Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

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

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

HOBBS OCD

SUBMIT IN TRIPLICATE - Other instructions on page 2

JUL 03 2019

RECEIVED

5. Lease Serial No.
NMNM0897

6. If Indian, Allottee or Tribe Name

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

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
BLACK & TAN 27 FEDERAL COM 406H

2. Name of Operator
APACHE CORPORATION
Contact: SORINA L FLORES
E-Mail: sorina.flores@apachecorp.com

9. API Well No.
30-025-46075-00-X1

3a. Address
303 VETERANS AIRPARK LANE SUITE 3000
MIDLAND, TX 79705

3b. Phone No. (include area code)
Ph: 432.818.1167
Fx: 432.818.1167

10. Field and Pool or Exploratory Area
BONE SPRINGS

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 27 T20S R34E SESE 215FSL 762FEL
32.537437 N Lat, 103.541969 W Lon

11. County or Parish, State
LEA COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other Change to Original APD
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

NMB000736

Apache Corp respectfully requests approval for the following changes and additions to the drilling plan:

Utilize Cameron's MN-DS multibowl wellhead. Multiblow wellhead will be installed after drlg sets surf. Rig will NU & test BOPE surf csg to required pressures per Onshore Order 2. Interm to be drilled to 800', 9-5/8" interm csg will be ran & landed w/mandrel hanger on MN-DS interior load shoulder. Landing jt will be backed off & packoff installed. Packoff's upper & lower seals will be tested. Apache respectfully request to continue ops without performing BOP test since no BOP seal is planned to be broken during process. Initial pressure test should still be valid as long as no seal broken and <30 days from initial pressure test. Interm csg will be tested to required

Carlsbad Field Office
OCD Hobbs

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #468826 verified by the BLM Well Information System
For APACHE CORPORATION, sent to the Hobbs
Committed to AFMSS for processing by PRISCILLA PEREZ on 06/13/2019 (19PP2174SE)

Name *(Printed/Typed)* SORINA L FLORES — Title SUPV DRLG SERVICES

Signature (Electronic Submission) — Date 06/12/2019

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By LONG VO — Title PETROLEUM ENGINEER — Date 06/24/2019

Conditions of approval, if any, are attached. Approval of this notice 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.

Office Hobbs

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.

(Instructions on page 2)

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

KZ

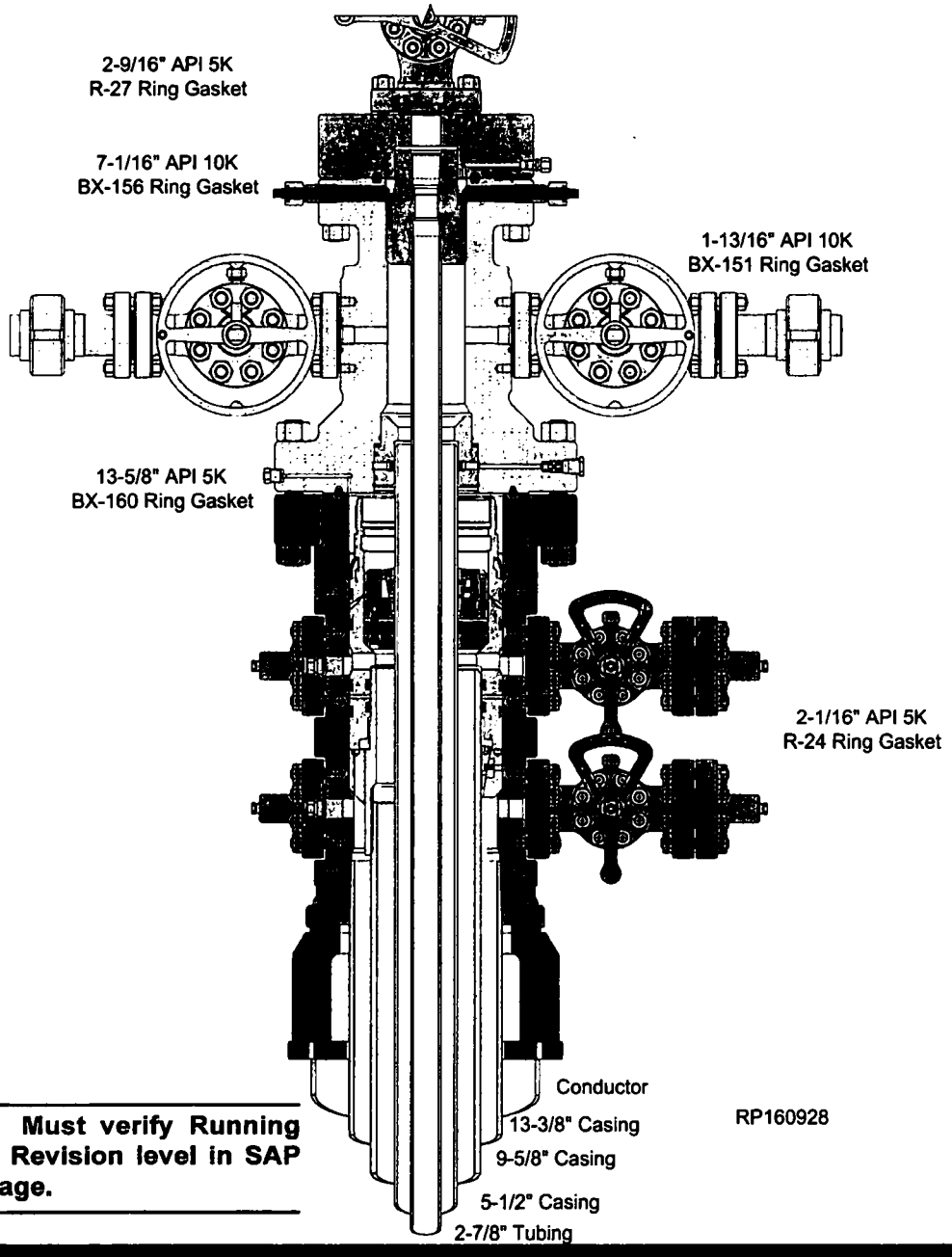
Additional data for EC transaction #468826 that would not fit on the form

32. Additional remarks, continued

pressures per Onshore Order 2. Interm 2 will be drilled to csg depth of 5660' and 7-5/8" drlg liner will be ran & cmt'd prior to setting liner. Drill pipe & liner setting tools will be POOH after successful positive pressure test performed on liner top. Apache respectfully request to continue ops without performing BOP test since no BOP seal will be broken during process. Initial pressure test should still be valid as long as no seal broken and <30 days f/initial pressure test. BOP will be tested prior to drlg prod section on wells that were skidded off during batch drill ops. Drlg liner will be tested to required pressures per Onshore Order 2. Curve/lateral will be drilled according to plan approved on APD. Prod csg will be ran to 16347' and 5-1/2" slips will be used after prod cmt job. Once rig is removed, Apache Corp will secure wellhead with tubing head & cap. Wellhead area will be protected by placing guard rail around cellar area. Please refer to Cameron's MN-DS multibowl wellhead running procedures.

RUNNING PROCEDURE

Apache Corp.
5-1/2" or 7" Producer



RP160928

Must verify Running Procedure Revision level in SAP prior to usage.

Surface Systems Publication

CAMERON A Schlumberger Company	**13-5/8" 5K MN-DS System** **13-3/8" x 9-5/8" x 5-1/2"(or 7") x 2-7/8" Casing Program**	**RP-003612** **Rev 02**

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.

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

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

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

NOTICE Preferred to address practices not related to personal injury

ES-000175-02

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

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.

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

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

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

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

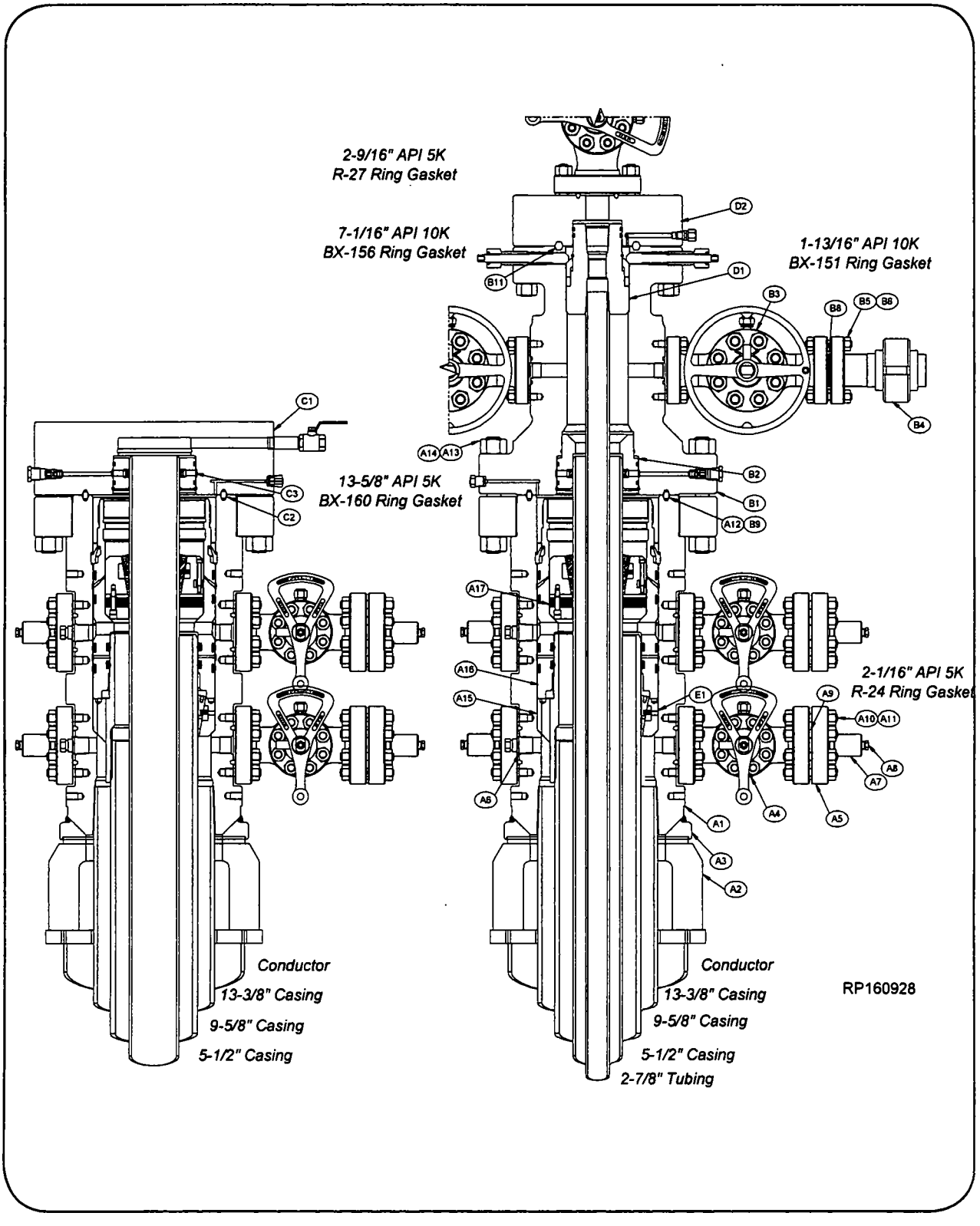
Equipment Operations
Always operate equipment and vehicles with safety devices enabled, and never beyond their capabilities, environmental limits, or designed purposes.

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

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

System Drawing



CAMERON A Schlumberger Company	**13-5/8" 5K MN-DS System** **13-3/8" x 9-5/8" x 5-1/2"(or 7") x 2-7/8" Casing Program**	**RP-003612** **Rev 02** Page 7

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.**

CASING HEAD

Item	Qty	Description
Section Assembly : A1 - A14		
PN: 2393657-02-01		
A1	1	Csg Hd Housing,MN-DS, 13-5/8" OEC 5K x 13-3/8" API BC box btm, (4) 2-1/16" 5M SSO's 12.615 Min Bore Part # 2345472-14-01
A2	1	Landing Base, CR, 13-5/8" Flange, 24" OD Part# 2057661-05-01
A3	1	Body; Load Ring Adapter f/ 13-5/8" MN-DS Housing w/ CR Landing Base Part #2379363-01-01
A4	2	Gate Valve, Manual Model M, 2-1/16" 5,000 flg x flg Part# 2737400-01-12
A5	4	Companion Flange, 2-1/16" 5,000 x 2" LP Part# 142362-01-03-02
A6	2	VR Plug, 2-1/16" 1-1/2" VEE Tubing thread Part# 255290-01
A7	4	Bull Plug, 2" LP x 1/2" NPT Part# 007481-01
A8	4	Vent Fitting, 1/2" NPT Part# 2738068-02
A9	6	Ring Gasket, R-24 Part# 702001-24-02
A10	16	Stud Cont thread, .875"-9 x 6" long Part# 702533-08-10-60
A11	32	Nut, Heavy Hex, .875"-9 Part# 2709000-09-01
A12	1	Ring Gasket, BX-160 Part#702003-16-02
A13	16	Stud Cont thread, 1.625"-8 x 12.50" long Part# 702533-14-11-22
A14	32	Nut, Heavy Hex, 1.625"-8 Part# 2709000-15-01

CASING HEAD CONT.

Item	Qty	Description
A15	1	Mandrel Csg Hng MN-DS, 13-5/8"Nom x 9-5/8" 40 LB/FT API Buttress Box thd btm x 10.00"-4 TPI L.H. Stub Acme R/Thd top Min. Bore: 8.835" Part # 2345509-09-01
A16	1	Bushing, Packoff Support, MN-DS, 13-5/8" Nom, w/ 13-5/8" dovetail seal, w/ 9-5/8" 'T' seals, internal and external lock ring prep Min. Bore: 8.835" Part # 2161673-29-01
A17	1	Casing Hanger, IC-2, 11" x 5-1/2" Part # Y15001-21002901

TUBING SPOOL

Item	Qty	Description
B1	1	Tubing Spool, Type 'C', 13-5/8" API 5K BX-160 flg btm x 7-1/16 API 10K BX-156 flg top, w/ (2) 1-13/16" API 10K BX-151 SSo's and 11" NOM 'NX' prep btm. Min. Bore: 6.34" Part# 2247641-04-01
B2	1	NX Bushing, 11" x 5-1/2" w/ Integral Bit Guide Min. Bore: 4.92 Part# 2161829-02-01
B3	2	Gate Valve, Manual, Model 'FLS', 1-13/16" API 10K Part# 141510-41-95-02
B4	2	Assy; Flg, Weco, 1-13/16" API 10K x 2" Nom Weco 1502 Female Fitting, Min Bore: 1.81" Part# 2133556-02-03
B5	16	Stud Cont thread, .750"-10 x 5.00" long Part# 702533-07-10-50
B6	32	Nut, Heavy Hex, .750"-10 Part# 2709000-08-01

TUBING SPOOL

Item	Qty	Description
B7	1	Ring Gasket, BX-160 Part# 702003-16-02
B8	4	Ring Gasket, BX-151 Part# 702003-15-14
B9	1	Ring Gasket, BX-156 Part# 702003-15-62

CAPPING FLANGE

Item	Qty	Description
C1	1	Capping Flange, 13-5/8" API 5K stud'd btm w/ 11" NOM x 7" CSG NX Bushing, (1) NPT Ball valve Part # 2378469-06-01
C2	1	Ring Gasket, BX-160 Part# 702003-16-02
C3	1	NX Bushing, 11" x 5-1/2" Part# 608783-12

CHRISTMAS TREE

Item	Qty	Description
D1	1	Assy, Hanger, TC-1A-EN, 7 In Nom., w/5.487 OD Extended Neck, 2-7/8" API EU 8RD Box Thd Btm x Top 2-1/2" Nom 'H' BPV Thread Part # 2203910-01-01
D2	1	Purchased Tubing Head Adapter A5P Shorty 7-1/16" 10K Flg Btm x 2-9/16" 5K Std'd Top w/ 5-1/2 Seal Pocket Part # 2737555-01

EMERGENCY EQUIPMENT

Item	Qty	Description
E1	1	Casing Hanger, MN-DS-IC-1, 13-5/8" nom x 9-5/8" casing Part # 2161741-08-01

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.**

HOUSING CONTINGENCY

Item	Qty	Description
A1a	1	Conversion Casing Hd housing, MN-DS, 13-5/8" OEC API 5K BX-160 w/ 18.250-4TPI LH Stub ACME top for thd flange and prep f/ internal snap ring x 13-3/8" SOW btm, two upper and two lower 2-1/16" API 5K SSO's Min. Bore:12.615 Part# 2031060-48-04
A2a	1	Landing Base, CR, for 13- 5/8" housing, 32" OD base plate w/ flow-by slots Capacity: 850,000 LBS Part# 2057661-04-01

7" CASING CONTINGENCY

Item	Qty	Description
A17a	1	Casing Hanger, IC-2, 11" x 7" Part # 2133152-03-05
B2a	1	NX Bushing, 11" x 7" w/ Integral Bit Guide Min. Bore: 6.34 Part# 2161829-17-01
C3a	1	NX Bushing, 11" x 7" Part# 608783-17

SERVICE TOOLS CONT.

