceptable lubricants include thread joint compounds which meet the formulation, evaluation and testing requirements specified in API Recommended Practice 5A3/ISO13678. (Reference - Jet Lube Grease, 1 lb can PN: 2737980-02).

  Studs and nuts coated with Xylan/PTFE compound in accordance with a Cameron procedure do not require lubrication. However, a light coat of API Recommended Practice 5A3/ISO13678 thread compound is recommended for Xyland-coated bolting as an aid to assembly.

  Material gaskets should be lightly coated with lubricant prior to assembly. Acceptable lubricants include motor oil or Cameron gate valve greases.

IC Test Plug Load Chart

IC Test Plug Maximum Load							
Bowl		Maximum Hanging Load (in 1000s lbs) at Test Pressure					
Size	Pressure	0 psi	2,000 psi	3,000 psi	5,000 psi	10,000 psi	15,000 psi
7-1/16"	2,000 to 5,000 psi	213	135	96	19	N/A	N/A
	10,000 psi	253	175	136	59	0	N/A
	15,000 psi	477	399	360	282	88	0
9"	2,000 to 10,000 psi	600	479	419	299	0	N/A
	15,000 psi	751	630	570	450	149	0
11"	2,000 to 10,000 psi	1277	1091	998	812	348	N/A
	15,000 psi	1596	1410	1317	1131	667	202
13-5/8"	2,000 to 10,000 psi	1713	1426	1283	997	281	N/A
	15,000 psi	2142	1855	1712	1426	710	5
16-3/4"	2,000 to 5,000 psi	3076	2641	2424	1990	N/A	N/A
20"	2,000 to 5,000 psi	2733	2096	1778	1142	N/A	N/A

Minimum Casing Load Chart for IC Type Hangers

Minimum Casing Load for IC-2 & IC-6 Casing Hangers		
Hanger Nom. Size	Casing Size	Load (Pounds)
11"	4-1/2"	78,000
	5"	74,000
	5-1/2"	70,000
	6-5/8"	59,000
	7"	55,000
	7-5/8"	48,000
13-5/8"	5-1/2"	120,000
	7"	106,000
	7-5/8"	99,000
	8-5/8"	86,000
	9-5/8"	72,000
	10-3/4"	54,000

Minimum Casing Load for IC-2 & IC-6 Casing Hangers		
Hanger Nom. Size	Casing Size	Load (Pounds)
16-3/4"	9-5/8"	146,000
	10-3/4"	128,000
	11-3/4"	110,000
	11-7/8"	109,000
	13-3/8"	79,000
20-3/4" 21-1/4"	10-3/4"	228,000
	13-3/8"	180,000
	13-5/8"	175,000
	16"	120,000