Item	Qty	Description
ST1	1	Test Plug, 'C', 13-5/8" nom x 4-1/2" IF Box btm x top Part # 2247044-01-01
ST2	1	Wear Bushing Running Tool, IC-2, 13-5/8" nom w/ double lead pin thd. btm x NC50 (4-1/2" IF) box top, w/ 6-1/2" OD ext. Part # 608536-19
ST3	1	Wear Bushing, 13-5/8" Nom, w/ (4) O-Rings, Min bore. 12.615" Part # 2394103-01-01

SERVICE TOOLS CONT.

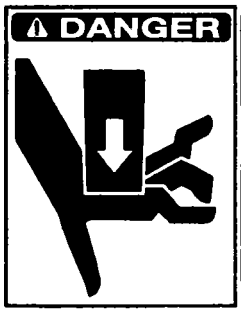
Item	Qty	Description
ST4	1	Hanger Running Tool, 13-5/8" nom x 10.000"-4TPI LH Stub Acme bottom thread x 9-5/8" 8RD LC top thread, w/ 3 centralizing ribs for 10K Csg Hanger Part # 2161757-69-01
ST5	1	Running Tool f/ 13-5/8" Nom Seal Packoff w/ 4-1/2" IF top and bottom and 12.375-4TPI LH Stub Acme thread Part # 2017712-10-01
ST6	1	Test Plug, C, 11" Nom x 4-1/2" IF Box top x pin btm Part # 2247042-10-01
ST7	1	Wear Bushing Running and Retrieving Tool f/ 11" nom x 4-1/2" IF thd Part # 661822-06
ST8	1	Wear Bushing f/ 11" nom type MN-DS; 8.910" Min. Bore Part # 2125720-10-01
ST9	1	Assy; Housing Running Tool, 13-3/8" API Btc Box Thd Top x 18.250" Od-4TPI LH Stub Acme Running Thd, Min Bore: 12.59" Part# 2017488-17
ST10	1	Snap Ring Installation Tool Part# 2209192-01
ST11	1	Wash Tool, 13-5/8" nom x 4-1/2" IF Box top Part# 2125914-01
ST12	1	Saver Sub, 4-1/2" IF pin x 4-1/2" IF Box Part# 2361943-01
ST13	4	VR Flush Plugs, Type with 1-1/2" Vee Tubing Thrds Part# 255290-01
ST14	2	VR Plug, 2-1/16", 1-1/2" VEE tubing thread Part# 2222164-02-01

SERVICE TOOLS CONT.

Item	Qty	Description
ST15	1	Assy, Casing Head Housing R/Tool, W/ 18.250-4TPI LH Stub Acme Box Thd Btm x Threaded Holes Top. Min Bore 13.588 Part# 2143701-84
ST16	1	Lift Plate f/Casing Head Rt w/Ext 14.75" Stub Acme LH Thd ; (2) OD O-Ring Seals. Safe Working Load 150,000 Lbf, 2,000 PSI Part# 2368935-01-01
ST17	1	Casing Hd Running Tool, 14.750"-4 TPI LH Internal Stub Acme Thd Btm x 13-3/8" API 8RND Short Thread Casing Box Thd Top, For "SSDC" Compact Casing Head, Min Bore: 12.968 Part# 2254468-03-01
ST18	1	Pump In Cap, f/13-5/8" Nom 5K MN-DS Housing, 14.750"-4 TPI LH Stub Acme Thd Btm x 2" LP Top. ***Max Working Pressure: 2000 Psi*** Part# 2394118-02-01
ST19	1	Assy, Drilling Adapter, 13-5/8 API, 10K Top x 13-5/8 10K Fastlock Sub-Assembly, Bx-160 Gasket Prep Btm, Min Bore: 13.630, **Max WP 5,000 PSI, to be Hydro Tested to 7,500 PSI**, **Make-Up Torque is 600 Ft/Lbf **, **Max Bending Moment @ WP. 220,000 FT-LBF** Part# 2403803-01-01
ST20	1	Assy, Fastlock Hub, Type 'MN-DS' 13-5/8 10K API 16A #15 Clamp Hub x 18.250-4 TPI LH Stub Acme, use w/13-5/8 API 10K Fastlock Adapter Part# 2403930-01-01

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.



[redacted]

1.1. Install the MN-DS Housing and CR Landing Base

1.1.1. Run the Conductor and space out as required.

1.1.2. Final Cut the Conductor at the required elevation.

NOTE Ensure the conductor cut is level and smooth as this will determine the position and elevation of the entire Wellhead and Tree.

1.1.3. Ensure Conductor cut is smooth and level.

1.1.4. Place a 3/8" x 3/16" bevel on the OD of the conductor and remove all burrs and sharp edges and bevel the OD corner.

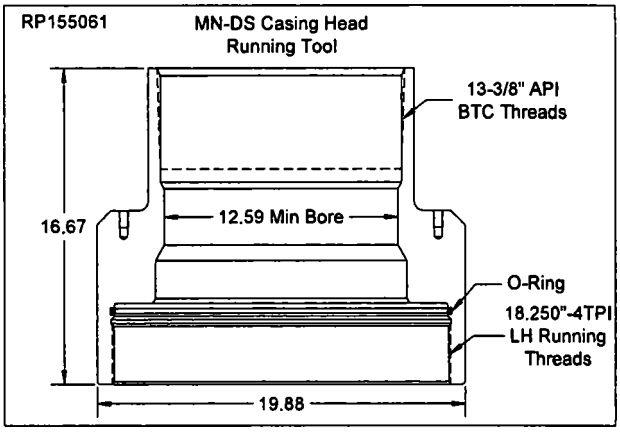
1.1.5. Run the 13-3/8" casing and space out as required. Retrieve the landing joint.

NOTE Running Tool will be bucked up to the landing joint offline and shipped to location as one assembly.

1.1.6. Examine the ***MN-DS Housing Running Tool (Item ST9).*** Verify the following:

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

1.1.7. Orient the Tool as illustrated.



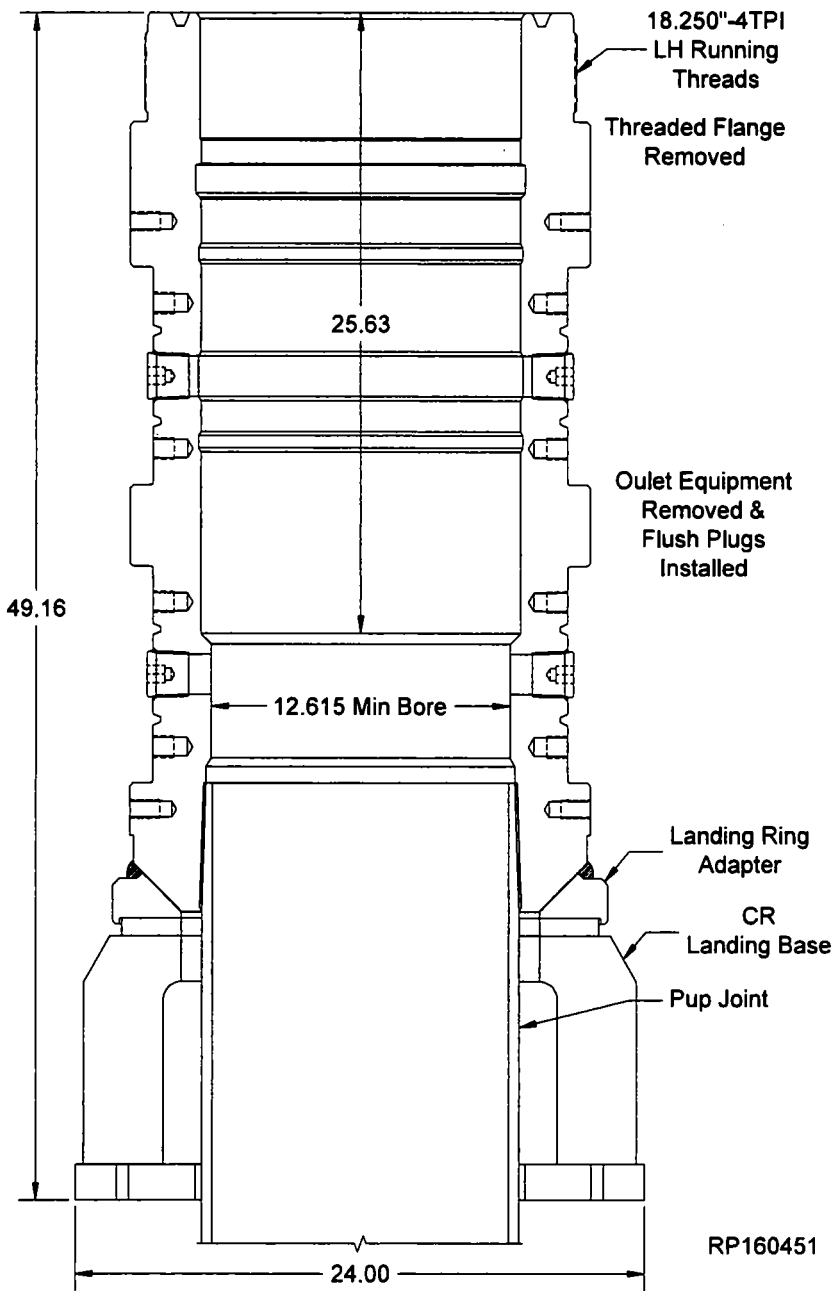
1.1.8. Examine the ***MN-DS Housing (Item A1).*** Verify the following:

- bore is clean and free of debris
- ring groove and seal areas are clean and undamaged
- all threads are clean and undamaged
- threaded flange has been removed
- pup joint is properly installed, clean, undamaged and compatible with casing run by rig
- all outlet equipment has been removed and replace with Flush Plugs
- ***Load Ring Adapter and Landing Base (Items A2 & A3)*** is properly installed, clean and undamaged

1.1.9. Orient the Housing illustrated on page 11.

Stage 1.0 — 13-3/8" Casing

MN-DS Casing Head Housing
13-5/8" API 5K Flange Top x 13-3/8" API BC Bottom



Stage 1.0 — 13-3/8" Casing

1.1.10. Mark the land out of the Casing Head on the landing joint to the rig floor.

1.1.11. Wipe the o-ring and threads of the Running Tool and the running threads of the Housing with a light coat of oil or grease.

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

1.1.12. Lower the Running Tool onto the Housing until the running threads make contact. Turn the Tool first to the right until thread 'jump' is felt. Then make up the connection with left hand rotation to a positive stop. Approximately 14 turns.

1.1.13. Carefully lower the Housing until the mating threads of the 13-3/8" Casing and the pin threads of the pup joint make contact and rotate the outlets as required. Make up to the thread manufacturer's recommended optimum torque per rig procedure.

CAUTION Ensure Running Tool connection to Casing Head is not backed off during make up of the pup joint to the casing string.

CAUTION Make sure not torque is applied to Landing Joint!

CAUTION Do not use CRT or torque on Landing Joint! Torque on pup joint below Housing as running and retrieving tool has Left Hand threads.

1.1.14. Release the casing from the floor slips, and carefully lower the Casing Head Assembly and land as required.

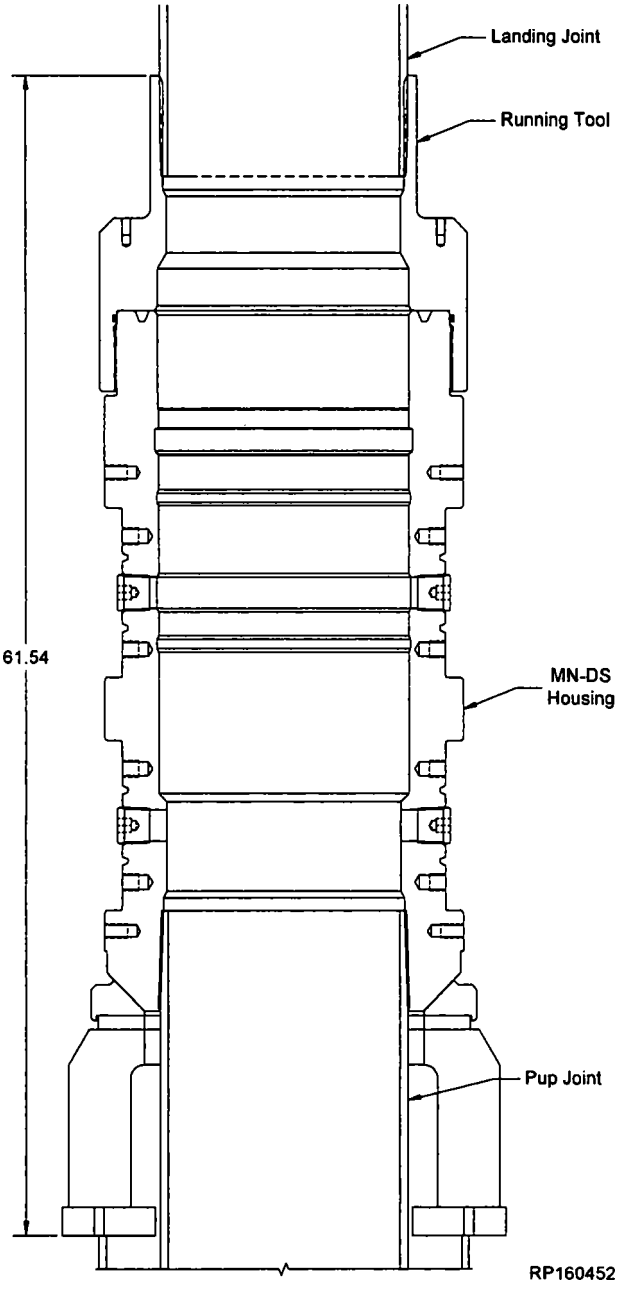
1.1.15. Confirm landing measurement as landing out with 5 ft stick system.

1.1.16. Rig should chain down landing joint during cement to prevent the Casing Head from rising during the cement operations.

NOTE Ensure landing joint remains level after it is chained down.

1.1.17. Cement as required.

NOTE Cement returns may be taken through the flow by slots of the MN-DS Housing.



Stage 1.0 — 13-3/8" Casing

1.1.18. Rotate the landing joint to the right, approximately 14 turns or until thread 'jump' is felt, to remove the Running Tool from the Head.

1.1.19. Retrieve the Running Tool to the rig floor.

1.1.20. Clean, grease and store the Running Tool as required.

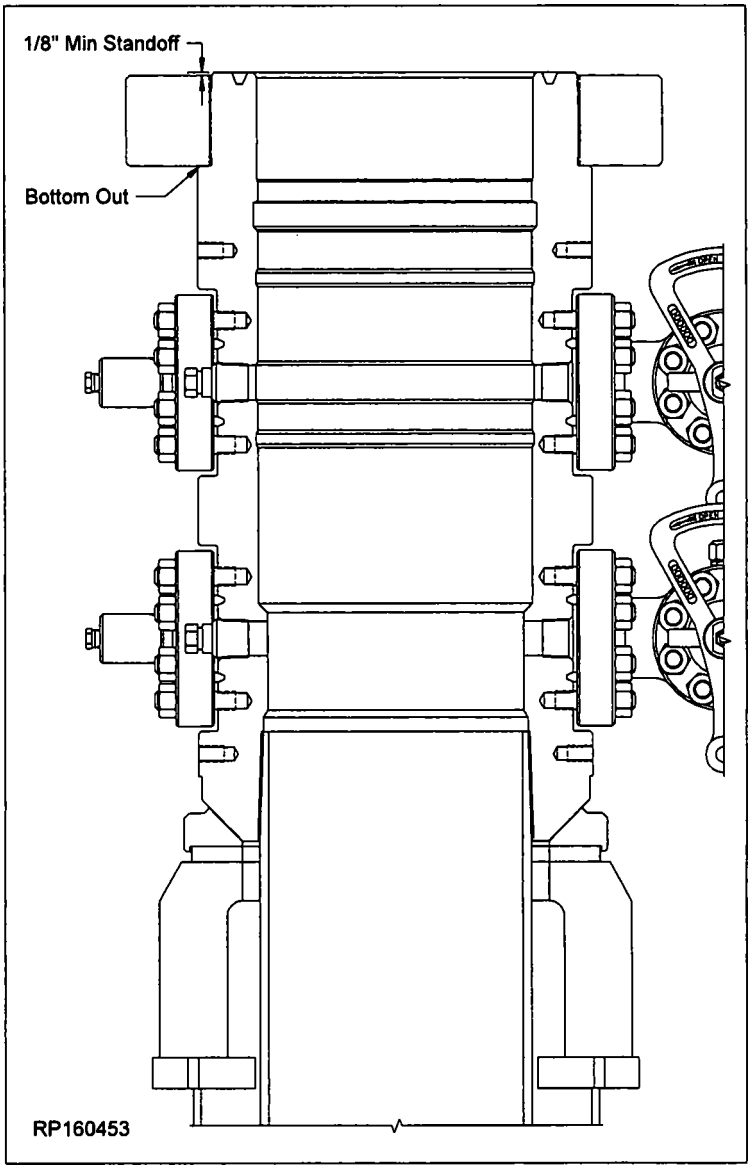
1.1.21. Remove Flush Plugs and install upper and lower Casing Head Outlet equipment.

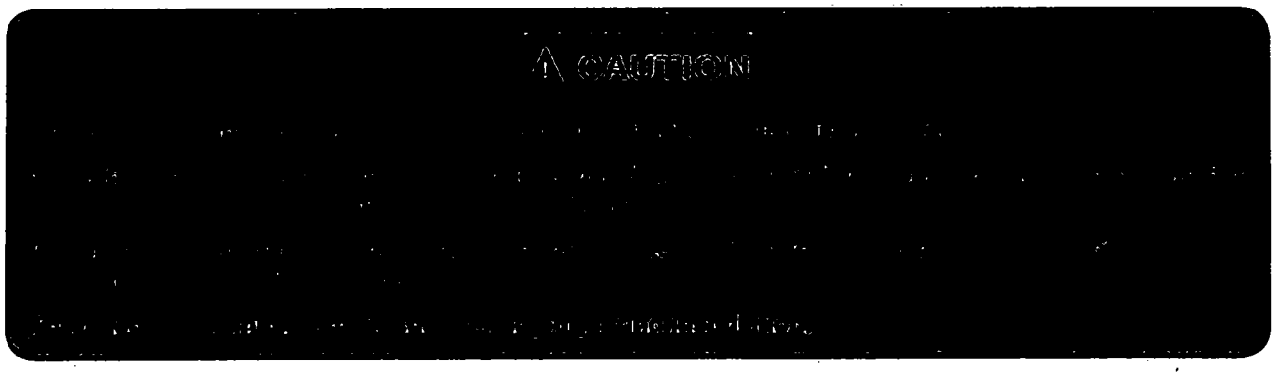
1.1.22. Install VR plugs and test the outlet valve connections against VR plugs to ***5,000 PSI*** as required per rig procedure.

1.1.23. Remove VR Plug and close the Upper and Lower outlet Valves.

1.1.24. Install the Blind Flanges and test against VR plugs to ***5,000 PSI*** as required per rig procedure.

1.1.25. Install the Threaded flange to the top of the Casing Head Housing.





Stage 1.0 — 13-3/8" Casing

1.2. Install the CR Landing Base and MN-DS Housing (Contingency)

1.2.1. Run the 20" Conductor and space out as required.

1.2.2. Run and space out the 13-3/8" casing as required.

1.2.3. Determine the correct elevation for the top of the Housing and cut the 20" Conductor at a recommended height.

NOTE **Ensure the conductor cut is level and smooth as this will determine the position and elevation of the entire Wellhead and Tree.**

NOTE **Always measure the bottom prep of the equipment to be installed to know the correct cut off height.**

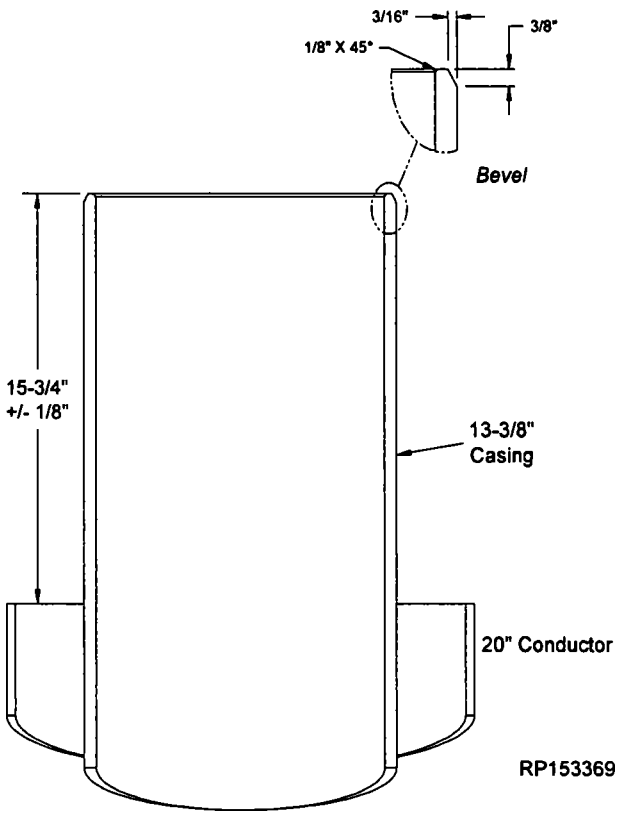
1.2.4. Final cut the 13-3/8" casing at 15-3/4" +/-1/8" above the conductor.

1.2.5. Ensure the Casing is cut smooth and level.

1.2.6. Place a 3/8" x 3/16" bevel on the OD of the casing stub and remove all burrs and sharp edges and bevel the OD corner as illustrated.

NOTE **There must not be any rough edges or the seal of the MN-DS housing will be damaged.**

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



Stage 1.0 — 13-3/8" Casing

1.2.7. Examine the ***MN-DS Housing (Item A1a)***. 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
- all peripheral equipment is intact and undamaged
- threaded flange is properly installed

1.2.8. Orient the assembly as illustrated.

1.2.9. Remove the pipe plug from test port located near the bottom of the housing.

1.2.10. Lightly oil the ID of the Housing and O-ring.

CAUTION Excessive oil may prevent a positive seal from forming.

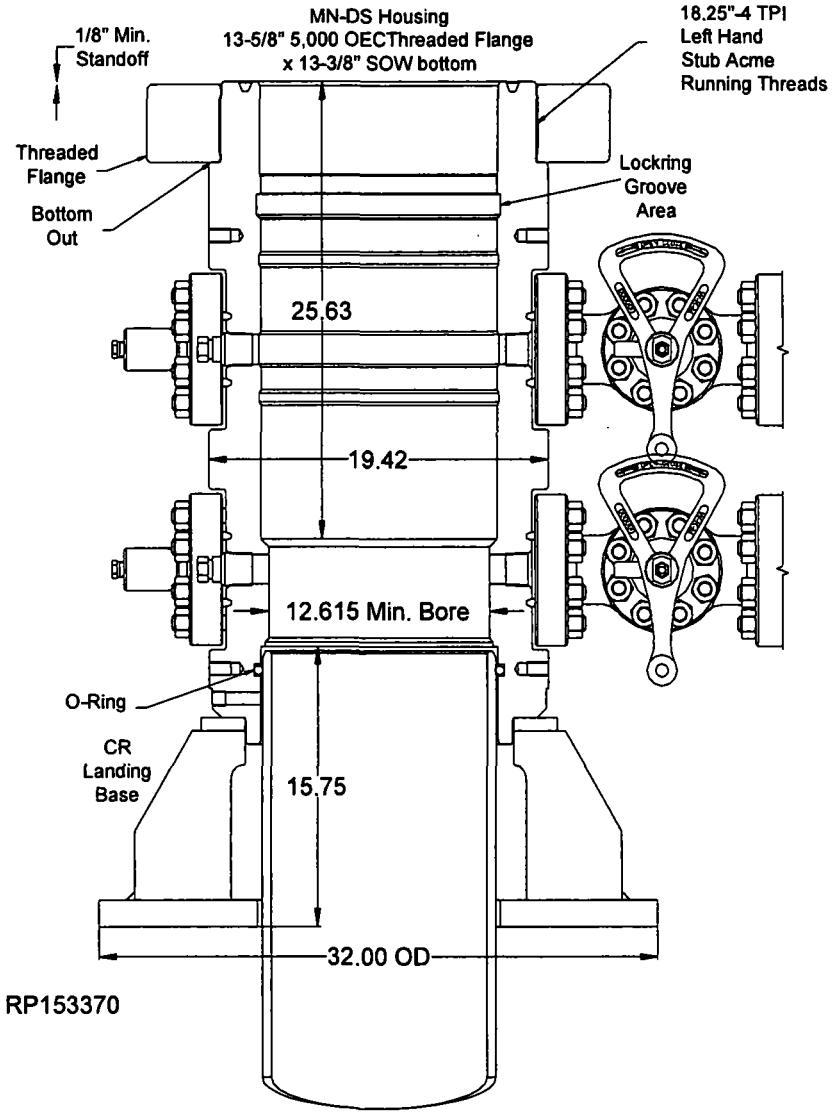
1.2.11. Align and level the Housing Assembly above the casing stub orienting the outlets to be compatible with the drilling equipment.

1.2.12. Slowly and carefully lower the assembly onto the casing stub and land as required.

CAUTION Be Careful not to damage the O-Ring or sealing ability will be impaired.

1.2.13. Level the Casing Head, weld it to the 13-3/8" Casing.

1.2.14. Test the weld using Nitrogen as per customer requirements.



CAUTION If applying heat greater then 400°F (with such device as strip heater or Hot Hed), remove o-ring in Casing Head prior to preheat. Inside weld may be used instead of o-ring for testing the outside weld.

NOTE The weld should be a fillet-type with welds no less then the wall of the casing. Weld legs of 1/2" to 5/8" are adequate for most jobs.

NOTE Refer to the Recommended Procedure for Field Welding Pipe to Wellhead Parts for Pressure Seal found in the back of this manual for details of welding and testing procedures.

1.3. Install the Fastlock Hub

1.3.1. Remove the Threaded Flange from the top of the Housing.

1.3.2. Examine the ***Fastlock Hub (Items ST20).*** Make sure:

- bore is clean and free of debris
- all threads are clean and undamaged
- set screws (2) are retracted from the bore and undamaged

1.3.3. Orient the Fastlock Hub as indicated.

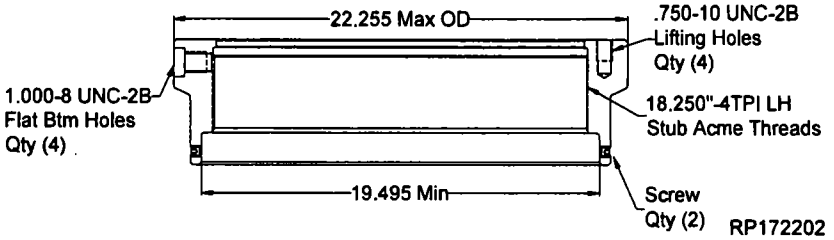
1.3.4. Lubricate the threads of both the Housing and Fastlock Hub with a light coat of oil or grease.

[redacted] Excessive oil or grease may prevent a positive seal from forming.

1.3.5. Carefully lower and install the Fastlock Hub to the top of the Housing. Turn clockwise until thread 'jump' is felt and then counterclockwise to a positive stop. Approximately 14-1/2 turns.

1.3.6. Run in both set screws into the Housing.

Type MN-DS Fastlock Hub
13-5/8 API 10K #15 Clam Hub



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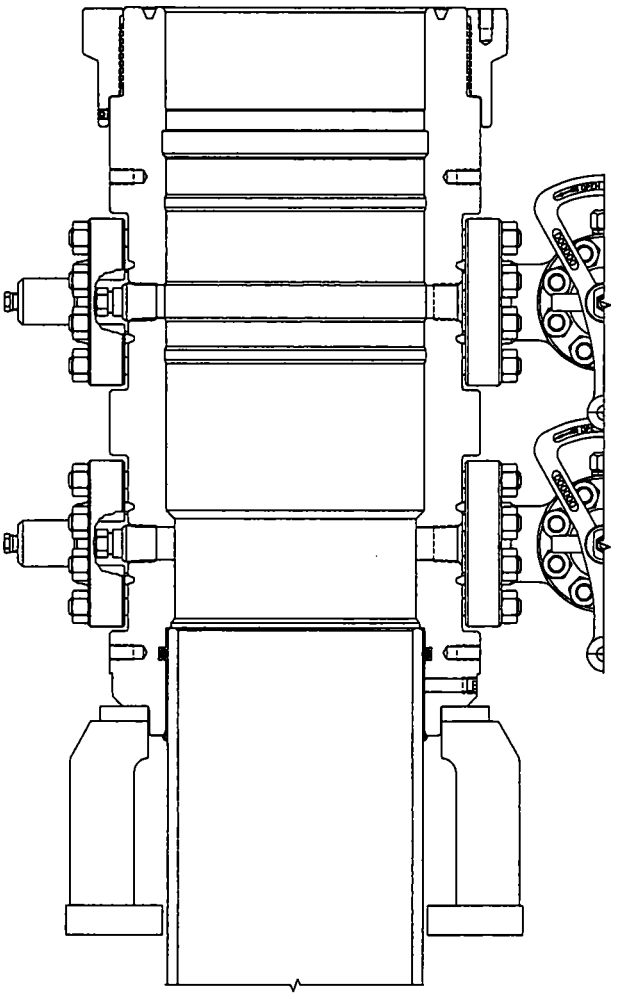


RP172990

1.4. Install the Drilling Adapter

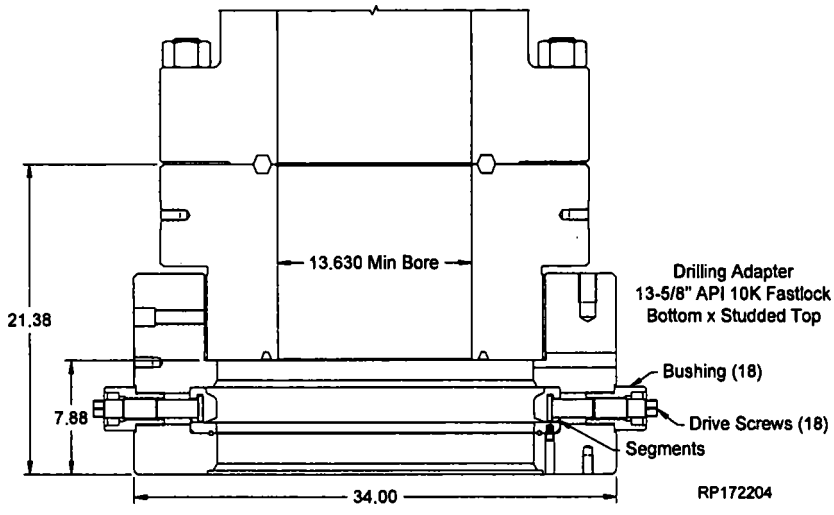
1.4.1. Examine the ***Drilling Adapter (Items ST3)/ BOP Stack Assembly.*** Make sure:

- bore is clean and free of debris
- all drivescrews are fully retracted
- seal areas are clean and undamaged

1.4.2. Orient the Drilling Adapter as indicated.

1.4.3. Clean the mating ring grooves of the Housing and Drilling Adapter. Lubricate each groove with a light coat of oil or grease.