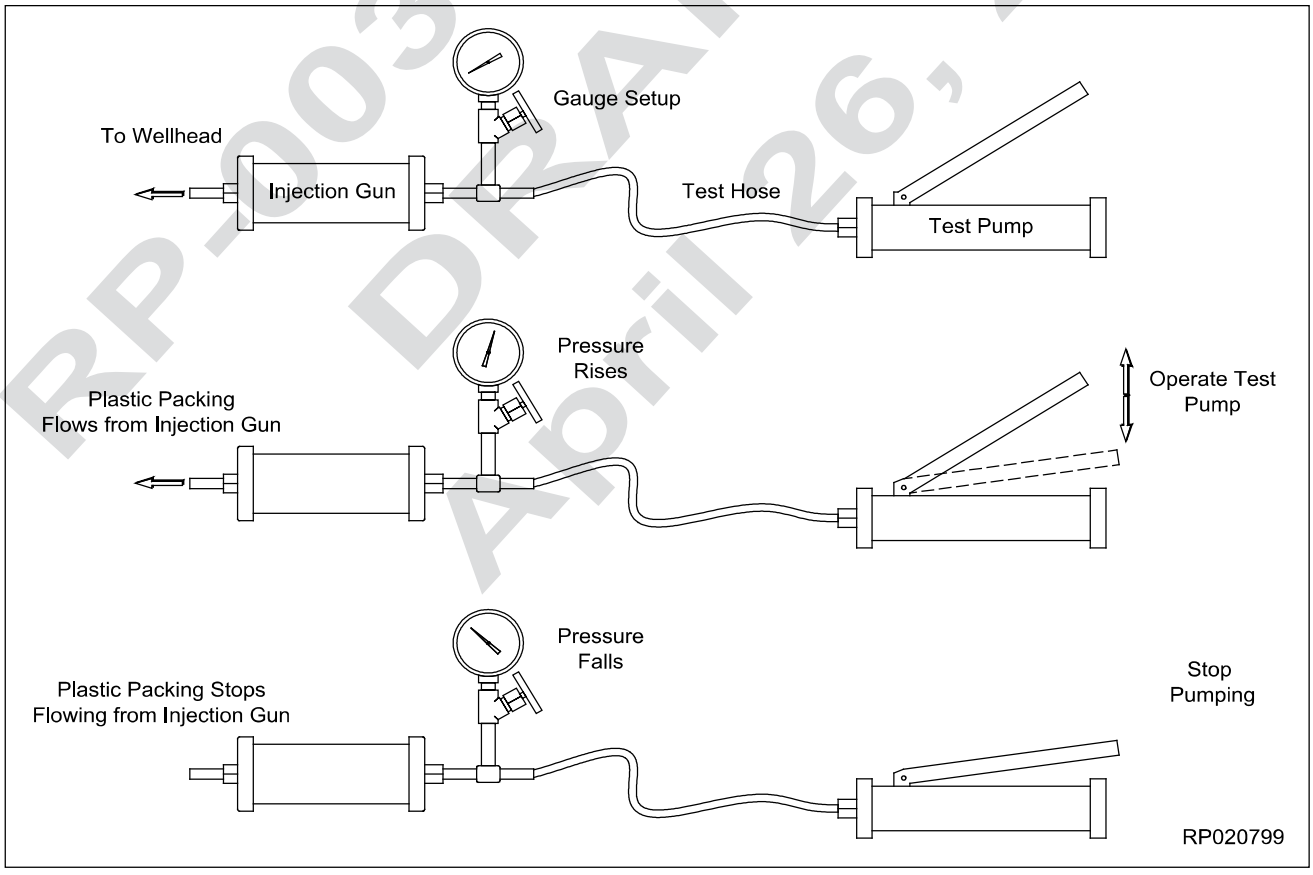
Injection Gun Preparation

1. Maintaining the Injection Gun at ambient temperatures, prepare Test Pump and Injection Gun for injecting P seals.
2. Operate Test Pump to inject fluid into Injection gun.
3. Monitor open end of Injection Gun for signs of plastic packing.
4. After plastic packing begins to flow from open end of Injection Gun continue to inject fluid from Test Pump increasing pressure an additional 200 to 400 psi.
5. Stop pumping Test Pump and monitor plastic packing movement and pressure on the pressure gauge.
6. Once packing has stopped flowing and the pressure gauge has stabilized observe the reading on gauge and record the pressure. **This will be your P1 pressure.**

Screw Type Injection Gun	
Applied Torque (ft-lb)	**Packing Pressure (psi)**
25	1,600
50	5,000
75	7,000
100	8,800
150	14,100
200	17,700
220	20,000

NOTE The pressure recorded will become "0". This is the pressure required to move the plastic packing and is not included in the actual injection pressure.

NOTE The amount of pressure required to force plastic packing to flow from the Injection Gun is dependent on several factors including outside temperature and the plastic injection gun itself. The example given above is for illustration purposes only.



Fraction to Decimal Conversion Chart

FRACTION TO DECIMAL CONVERSION CHART													
4THS	8THS	16THS	32NDS	64THS	TO 3 PLACES	TO 2 PLACES	4THS	8THS	16THS	32NDS	64THS	TO 3 PLACES	TO 2 PLACES
				1/64	.016	.02					33/64	.516	.52
			1/32		.031	.03				17/32		.531	.53
				3/64	.047	.05					35/64	.547	.55
		1/16			.062	.06			9/16			.562	.56
				5/64	.078	.08					37/64	.578	.58
			3/32		.094	.09				19/32		.594	.59
				7/64	.109	.11					39/64	.609	.61
	1/8				.125	.12		5/8				.625	.62
				9/64	.141	.14					41/64	.641	.64
			5/32		.156	.16				21/32		.656	.66
				11/64	.172	.17					43/64	.672	.67
		3/16			.188	.19			11/16			.688	.69
				13/64	.203	.20					45/64	.703	.70
			7/32		.219	.22				23/32		.719	.72
				15/64	.234	.23					47/64	.734	.73
1/4					.250	.25	3/4					.750	.75
				17/64	.266	.27					49/64	.766	.77
			9/32		.281	.28				25/32		.781	.78
				19/64	.297	.30					51/64	.797	.80
		5/16			.312	.31			13/16			.812	.81
				21/64	.328	.33					53/64	.828	.83
			11/32		.344	.34				27/32		.844	.84
				23/64	.359	.36					55/64	.859	.86
	3/8				.375	.38		7/8				.875	.88
				25/64	.391	.39					57/64	.891	.89
			13/32		.406	.41				29/32		.906	.91
				27/64	.422	.42					59/64	.922	.92
		7/16			.438	.44			15/16			.938	.94
				29/64	.453	.45					61/64	.953	.95
			15/32		.469	.47				31/32		.969	.97
				31/64	.484	.48					63/64	.984	.98
1/2					.500	.50	1					1.000	1.00