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



Stage 1.0 — 13-3/8" Casing

1.4.4. Install a spare ***BX-160 Ring Gasket (Item B9)*** into the ring groove of the Housing.

1.4.5. Lift and suspend the Drilling Adapter over the Housing, ensuring it is level.

1.4.6. Lower the Drilling Adapter onto the Fastlock Hub and make sure it has landed properly. A make-up mark provided on the Hub is the best way to get visual verification.

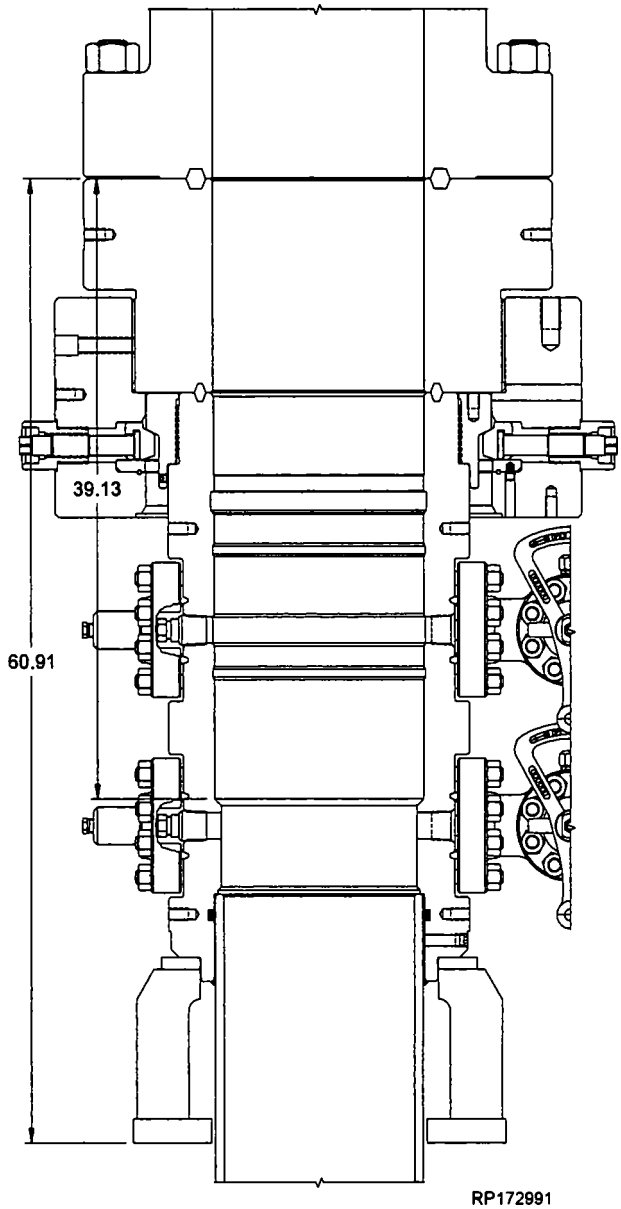
1.4.7. Run in all of the drive screws by hand or with a small wrench until the segments all contact the Hub. This is to make sure that the body is initially centered on the Hub prior to make-up.

1.4.8. Using 180° alternating pattern, tighten the screws to approximately ***600 ft-lbs maximum***.

1.4.9. Using the same 180° pattern, make up the screws. Check each screw to make sure that it has the proper amount of torque.

1.4.10. When properly made up, the end of the drive screw should be flush with the end of the bushing. This is a secondary verification that the connector is properly made up.

1.4.11. Fill the area around the segments with a general purpose grease, using the grease fitting on the OD of the body. A vent fitting is located opposite the grease fitting to release any trapped air. Fill the connector with grease until all of the air is displaced and grease begins coming out the vent fitting.



2.1. Test the BOP Stack

NOTE ***Previously used BOP Test Plug must be inspected for damage due to wear.***

2.1.1. Clean and inspect the ***BX seal groove*** on the MN-DS housing. Make up the BOP stack using a spare ring gasket as required.

2.1.2. Examine the ***Test Plug (Item ST1).*** Verify the following:

- seal is in place and undamaged
- 1/2" LP pipe plug is removed
- all threads are clean and undamaged

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

2.1.3. Orient the Tool as illustrated.

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

CAUTION **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.**

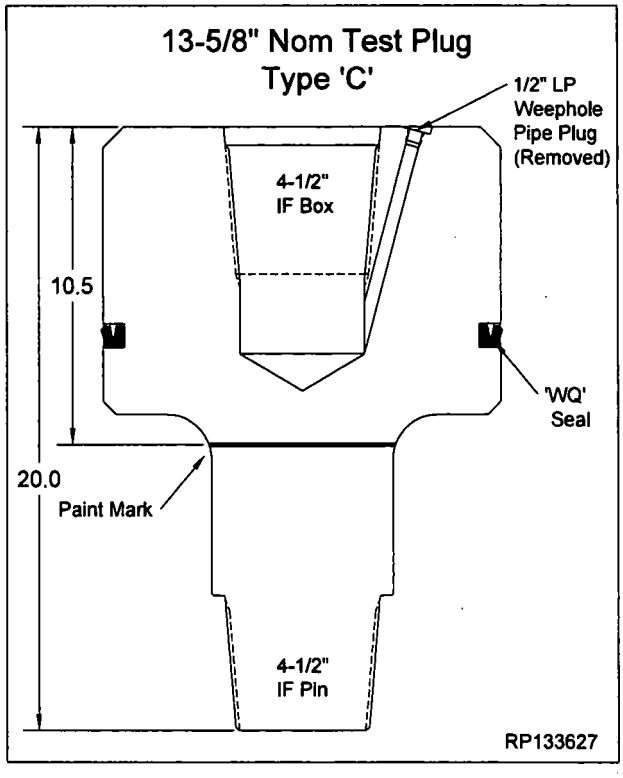
2.1.5. Place a paint mark around the Test Plug for landing verification.

NOTE **When the Test Plug is properly landed, paint mark will be visible in the center of the lowermost annulus valve of the Housing.**

2.1.6. Wipe the seal of the Tool with a coat of light oil.

CAUTION **Excessive oil may prevent a positive seal from forming.**

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



Stage 2.0 — 9-5/8" Casing

2.1.8. Slowly lower the tool through the BOP stack until it lands on the load shoulder in the housing. Measure and record.

NOTE Distance from the Housing load shoulder to the face of the BOP Flange is 39.13"

2.1.9. Close the BOP rams on the drill pipe and test to ***5,000 psi maximum.***

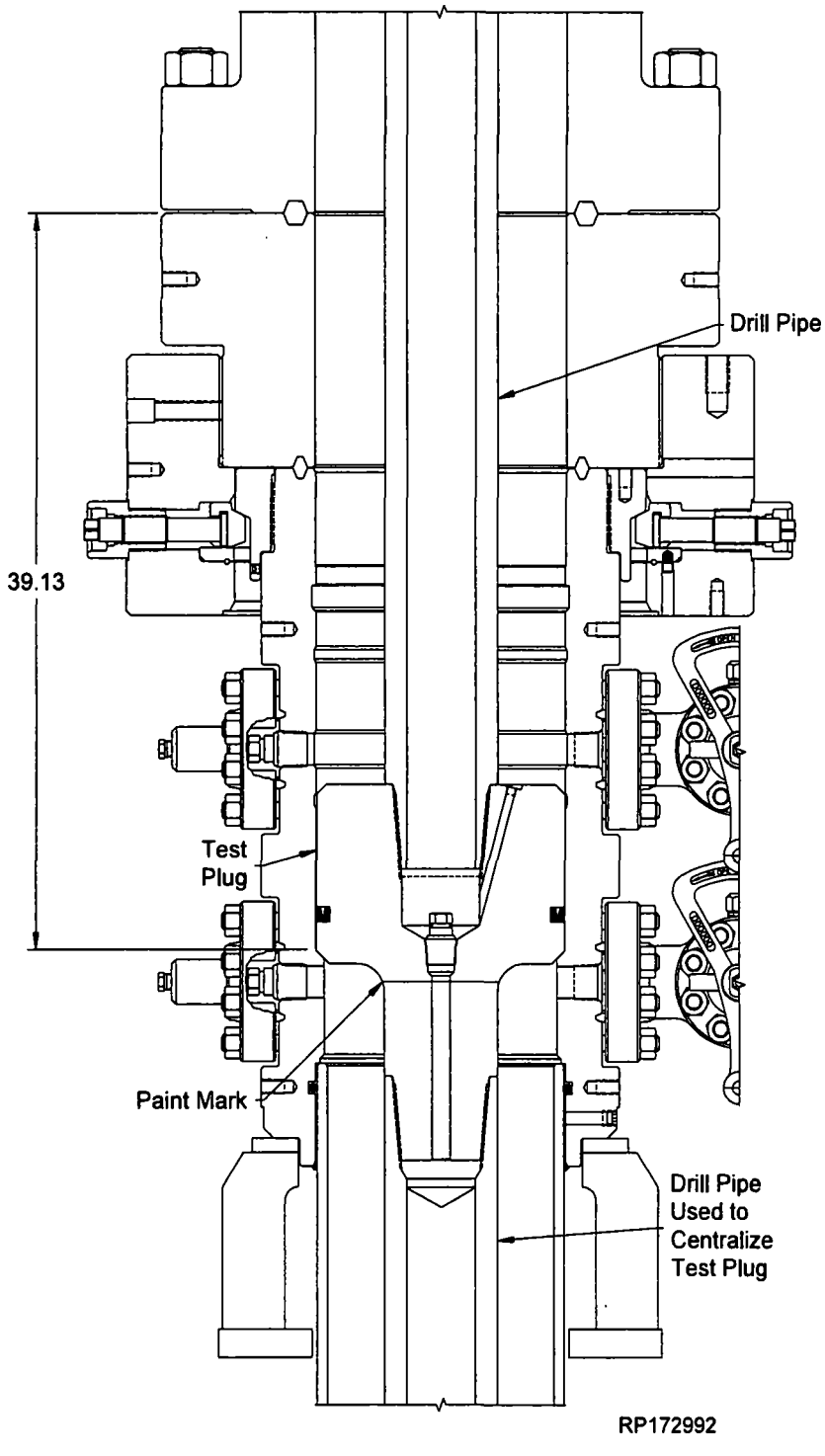
2.1.10. Monitor the annulus valve for signs of pressure.

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

2.1.12. Open upper casing valve and remove as much fluid from the BOP as possible.

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

NOTE It may be necessary to open the upper 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.



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.**

2.2. Run the Wear Bushing Before Drilling

2.2.1. Examine the ***Running Tool (Item ST2).*** Verify the following:

- all threads are clean and undamaged
- pup joint is properly installed for tonging

2.2.2. Orient the Tool with the Lead Threads down.

2.2.3. Examine the ***Wear Bushing (Item ST3).*** 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

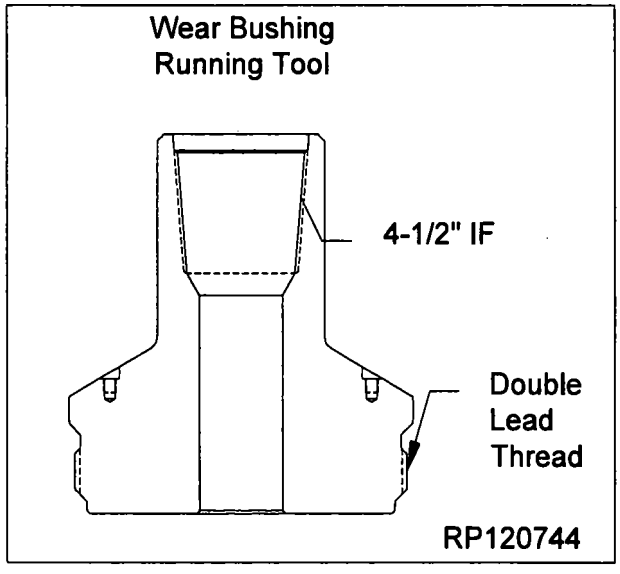
2.2.4. Orient the Wear Bushing as illustrated.

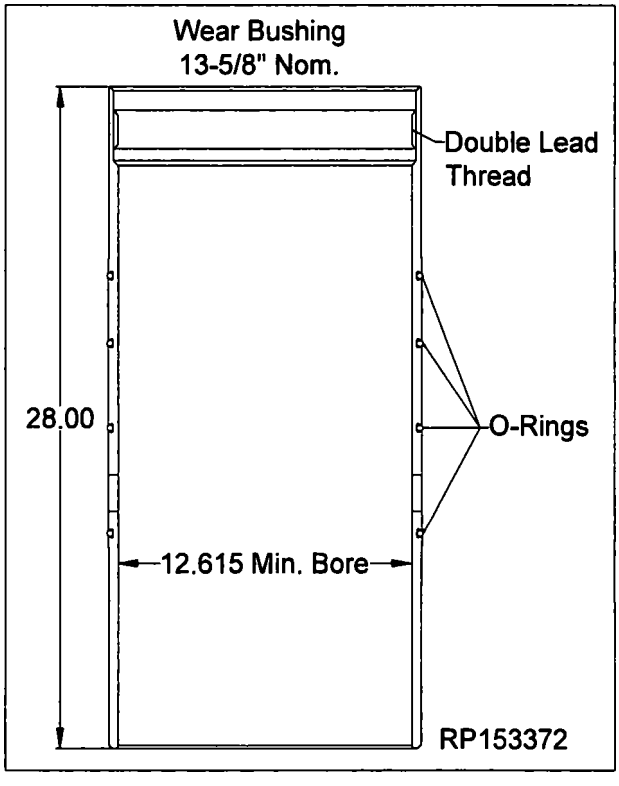
2.2.5. Wipe the o-ring seals of the wear bushing with a light oil or grease.

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

NOTE **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 become lodged in the BOP.**





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

DO NOT overtighten the Tool/Wear Bushing connection.

2.2.8. Carefully lower the Tool/ Wear Bushing Assembly through the BOP stack. Measure depth while lowering the assembly into the wellhead. Measure and record.

2.2.9. Land the tool/wear bushing on the load shoulder in the Housing and mark drill pipe joint.

2.2.10. Compare and confirm dimension against BOP stack drilling adapter and wellhead housing.

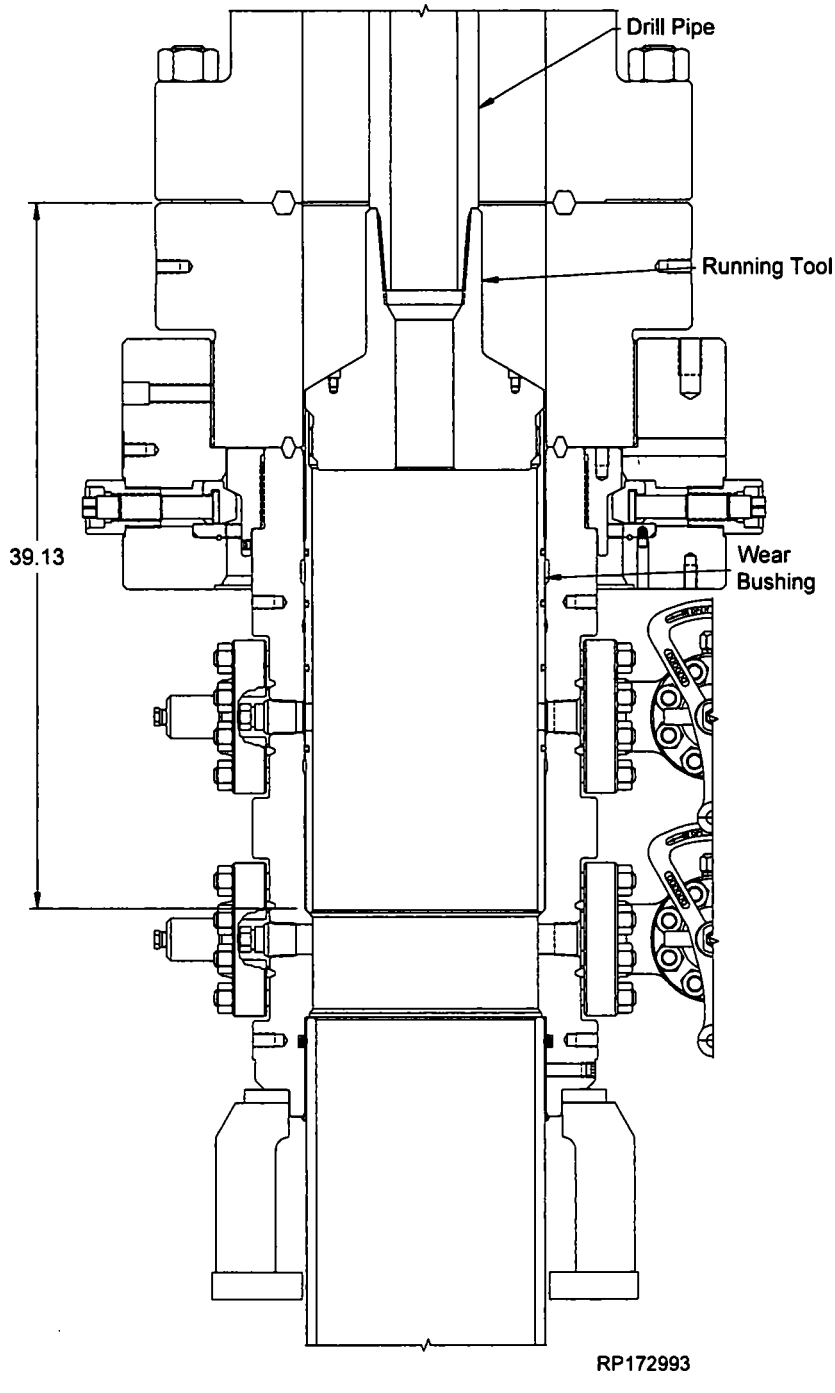
NOTE Distance from the Housing load shoulder to the face of the BOP Flange is 25.63"

2.2.11. Disengage the Tool from the Wear Bushing by rotating the drill pipe counterclockwise and lifting straight up.

2.2.12. Remove the Tool from the drill string.

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

2.2.14. Drill as required.



2.4. Retrieve the Wear Bushing After Drilling

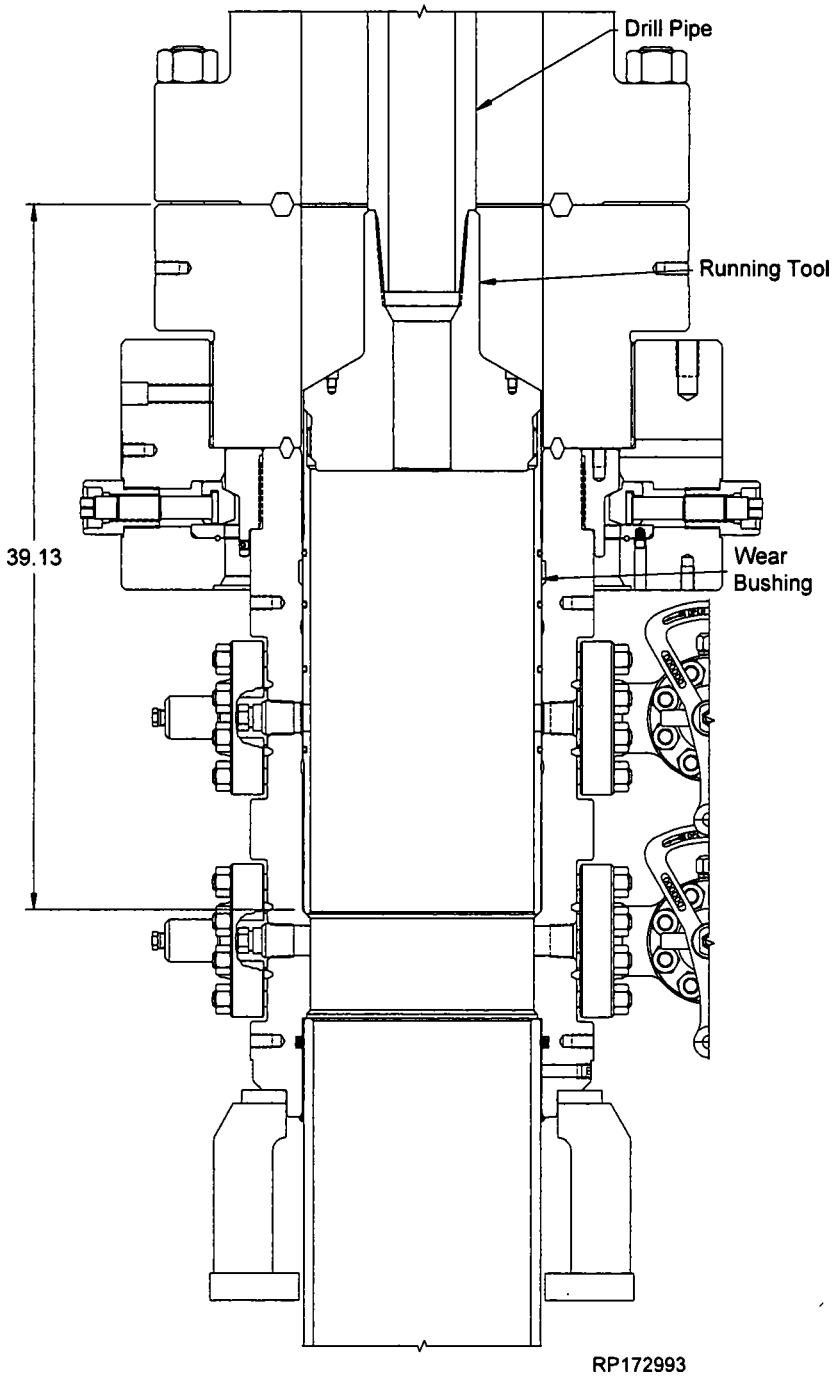
2.4.1. Make up the Tool to the drill pipe with the threads down.

2.4.2. Slowly lower the Tool into the Wear Bushing. Confirm dimension.

2.4.3. Rotate the Tool counter clockwise until thread jump can be felt. Slack off all weight to make sure tool is down. Then rotate clockwise to a positive stop.

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

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

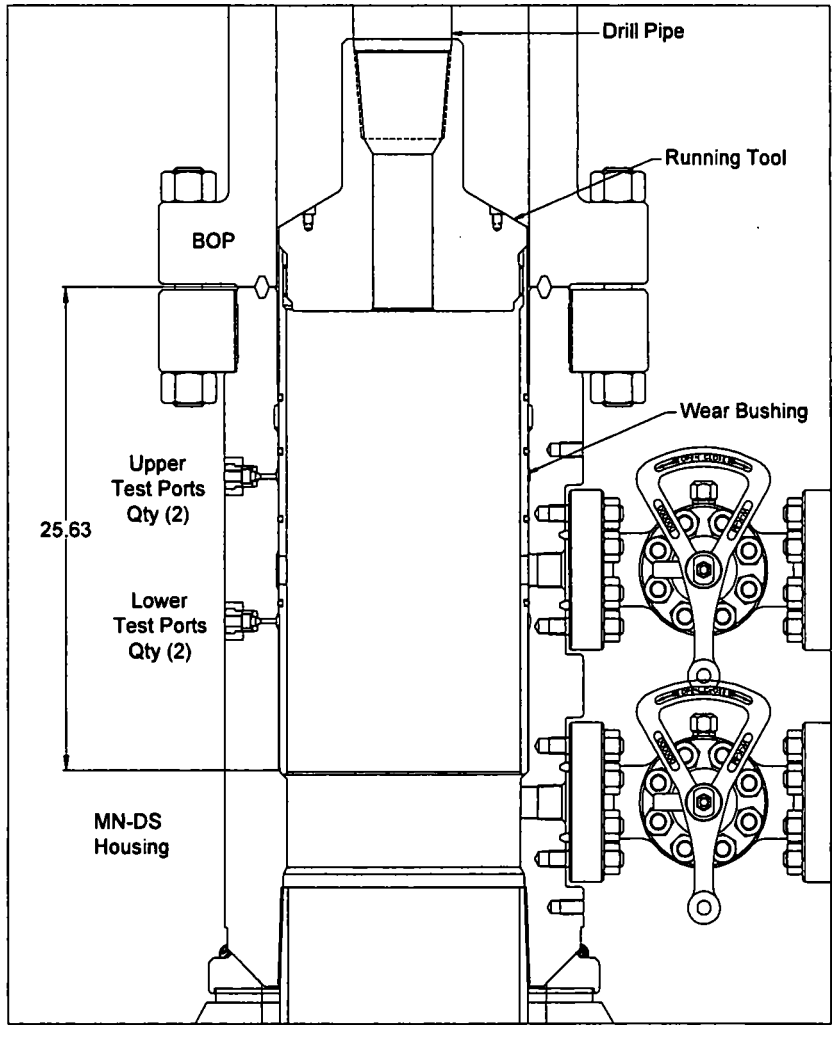


2.5. Contingency to retrieve a wear bushing that has become stuck due to debris

2.5.1. If the wear bushing becomes stuck due to debris, follow the steps below:

- Pump grease or hydraulic oil into test ports on the MN-DS housing to remove debris
- Pump fresh water through the upper most 2" 5K outlet valves for 15 minutes to wash out around the wear bushing

NOTE Communicate with company representative on desired overpull. Pull over in 10,000 lb increments(to maximum allowed, per engineering specification and tool ratings.)



2.6. Hang Off the Casing

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

2.6.2. 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 2.5.3 - 2.5.12 will be conducted offline in the shop and ship to location as one assembly.

2.6.3. Examine the ***Casing Hanger Running Tool (Item ST4).*** Verify the following:

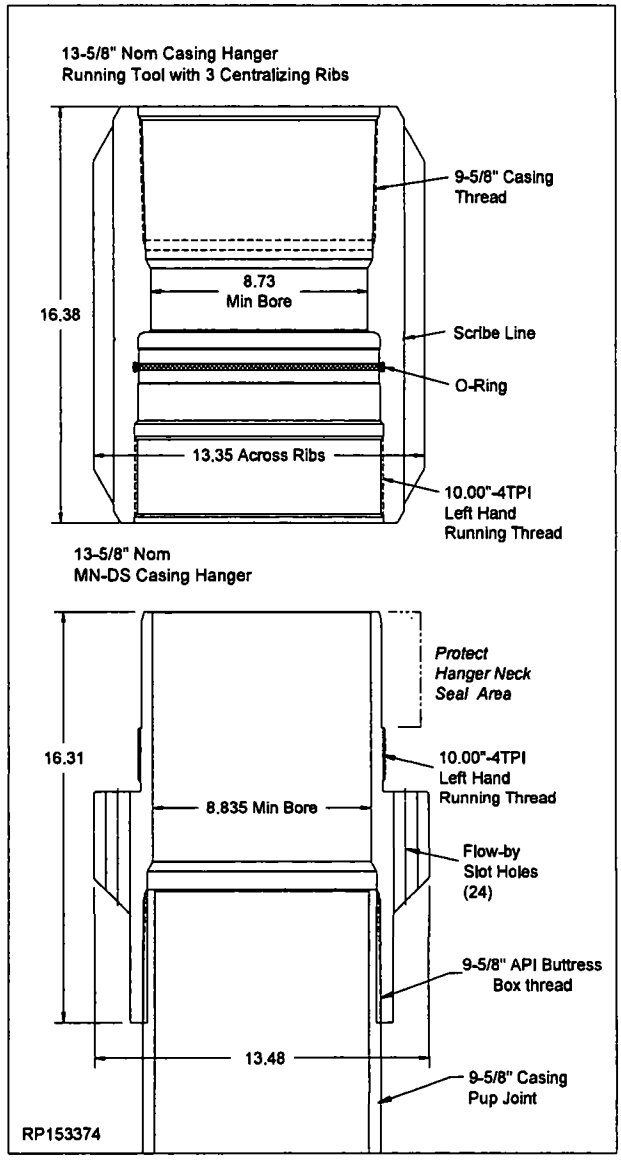
- bore is clean and free of debris
- all threads are clean and undamaged
- internal seal is properly installed, clean and undamaged

2.6.4. Orient the Running Tool with the stub acme running threads down.

2.6.5. Examine the ***Casing Hanger (Item A15).*** 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

2.6.6. Orient the Hanger with the casing threads down.



2.6.7. Make up a landing Joint to the top of the Running Tool.

2.6.8. Wipe the running threads of both the Tool and the Hanger and the seal of the Tool with a light oil or grease.

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

2.6.9. Lift and suspend the Tool over the Hanger.

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

2.6.11. While balancing the weight, rotate the Tool to the right until the thread 'jump' can be felt then to the left to a positive stop. Approximately 8 turns.

DO NOT Torque the connection.

2.6.12. Back the tool off 1/4 a turn to the right to keep the threads from binding up.

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

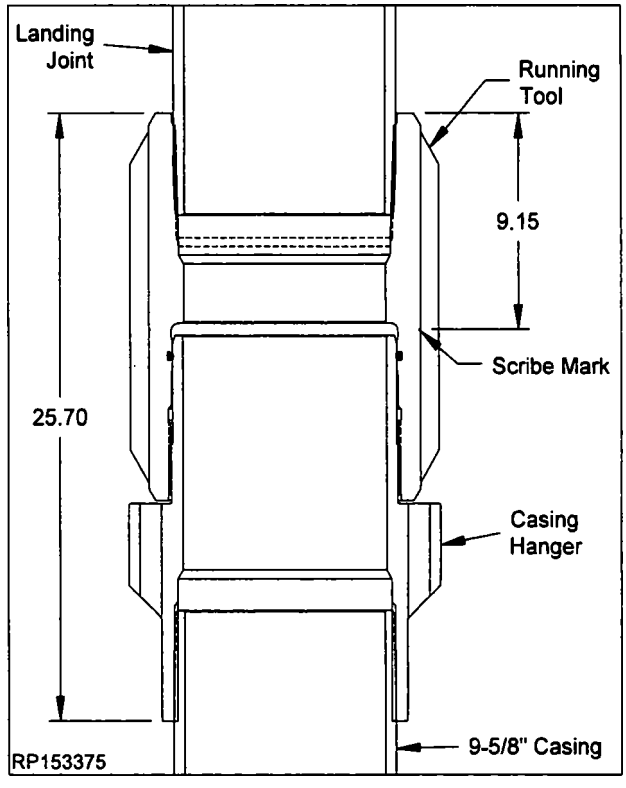
2.6.14. Lower the hanger assembly until the mating threads of the 9-5/8 casing and the pin threads of the pup joint make contact.

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

Do not use CRT or torque on Landing Joint! Torque on pup joint below the hanger as running and retrieving tool has Left Hand threads.

2.6.15. While balancing the weight, rotate the assembly to the left until the thread 'jump' can be felt then to the right to the thread manufacturer's recommended optimum torque.

2.6.16. Paint the scribe mark on the running tool all the way around the tool for landing verification.



2.6.17. Open the lowermost valve to drain Housing fully.

a) Ensure the well is stable and no pressure buildup or mud flow is occurring.

b) on lowermost valve companion flange, open bleeder fitting on bull plug.

c) Remove the Bull Plug from companion flange on end of valve.

d) open lowermost valve allowing BOP to drain.

e) Reinstall companion flange with bull plug to end of lowermost valve.

NOTE Verify BOP's are free of debris before landing hanger.

2.6.18. Calculate, measure and record the distance to land the hanger; from the 45 of the hanger to the rig floor or 39.13" below the face of the flange on the BOP Adapter.

2.6.19. Release the casing from the floor slips and lower it into the well, tallying the casing as it is lowered, until the Hanger lands on the load shoulder of the Casing Head.