Appendix 1

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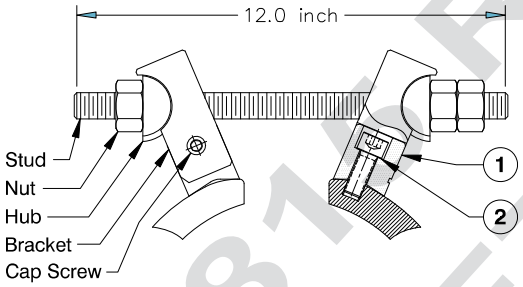
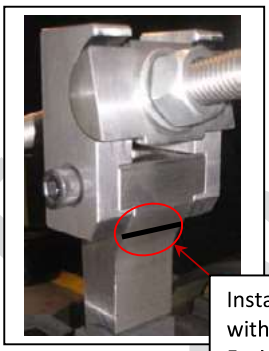
RECOMMENDED LOCKDOWN RING (COLLAPSING/EXPANDING) TOOL FOR SSMC AND E-LOCK

Scope

Recommended tool Top level assembly **2273869-05** contains common assembly parts with optional interchangeable adaptors and associated cap screws for specific lockdown ring size.

Table 1 lists recommended and existing tool Part numbers.





Install adaptor with Undercut Facing out

Figure 1 – Components in recommended tool top level assembly 2273869-05 (optional Item 1 – adaptor; comes with associated Item 2 – cap screw)

Procedure to use recommended tool 2273869-05

(A) Collapsing lockdown ring

Step 1
Power tight dedicated adaptor and cap screw to the specific lockdown ring size.

⚠ **Adaptor "Legs" must rest fully on ring profile to prevent loading stress on cap screw.**

Step 2
Make up brackets to receive Hub.

Step 3
Torque nut sufficiently to collapse ring.

⚠ **Torque should not exceed 10ft-lbs. Verify collapse interference by wiggling lock ring.**

(B) Expanding lockdown ring

Step 1
Power tight dedicated adaptor and cap screw to specific lockdown ring size.

Step 2
Make up bracket to receive Hub.

Step 3
Torque nut sufficiently to expand ring.

⚠ **Similar checks as collapsing the ring.**

Appendix 1

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Table 1
Recommended and Existing Tool PN

Type	Size	Recommended* and Existing Tools	Tool Model (Table 2)	Adaptor (Fig 1 - Item 1)	Cap Screw (Fig 1 - Item 2)	Use on Lock Down Ring PN
SSMC	7-1/16	2273869-05*	A	2309218-05	702550-05-00-12	2017505-01
		2017561-06	D	NA		
	9	2273869-05*	A	2309218-06	702550-05-00-12	2202370-01 2236286-01
		2017561-06	D	NA		
		2017561-14	D			
	11	2273869-05*	A	2309218-07	702550-05-00-14	2094484-02 2094484-02-01 2094484-05 2094484-06
		2209192-01	D	NA		
		2017561-06	D			
		2017561-14	D			
	13-5/8	2273869-05*	A	2309218-02	702550-06-00-12	2062967-02 2062967-02-13 2062967-06
		2017561-02	D	NA		
		2017561-15	D			
		2273869-02	E			
		2230761-02	C			
		2230761-05	C			
	18-3/4	2273869-05*	A	2309218-08	702550-06-00-14	2125281-01 2125281-02 2125281-04
		2017561-15	D	NA		
		2230761-01	C			
		2209898-01	D			
	21-1/4	2273869-05*	A	2309218-08	702550-06-00-14	2125281-03
		2230761-01	C	NA		
E-LOCK	9	2273869-05*	A	2309218-11**	702503-16-00-40	2236573-01
	11	2273869-05*	A	2309218-01	702550-05-00-22	2216464-01 2216464-03
		2017561-13	D	NA		
		2273869-04	B			