NOTE Distance from the Housing load shoulder to the face of the BOP Flange is 39.13"

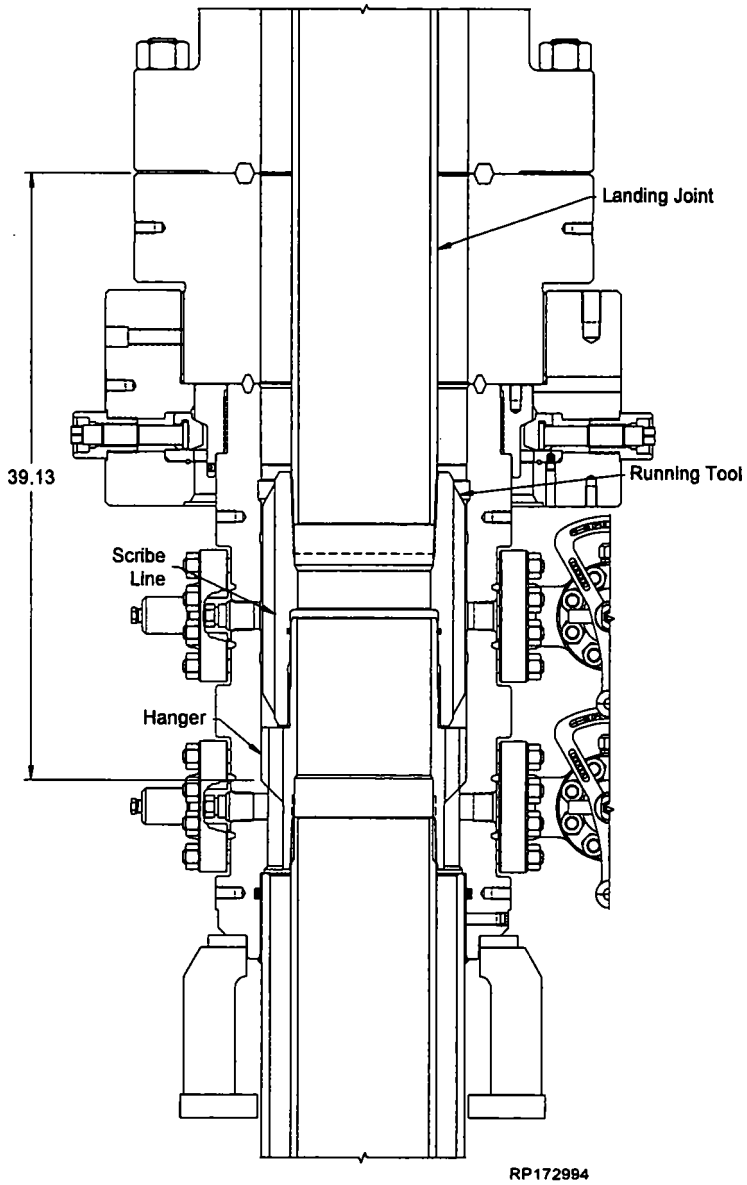
2.6.20. Ensure Mandrel hanger is centered in well bore.

2.6.21. Slack off all weight on the casing.

2.6.22. Tally dimension and ensure hanger has landed properly.

2.6.23. Verify through the open outlet on the MN-DS Housing the hanger has landed properly.

2.6.24. Check to ensure the scribed line on the running tool is in the middle of the uppermost outlet of the MN-DS Housing.



2.6.25. Close the uppermost outlet valves.

2.6.26. Cement as required.

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

2.6.27. With cementing completed, rotate the landing joint to the right 8 full turns to release the running Tool from the Casing Hanger.

2.6.28. Retrieve the Tool to the rig floor.

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

Stage 2.0 — 9-5/8" Casing

Always wear proper PPE (Personal Protective Equipment) especially gloves to handle and install the slip type casing hanger.

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.**

2.7. Hang off the Casing (Emergency Procedure)

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

2.7.1. Run the Casing and Cement as required.

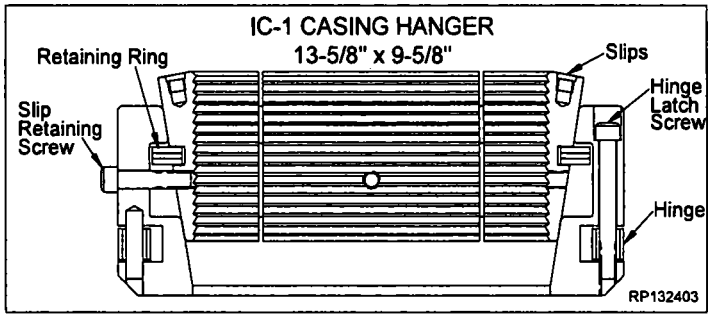
CAUTION Ensure that the casing is centralized. Hanger clearances are small and centering must be accurate.

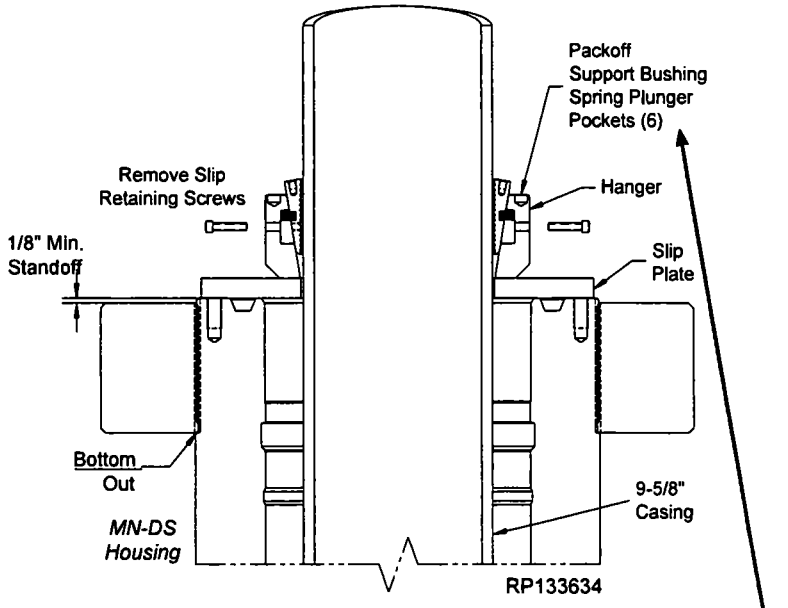
2.7.2. Ensure the well is safe and under control.

2.7.3. Drain the BOP and Housing bowl through the Housing lower side outlet. Leave the valve open until the Casing Hanger is set.

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

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





2.7.5. Washout as required.

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

- segments are clean, undamaged and secure
- all screws are in place and snug
- verify plunger pin pockets on upper face of hanger body prior to performing any installation, if no pockets are present, do not set hanger.

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

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

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

Stage 2.0 — 9-5/8" Casing

2.7.10. 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.

2.7.11. Grease the Casing Hanger's body.

2.7.12. 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.

CAUTION Do Not Drop the Casing Hanger!

2.7.13. 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.

2.7.14. Rough cut the casing at 5-1/2" per Wach's saw procedure, above the top flange of the Housing and move the BOP and excess casing out of the way.

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

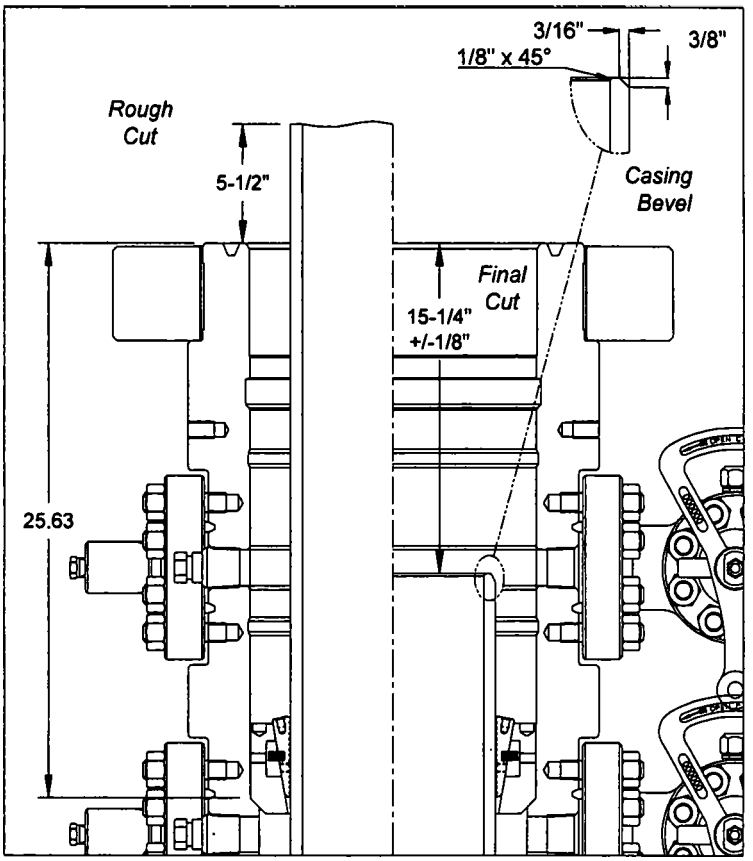
2.7.16. Using an internal cutter, final cut the casing at 15-1/4" +/-1/8" below the Housing flange.

2.7.17. 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.

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

2.7.19. Install the new ***BX-160 Ring Gasket (Item A12)*** in the Housing ring groove.



2.7.20. Reconnect the BOP Stack to the Housing using the studs and nuts provided. Tightening the studs and nuts in an alternating cross pattern to the torque referenced in the chart in the back of this manual.

2.7.21. Leave valves open. Continue with Packoff Support Bushing Installation per Section 2.8.

Stage 2.0 — 9-5/8" Casing

2.8. Washout the Spool

NOTE Do Not close the outlet valve on the lowermost Head, it will be left open while landing the Packoff Support Bushing.

2.8.1. Examine the ***Wash Tool (Item ST11).*** Verify the following:

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

2.8.2. Orient the Wash Tool with the box connection up.

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

2.8.4. Ensure lowermost outlet valve of Housing is open.

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

2.8.6. Lift the Tool approximately 2". Mark tool joint at floor/ rotary table.

2.8.7. Supply pressure through the drill pipe. At the same time the pressure is being supplied, rotate the Tool.

NOTE The maximum pressure rating for the wash tool is 1,000 psi, and at flow rate of 75 gpm.

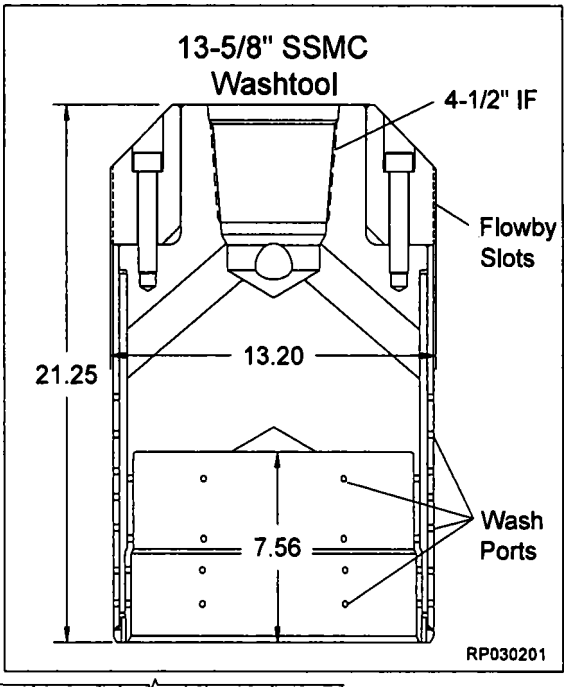
2.8.8. Monitor the outlet valve for returns.

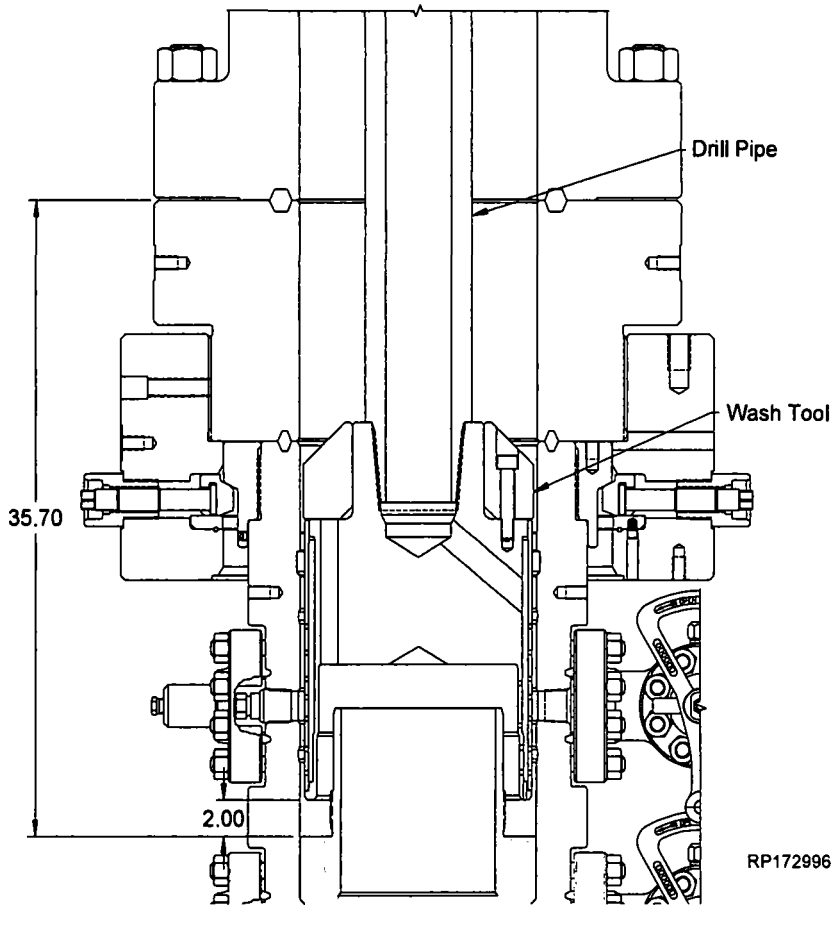
2.8.9. Once the returns are clean and free of debris, stop the rotation and the pump.

2.8.10. Retrieve the Tool to the rig floor.

2.8.11. Clean, grease and store the Wash Tool as required.

NOTE Verify visibility of hanger port and cleanliness of hanger after washing and draining.





2.9. Install the Packoff Support Bushing

2.9.1. Examine the ***Packoff Support Bushing Running Tool (Item ST5).*** 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

2.9.2. Orient the Running Tool with the internal running threads down.

2.9.3. Examine the ***Packoff Support Bushing (Item A16)***. 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 bottom of the Packoff Support Bushing are properly installed and spring loaded pins retract properly.

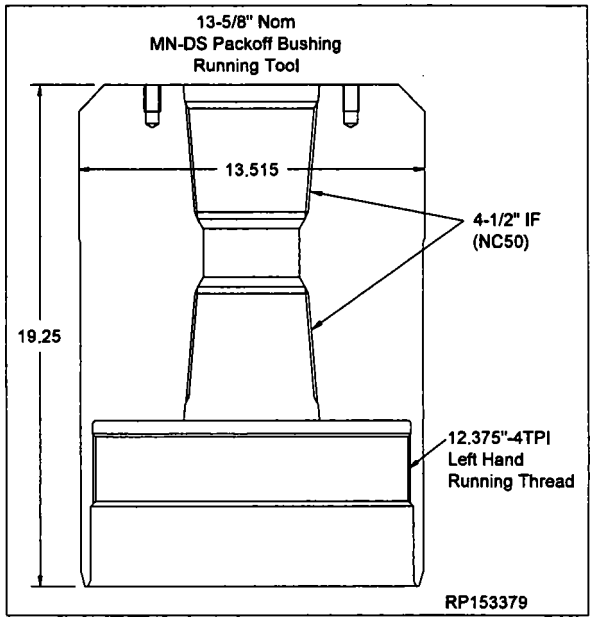
2.9.4. Orient the Seal Assembly with the external running threads up.

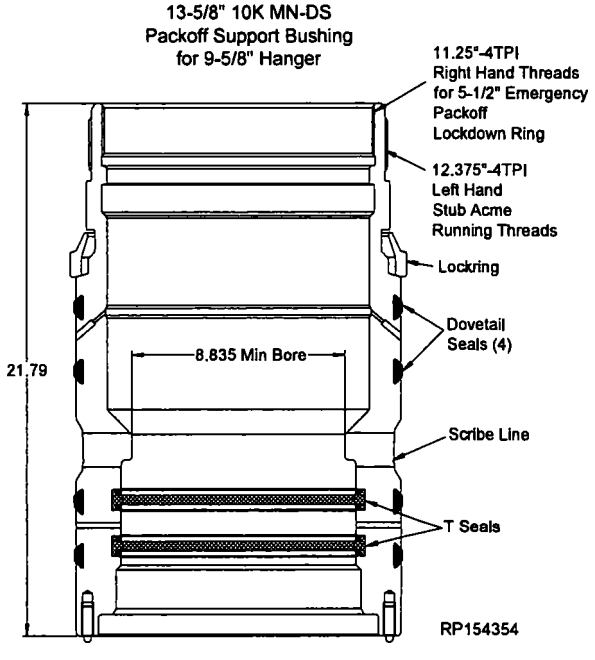
2.9.5. Lubricate the external running threads of the Packoff Support Bushing and threads of the Running Tool with a light coat of oil.