** Only to use on E-lock Union Connector with Enlarged Window (PN 2236288-03)

Appendix 1

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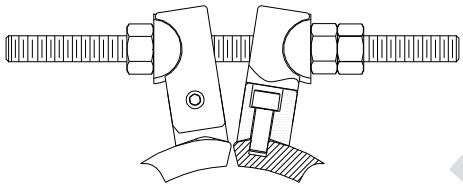
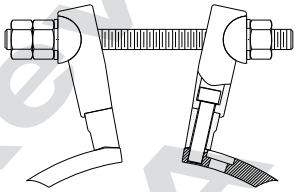
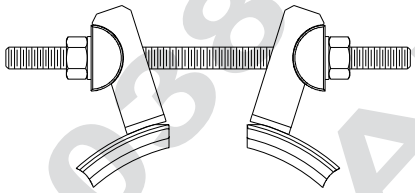
Table 2
Tool Models



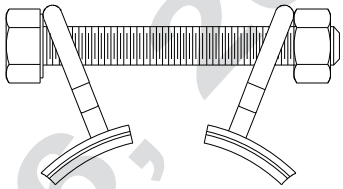
Model A - PN: 2273869-05
- **Recommended tool** for SSMC and E-lock
- Common assembly component
- Interchangeable adaptor and cap screw for specific lock ring size



Model B - PN: 2273869-04
- Specifically designed for 11" E-lock
- Adaptor not interchangeable for other lock ring sizes.

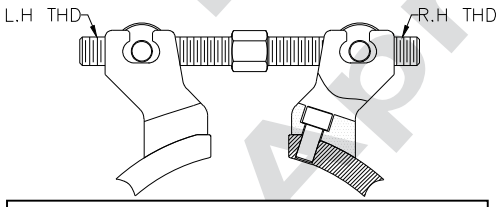


Model C - PN: 2230761
- Historically used on SSMC
- Various body components per ring size.
- Comes with extension pin for E-lock

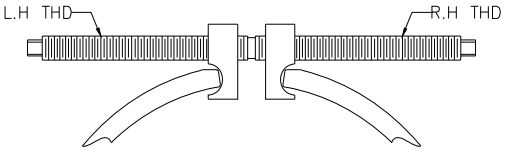


Model D - PN: 2017561 / 2209192 / 2209898
- Most common tool for SSMC and E-lock
- High occurrence to replace eyebolt

⚠ **Potential hazard due to shearing of eyebolt.**



Model E - PN: 2273869-02
- Specifically designed for 13-5/8" SSMC
- Opposite direction threaded ends to facilitate quick collapsing/expansion.



Model F - PN: 2273869-03
- Specifically designed for expanding process

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MAKE-UP AND BREAK OUT PROCEDURE FOR TYPE N LOCKSCREW ASSEMBLIES

1.0 SCOPE

This document provides recommended tools, assembly, make up and break out procedures for Type N lockscrew assemblies.

2.0 RECOMMENDED GREASE

All lockscrew assemblies require grease application at each threaded interface. Grease used on lockscrew assemblies must have a coefficient of friction within the range of 0.11 - 0.13. Table 1 provides recommended part numbers for grease to be used in lockscrew assemblies. Similar grease may be used if it has an acceptable coefficient of friction, as listed in this section.

Cameron PN	Description
708503	NeverSeez Regular Grade
700670	TF-41 Valve Grease

Table 1 - Standard Grease Part Numbers

3.0 LOCKSCREW ASSEMBLY

The standard lockscrew assembly is the type N lockscrew assembly (reference ES-000115-01). This consists of a lockscrew, gland, graphite packing, and spacer rings. Reference Figure 1 for the standard lockscrew assembly configuration.

CAUTION:
New gland PN 2165861-02-04 listed in ES-000115-01 rev 05 will not work with respective old N type lockscrew PNs on the following flange sizes because the old lockscrews will not retract all the way to clear the bore. The lockscrews listed on ES-000115-01 rev 05 must be used with this gland part number for the following flange sizes.

4-1/16 10K	5-1/8 10K	11 3K
4-1/16 15K	5-1/8 15K	13-5/8 2K
		13-5/8 3K

Contact local or regional engineering support for questions and/or additional support.