→ 2.9.6. 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 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 Packoff Support Bushing. Weight required to run the Packoff Support Bushing into the Housing is approximately 10,000 lbs.

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



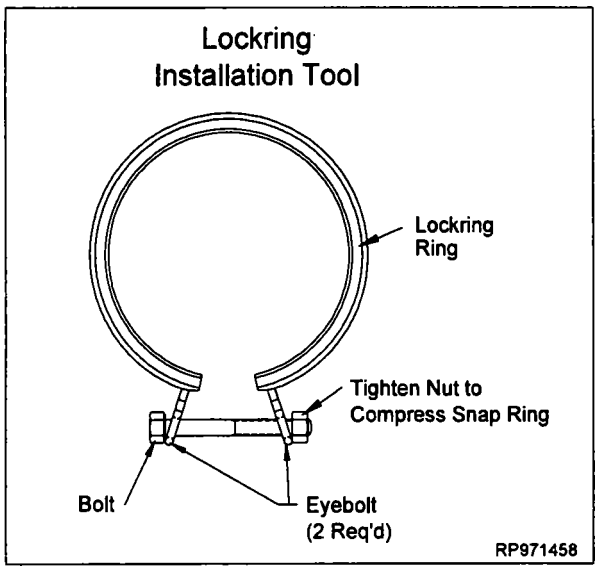


2.9.8. Install a ***Lockring Installation Tool(Item ST10)*** onto the lockring of the Support Bushing.

NOTE See APPENDIX 1 for Optional Lock ring installation tool on the back of this procedure.

2.9.9. Fully compress the lockring.

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



2.9.10. Carefully lower the Running Tool onto the Packoff Support Bushing Assembly until the threads make contact.

2.9.11. Make up the connection by first turning the Tool to the right to align the threads then to the left until the Tool engages the lockring.

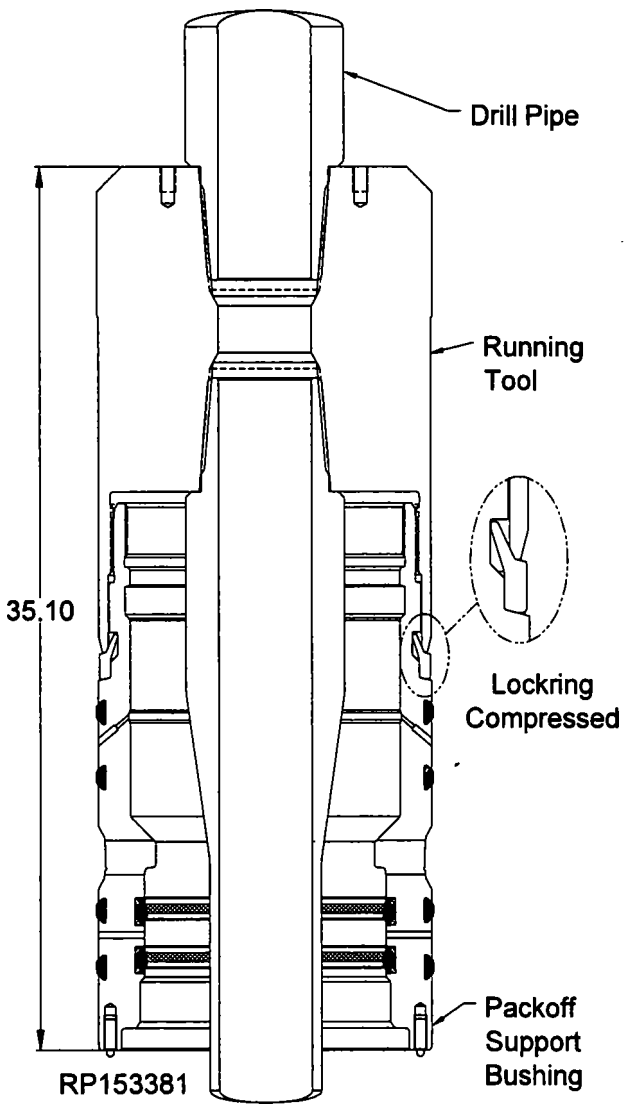
NOTE Approximate 8 turns are required for full make-up. Write down the number of turns to make up the Tool to the Packoff Support Bushing in the Field Service Report.

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

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

2.9.13. Wipe the ID of the 'T' seals and the OD of the dovetail seals with a light oil.

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



2.9.14. Lift and suspend the Assembly/Crossover stub over the drill pipe hung off in the rig floor.

2.9.15. Lower the Assembly/Crossover stub onto the threads of the drill pipe and make up the connection.

CAUTION Do not damage the internal seals of the Packoff Support Bushing assembly!

2.9.16. Open both upper and lower annulus valves on the Housing.

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

Stage 2.0 — 9-5/8" Casing

2.9.17. Center and lower assembly through the BOP Stack and Housing. Tallying assembly as it is lowered until the Support Bushing lands on the Casing Hanger. Mark landing joint.

2.9.18. Calculate, measure and record the distance to land the Packoff bushing. Distance will be 3.44 less than dimension calculated to land the casing hanger; or 35.70" below the face of the flange on the housing.

2.9.19. Tally dimension and ensure Support Bushing has landed on the casing hanger.

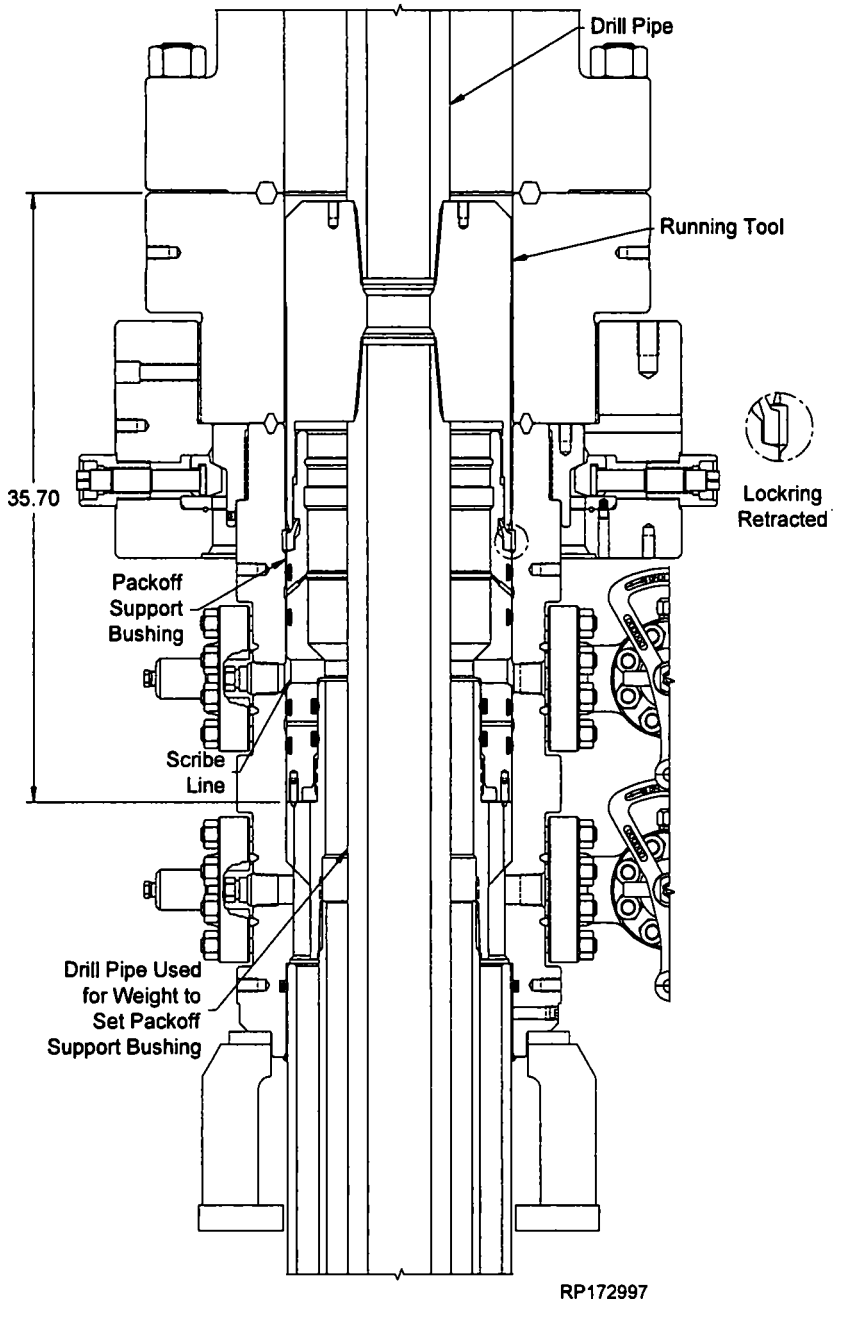
NOTE **Distance from the Mandrel Casing Hanger landing shoulder to the face of the BOP Flange is 35.70".**

2.9.20. Compare and confirm dimension against BOP stack drilling adapter and wellhead housing.

2.9.21. Verify the Packoff Support Bushing has landed properly through the upper annulus valve of the MN-DS Housing:

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

2.9.22. Turn the landing joint to the left until the (6) Spring Plunger pins engage the casing hanger mating slots. When the pins engage the hanger, STOP turning when a positive stop is felt.

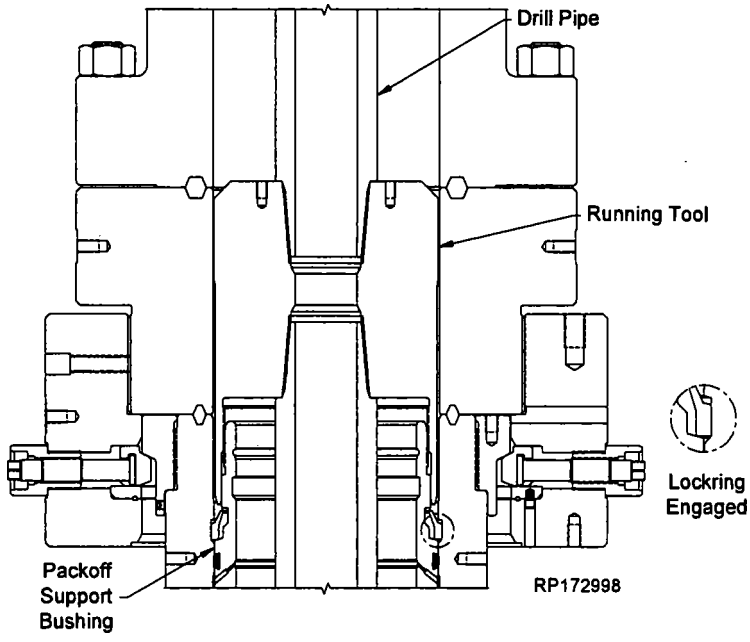


2.10. Set the Packoff Support Bushing Lockdown Ring

NOTE ***Confirm the Packoff Support Bushing has properly landed on Mandrel 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.***

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

2.10.2. Using chain tongs, back out the Tool 3.5 turns clockwise (right) to allow the Locking ring to expand into its mating groove in the Housing.



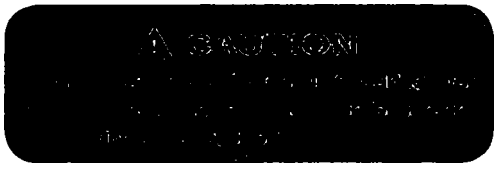
NOTE **Horizontal mark should raise no more than .875".**

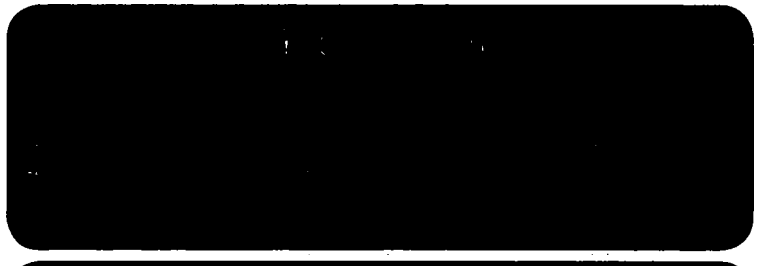
DO NOT ATTEMPT TO BACK OUT MORE THAN 3.5 TURNS.

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

2.10.4. Once a successful over pull has been achieved, slack off over pull and ensure elevators are well clear of the Drill Pipe Tool Joint.

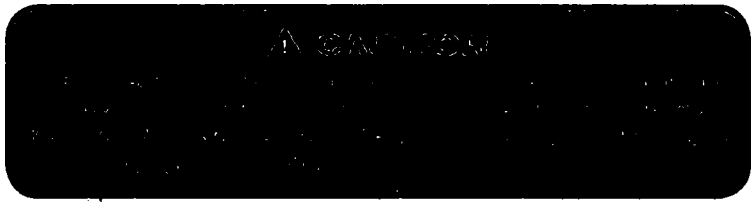
NOTE **Verify over pull calculated data. Make sure all personnel involved during Lockdown ring setting installation is aware of over pull requirements for Packoff Support Bushing.**





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 3.5 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 20,000 lbs over pull test.



NOTE **Dovetail seals must be replaced prior to reinstalling the Packoff Support Bushing.**

2.11. Test Between the 9-5/8" Packoff Lower Seals (ID &OD)

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

2.11.2. Attach a hydraulic test pump to the open test port and inject test fluid into the Packoff Support Bushing to ***5,000 psi.***

Do Not over pressurize!

NOTE If Emergency hanger was used 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.

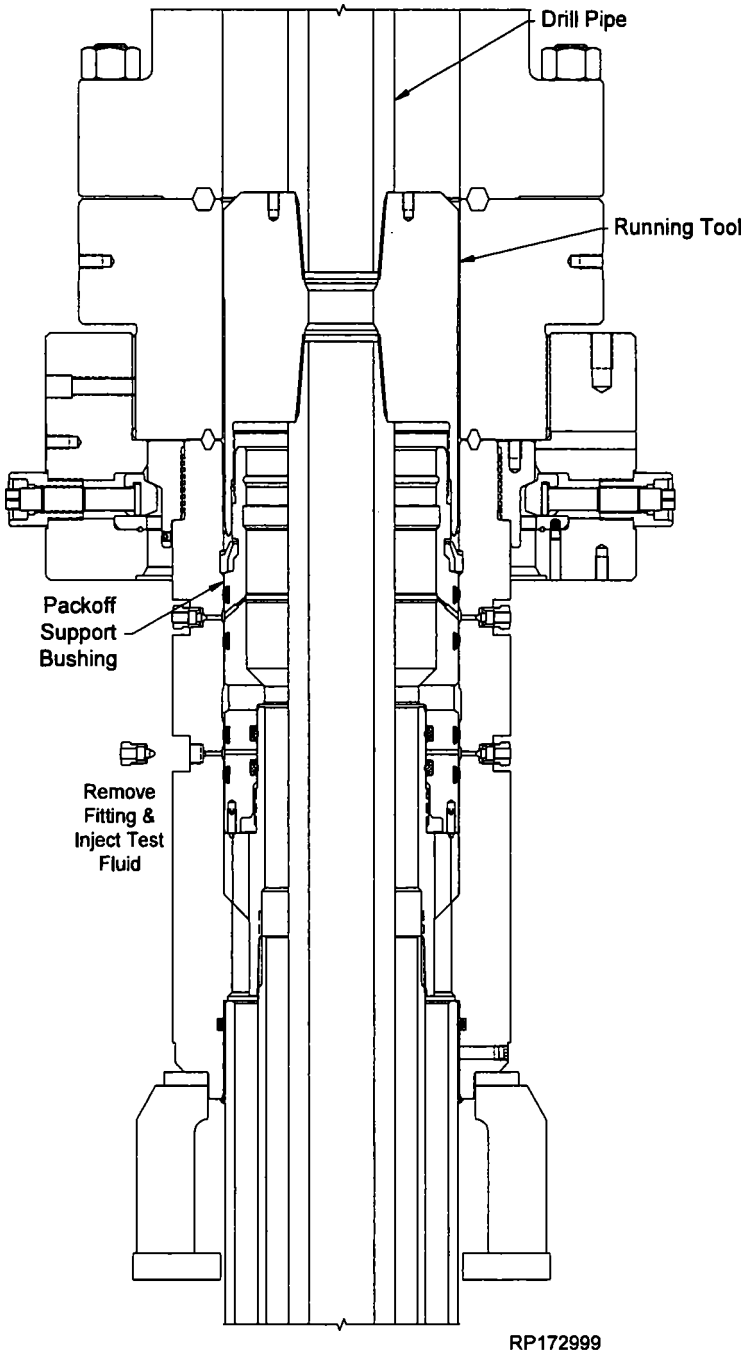
2.11.3. Hold and monitor the test pressure for fifteen minutes or as required by the Drilling Supervisor.