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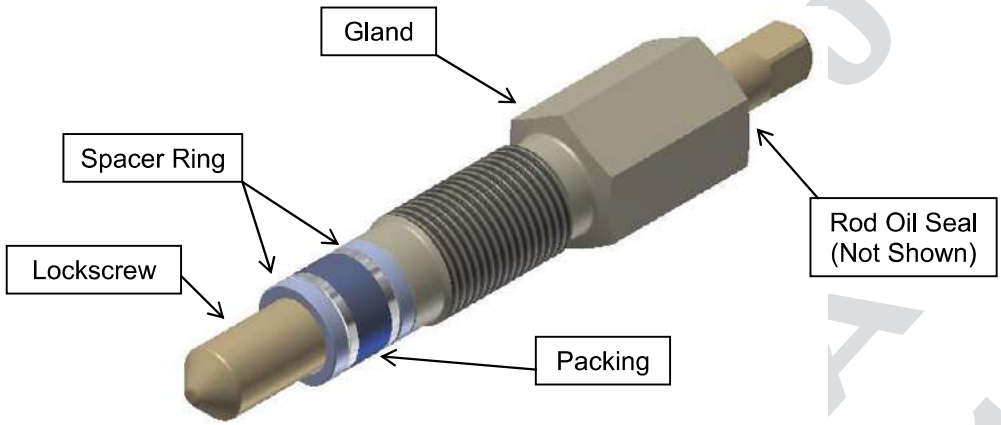

Figure 1 - Standard Type N Lockscrew Assembly

Spacer rings are placed on each side of the graphite packing, and this sub-assembly is then placed along the lockscrew shaft. The lockscrew external threads, along with the gland external and internal threads, must be fully coated with a layer of the recommended grease from Section 2.0, or a grease with a coefficient of friction within the range specified. Reference Figure 2 and Figure 3 for required grease locations.

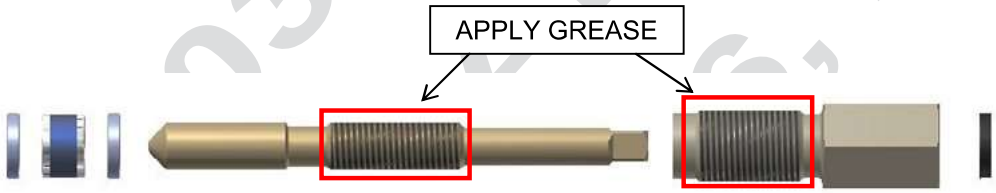

Figure 2 - Grease Locations (External)

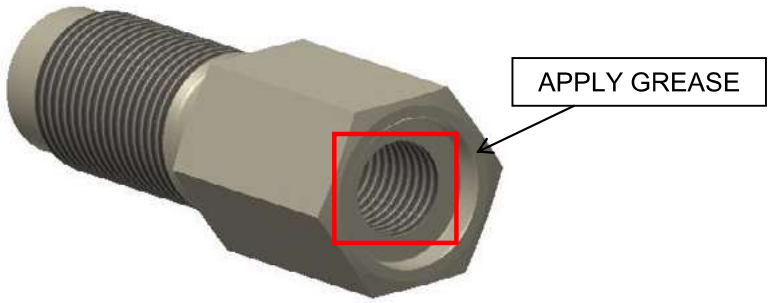

Figure 3 - Grease Location (Internal)

Appendix 2

The lockscrew gland must then be made up to the lockscrew. Once the gland is in place, insert the rod oil seal (Note: groove on rod oil seal must face out towards square drive on lockscrew). Lockscrew ports in housings must also be coated with a layer of grease. The lockscrew assembly may then be made up to the housing. It is acceptable for the graphite packing and junk rings to come in contact with grease, but not required.

4.0 LOCKSCREW ASSEMBLY MAKE UP PROCEDURE

The geometry and quantity of each assembly require all lockscrew assemblies to be fully engaged to be able to retain the casing or tubing hanger. Lockscrews should never be operated under pressure.

4.1 TORQUE TOOLS

Part numbers have been created for torque wrenches, sockets, and open ended torque wrench adapters required to achieve setting torques for Type N lockscrew assemblies.

Description	Drive	Length	Part Number
Torque Wrench (120-600 ft-lb)	3/4"	41.19"	2824392-01
Torque Wrench (200-1,000 ft-lb)	1"	69"	2824392-02
Torque Wrench (400-2,000 ft-lb)	1"	107.5"	2824392-03

Table 2 - Torque Wrench Part Numbers

Description	Drive	Size	Part Number
Socket	1/2"	9/16" - 8 pt	2824402-01
Socket	1/2"	5/8" - 8 pt	2824402-02
Socket	1/2"	11/16" - 8 pt	2824402-03
Socket	1/2"	3/4" - 8 pt	2824402-04
Socket	1/2"	1" - 8 pt	2824402-05
Socket Adapter (3/4" drive to 1/2" drive)	-	-	2824403-01

Table 3 - Lockscrew Socket Part Numbers

Description	Drive	Size	Part Number
Gland Adapter	3/4"	1-3/4" - 12 pt	2379114-01-03
Gland Adapter	1"	1-3/4" - 12 pt	2379114-01-02
Gland Adapter	3/4"	2-1/4" - 12 pt	2379114-01-05
Gland Adapter	1"	2-1/4" - 12 pt	2379114-01-04

Table 4 - Gland Nut Wrench Adapters

4.2 GENERAL OPERATIONAL SEQUENCE

- Ensure the lockscrew void is free of pressure
- Loosen gland to relive packing compression on lockscrew
- Retighten gland to 50 ft-lb
- Torque lockscrews in alternating cross pattern to the required torque listed in Section 4.3 and Section 4.4.
- Retighten gland to the required torque listed in Section 4.5.
  Note: Ensure the lockscrew is held stationary while torque is applied to the gland.

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4.3 LOCKSCREW TORQUE ON SOLID SHOULDER

All mandrel hangers or packoff assemblies that do not have compression style seals are to be considered to have a solid shoulder. When making up lockscrews to solid shoulders, **150 ft-lb** of torque must be applied to each lockscrew. This is to ensure that the lockscrew has fully engaged the shoulder to be retained without providing excessive preload throughout the lockscrew assembly.

4.4 LOCKSCREW TORQUE FOR ELASTOMER SEAL COMPRESSION

Table 5 displays the torque range required for all applications other than solid shoulder.
The minimum torque values are derived from load required to set an slip hanger elastomer seal (1,500 – 3,000 psi) , using either zinc coated or Xylan coated lockscrews, or 150 ft-lbs for cases where the derived torques is less than 150 ft-lbs.
The maximum torque values listed are based on allowable stress limits of the lockscrew assembly presented in the Design Files. See ES-000115-01 for further information.

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Size and Pressure	4140 Lockscrew - Zinc		718 Lockscrew - Xylan		4140 Lockscrew - Xylan	
Size	Min	Max	Min	Max	Min	Max
4-1/16 10K	150	300	150	240	-	-
4-1/16 15K	150	300	150	240	-	-
5-1/8 10K	150	300	150	240	-	-
5-1/8 15K	150	300	150	240	-	-
7-1/16 2K	150	250	150	185	-	-
7-1/16 3K	150	250	150	185	-	-
7-1/16 5K	150	250	150	185	150	250
7-1/16 10K	150	450	150	340	150	300
7-1/16 15K	150	450	150	300	150	300
7-1/16 20K	150	550	150	440	150	550
9 2K	200	300	150	240	-	-
9 3K	200	300	150	240	-	-
9 5K	175	450	150	340	175	450
9 10K	150	450	150	340	150	450
9 15K	150	550	150	440	150	550
9 20K	150	1350	150	440	150	550
11 2K	200	300	150	240	-	-
11 3K	200	300	150	240	-	-
11 5K	175	450	150	340	175	450
11 10K	150	450	150	340	150	450
11 15K	150	450	150	340	150	450
11 20K	300	1350	300	440	300	550
13-5/8 2K	200	300	150	240	-	-
13-5/8 3K	200	300	150	240	150	250
13-5/8 5K	150	450	150	340	150	450
13-5/8 10K	150	450	150	340	150	450
13-5/8 15K	150	1350	150	440	150	550
16-3/4 2K	350	450	200	250	-	-
16-3/4 3K	300	450	200	340	-	-
16-3/4 5K	200	450	200	340	-	-
16-3/4 10K	150	450	150	340	-	-
18-3/4 5K	250	450	200	340	-	-
18-3/4 10K	250	1350	200	440	-	-
20-3/4 3K	250	450	200	340	-	-
21-1/4 2K	375	450	200	340	-	-
21-1/4 5K	200	550	200	440	-	-
21-1/4 10K	175	1350	150	440	-	-
26-3/4 5K	500	1350	150	440	-	-

Table 5 - Torque Ranges for Lockscrews

Appendix 2

4.5 PACKING GLAND MAKE UP PROCEDURE

The recommended manufacturing gland torque is **200 ft-lb** (ER-4542) for factory assembly. The manufacturing torque assumes there is no torque on the lockscrew prior to making up the gland. The recommended manufacturing packing gland torque is the expected value to hold hydraulic pressure at ambient temperature for the one time proof test.

Table 6 lists the torque range for the Type N packing gland for field installation. The packing gland field torque is the torque required to maintain pressure for the life of the well, and is from Annex F testing experience. The field gland torque also assumes the worst case loading combination between working pressure of the well and torque applied on the lockscrew.
The maximum torque values listed are based on allowable stress limits of the lockscrew assembly presented in the Design Files. See ES-000115-01 for further information.
In manufacturing applications, lab test applications and in field applications when possible, the packing gland should not be adjusted while under pressure (Reference Section 4.2).

Flange Pressure	Torque	
Size	Min	Max
2K	400	500
3K	400	500
5K	500	600
10K	600	700
15K	800	850
20K	1000	1300

Table 6 - Torque Ranges for Glands

CAUTION: Do NOT use the Table 6 values to set or read torque wrench values when using a Gland Nut Wrench Adapter. Doing so would result in applying more torque than intended.

When using a Gland Nut Wrench Adapter included in section 4.1 the torque setting and/or reading on the torque wrench will be lower than the values listed in Table 6 to compensate for the length of the Gland Nut Wrench Adapter since the Gland Nut Wrench Adapter effectively makes the torque wrench longer.

Table 7 shows the torque wrench setting for the Type N packing gland for field installation for each of the torque wrenches in Table 2.

Torque on Gland Nut (From Table 6)	Torque Wrench Setting/Reading When Using Gland Nut Wrench Adapter from Table 4		
	Wrench p/n 2824392-01	Wrench p/n 2824392-02	Wrench p/n 2824392-03
200 (factory use only)	188	192	196
400	376	384	392
500	470	480	490
600	564	576	588
700	658	672	686
800	752	768	784
850	799	816	833
1,000	940	960	980
1,300	1,222	1,248	1,274

Table 7 - Torque Wrench Setting/Reading When Using Gland Nut Wrench Adapter from Table 4

Appendix 2

Example: Using Torque Wrench p/n 2824392-02 and the Gland Nut Wrench Adapter listed on Table 4 to make up a Gland Nut on a 11" 10,000 psi flange the required minimum torque for the Gland Nut is 600 ft-lbs so the Torque Wrench setting or reading will be 576 ft-lbs using the above table.

Torque on Gland Nut (From Table 6)	Torque Wrench Setting/Reading When Using Gland Nut Wrench Adapter from Table 4		
	Wrench p/n 2824392-01	Wrench p/n 2824392-02	Wrench p/n 2824392-03
200 (factory use only)	188	192	196
400	376	384	392
500	470	480	490
600	564	576	588
700	658	672	686
800	752	768	784
850	799	816	833
1,000	940	960	980
1,300	1,222	1,248	1,274

CAUTION: Do NOT use Table 7 torque values when using a Gland Nut Adapter with any torque wrench not listed in Table 2. Contact Engineering prior to using a Gland Nut Wrench Adapter in Table 4 with any torque wrench other than the part numbers listed in Table 2 to determine the setting / reading for the torque wrench being used.

5.0 Break Out Procedure

All test port plugs and check valves shall be removed prior to removing lockscrews and packing glands in a made up connection to verify there is no pressure behind the screw. Also, the annulus below the retained equipment must be checked to verify absence of pressure. Failure to verify and bleed down pressure prior to disassembly could lead to personal injury.

The lockscrew cannot be retrieved though the packing gland, so the gland must be completely removed upon disassembly. The break out torque of the gland is approximately equal to the makeup torque. However, higher than expected break out torque can be caused from poor thread conditions, old lubrication or trapped pressure. If higher than expected break out torque is encountered, try removing other glands. If the other glands can be removed, the high torque is a result of thread conditions, and not trapped pressure.

Appendix

Calculation of torque wrench setting/reading when using Gland Nut Wrench Adapter

When using a Gland Nut Wrench Adapter in Table 4, a torque factor (TF) must be derived to determine the adjustment required to the torque wrench setting.
This torque factor is derived as follows:

- Determine wrench length: W_len in feet.
- TF = W_len / (W_len +.25')
  [Note: for the gland nut wrench adapters listed in Table 4, the length from center of square drive to center of socket is 0.25 ft]
- The torque factor must then be multiplied to the gland torque listed in Table 6 to determine the torque reading/setting required on the wrench: $T = TF * T_{table\ 6}$

Note: When the torque wrench being used is one of the part numbers listed in Table 7, the wrench setting in Table 7 shall be used. The calculation in this appendix is required when the torque wrench being used is not one of the wrenches listed in Table 7.

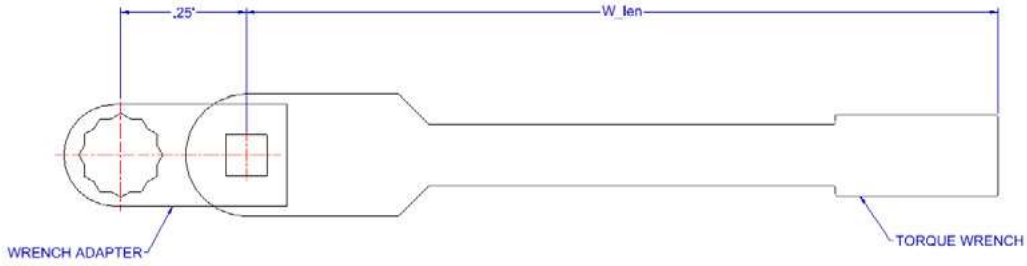


Figure 4 - Wrench Adapter and Wrench Torque Arm Dimensions

Document Control

Revision History

Revision	Date	Description	Prepared by:
01		Initial Release per ZE 650265717	Rodrigo Araujo

About this Revision

Owner: **Surface Systems Engineering - Running Procedures Department, Houston, TX**

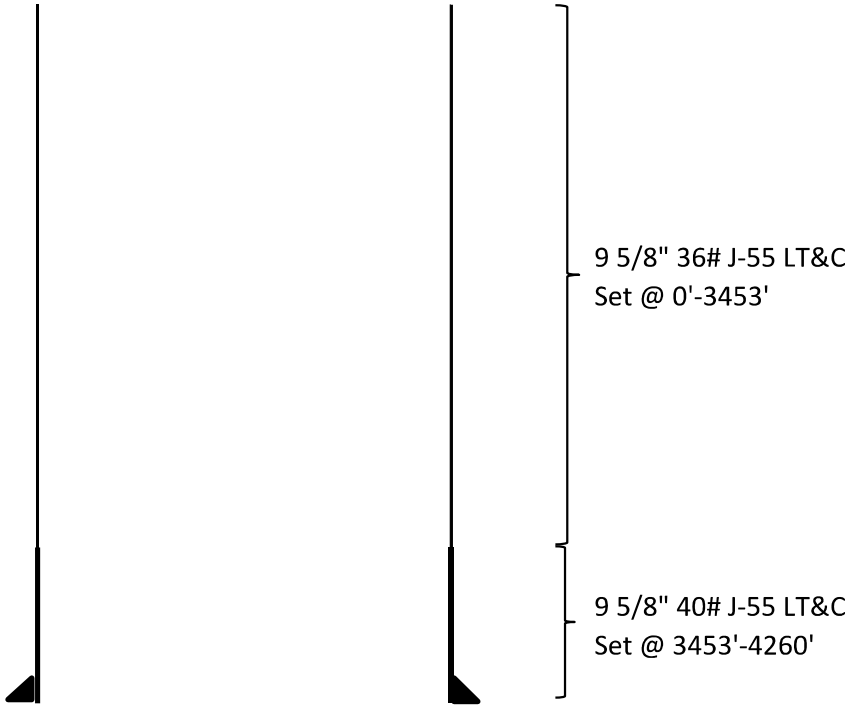
Author: **Rodrigo Araujo**

Reviewer: **Name**

Approver: **Name**

Released by: **Name, SAP**

Red Hills West Unit #018H
Intermediate Casing



Casing	SF Collapse	SF Burst	SF Jt Tension	SF Body Tension
36# J-55	1.13	1.96	2.89	4.54
40# J-55	1.16	1.78	16.11	19.52

District I
1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720
District II
811 S. First St., Artesia, NM 88210
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District III
1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170
District IV
1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

CONDITIONS

Action 47258

CONDITIONS

Operator:	OGRID:
MEWBOURNE OIL CO P.O. Box 5270 Hobbs, NM 88241	14744
	Action Number: 47258
	Action Type: [C-101] BLM - Federal/Indian Land Lease (Form 3160-3)

CONDITIONS

Created By	Condition	Condition Date
pkautz	Per OCD and SLO policy all wells covered by a single agreement should have the same name. Also, all wells with the same spacing unit will need the same name. All wells in a Com shall have the same property name. Please submit a name change within 30 days to change the property name of wells covered by this com agreement to the same property name.	9/16/2021
pkautz	Will require a administrative order for non-standard location prior to placing the well on production	9/16/2021
pkautz	Will require a File As Drilled C-102 and a Directional Survey with the C-104	9/16/2021
pkautz	Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string	9/16/2021
pkautz	Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system	9/16/2021
pkautz	Cement is required to circulate on both surface and intermediate1 strings of casing	9/16/2021