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

2.11.5. Release the running tool from the Packoff Support Bushing by rotating the drill pipe (with chain tongs) to the right approximately 4-1/2 turns or until it comes free from the seal assembly.

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

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



2.12. Retrieval of Packoff Support Bushing Assembly

2.12.1. Make up a joint of drill pipe to the top of the ***Packoff Support Bushing Running Tool (Item ST5).***

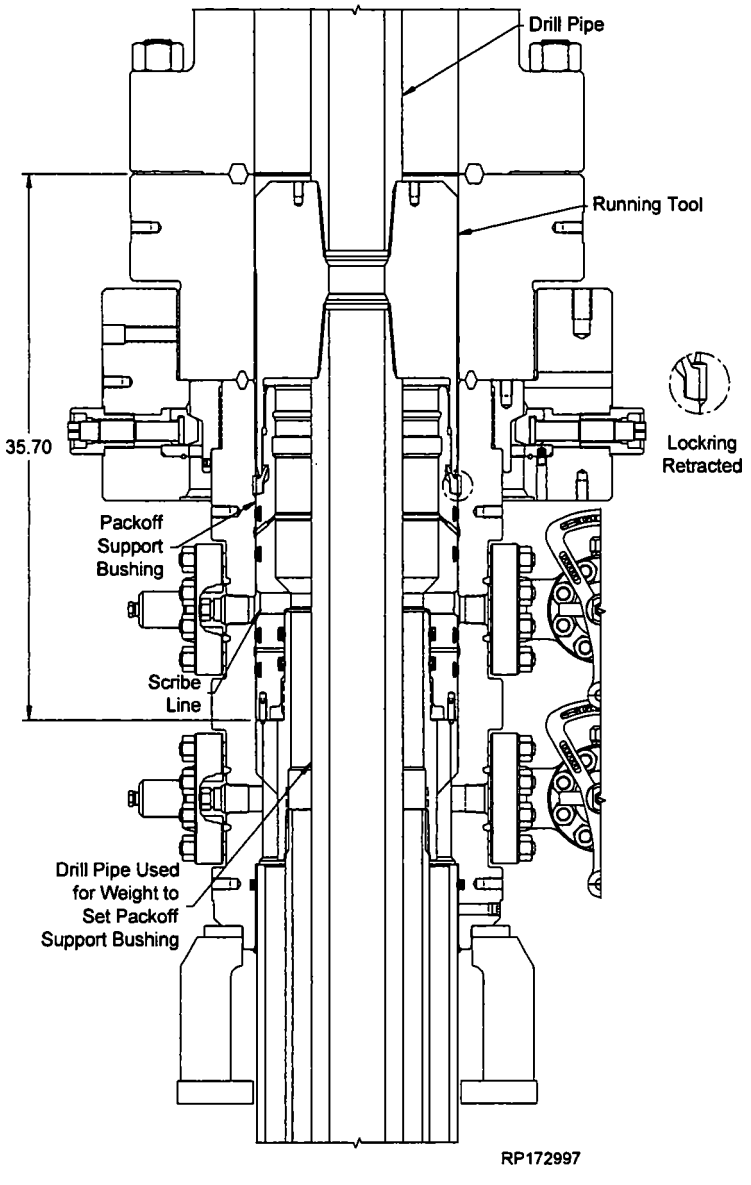
2.12.2. Lower the Running Tool through BOP stack and land on top of Packoff Support Bushing.

2.12.3. Rotate the Tool counterclockwise approximately 8 turns or the number of turns documented per Section 2.8, 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.

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

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

2.12.5. To remove Packoff Support Bushing from the running tool, install the Lockring Collapsing Tool and fully compress the Lockring.



NOTE Dovetail seals must be relpaced prior to reinstalling the Packoff Support Bushing.

Stage 3.0 — 5-1/2" or 7" Casing

3.1. Test the BOP Stack - Optional

NOTE ***Previously used BOP Test Plug must be inspected for damage due to wear.***

NOTE ***After Drilling and running the 7-5/8" Liner, there is no need to re-test the BOP Stack as no connections on the Well-head or BOP have been broken.***

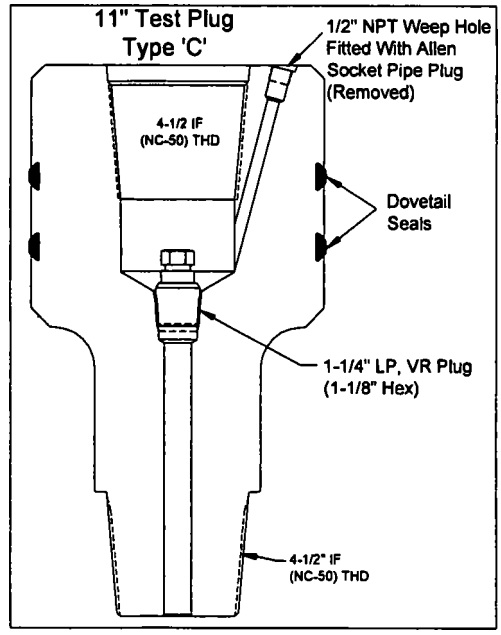
3.1.1. Examine the ***Test Plug (Item ST6).*** Verify the following:

- seals are properly installed, clean 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.



NOTE **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. Wipe the dovetail seal of the Tool with a coat of light oil.

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

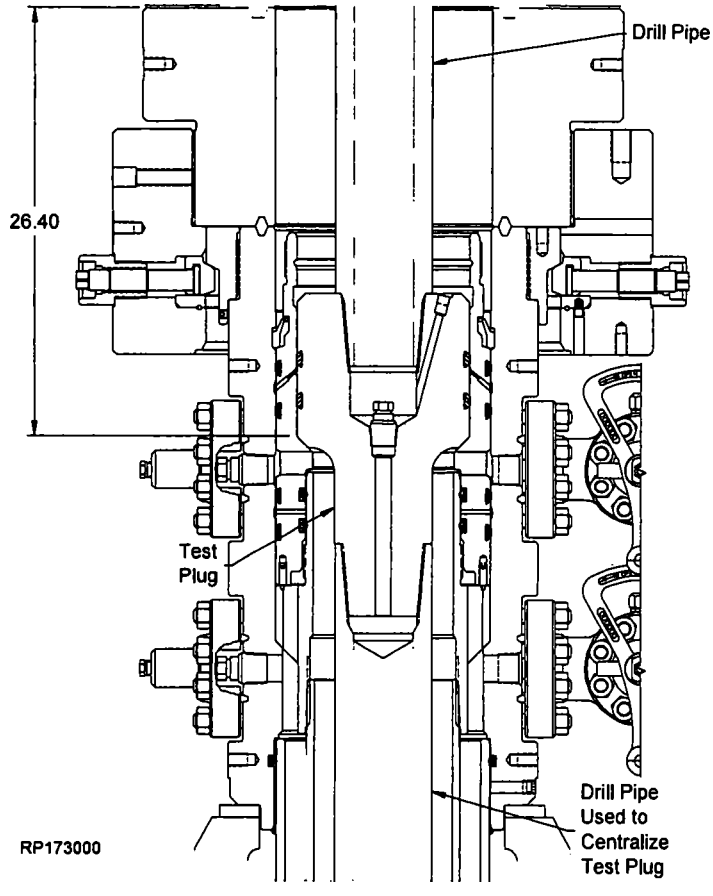
3.1.6. Slowly lower the Tool through the BOP Stack until it lands on the load shoulder in the Packoff. Measure and record.

NOTE **Distance from the Packoff Support Bushing load shoulder to the face of the BOP Flange is 26.40"**

3.1.7. Close the BOP rams on the drill pipe and test to ***5,000 psi maximum.***

3.1.8. Monitor the annulus valve for signs of pressure.

3.1.9. After a satisfactory test is achieved, release pressure. Leave test plug in place to test the Packoff Support Bushing upper dovetail seals.



3.2. Test Between Upper the 9-5/8" Packoff Dovetail Seals - Optional

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

3.2.2. Attach a hydraulic test pump to the open test port and inject test fluid into the Packoff Support Bushing to ***5,000 psi.***

CAUTION Do Not over pressurize!

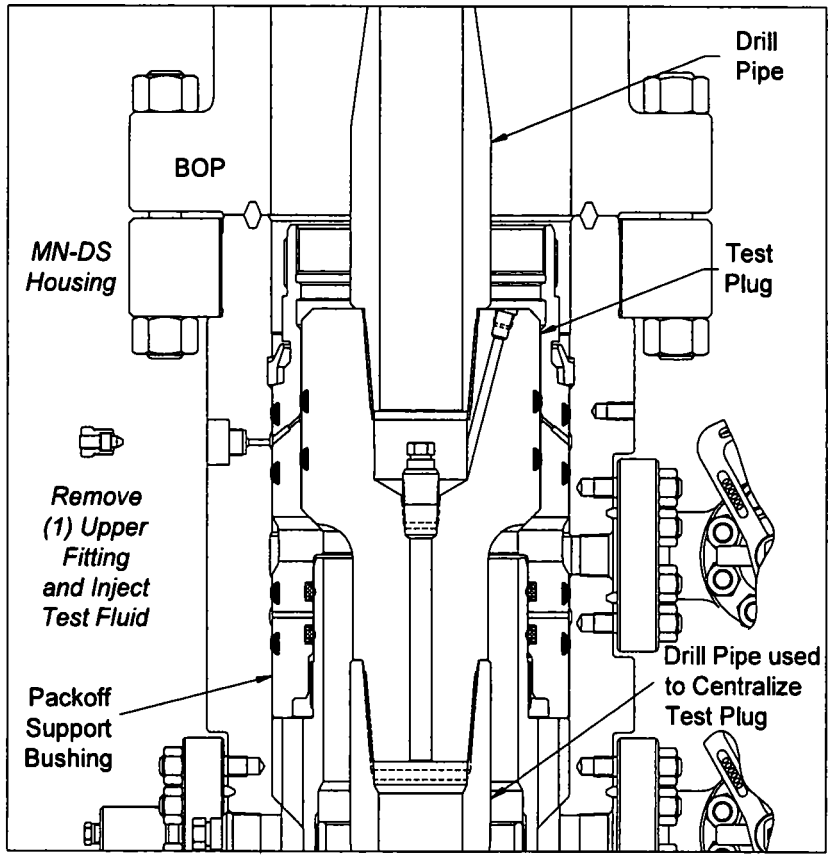
NOTE If Emergency hanger was used do not exceed 80% of casing collapse.

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

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

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

3.2.5. Open the annulus valve.



3.2.6. 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.

3.2.7. Drain BOP stack.

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.**

3.3. Run the Wear Bushing Before Drilling

3.3.1. Examine the ***Running Tool (Item ST7).*** Verify the following:

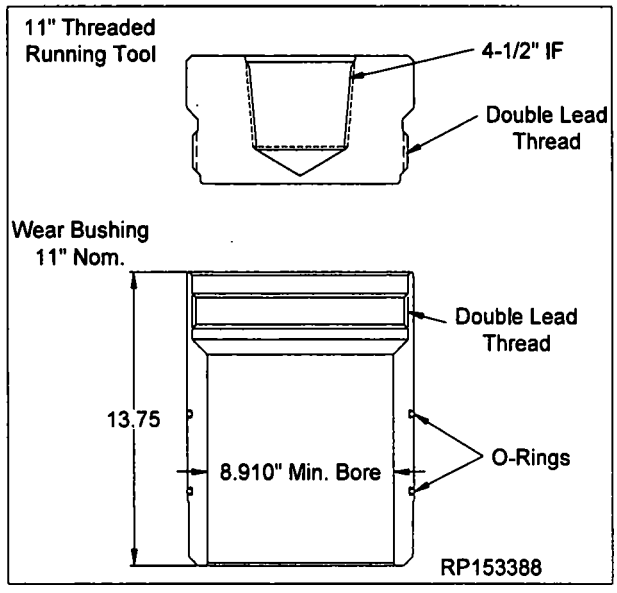
- all threads are clean and undamaged
- pup joint is properly installed for tonging

3.3.2. Orient the Tool with the Double Lead Thread down.

3.3.3. Examine the ***Wear Bushing (Item ST8).*** Verify the following:

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

3.3.4. Orient the Wear Bushing as illustrated.



NOTE **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 become lodged in the BOP.**

3.3.5. Wipe the o-ring seals of the wear bushing with a light oil or grease.

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

NOTE Make sure the threads are down when making up the drill pipe to the running tool.

3.3.7. Lower the Tool into the Wear Bushing and rotate the drill pipe counter clockwise until thread jump can be felt, then clockwise to a positive stop.

3.3.8. Carefully lower the Tool/ Wear Bushing Assembly through the BOP until it lands on the load shoulder of the Packoff Support Bushing. Measure and record.

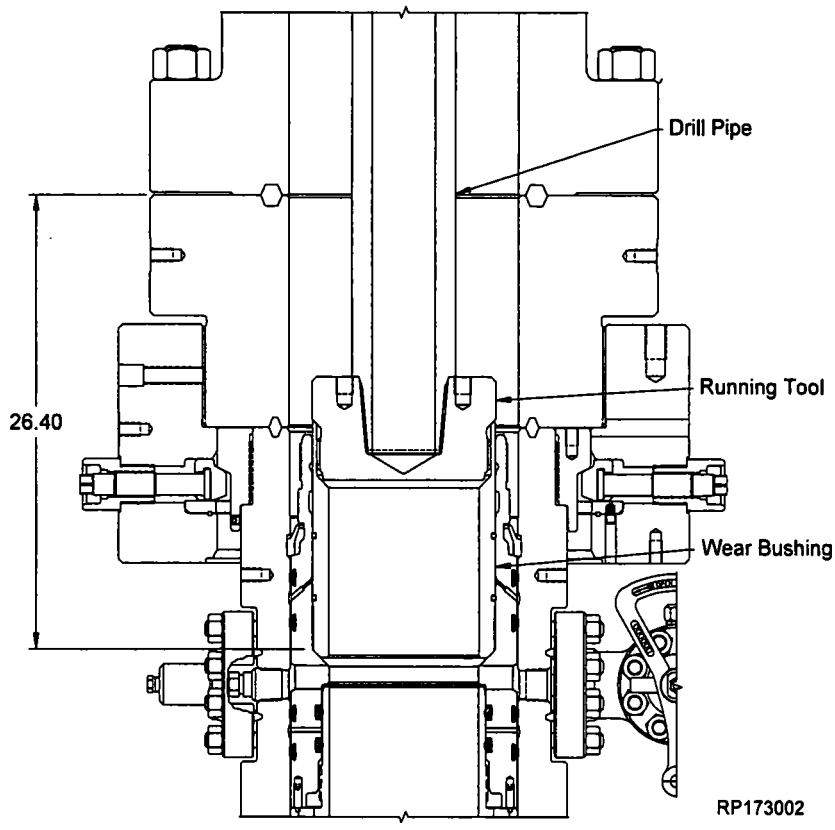
NOTE Distance from the Pack-off Support Bushing load shoulder to the face of the BOP Flange is 12.90"

3.3.9. Remove the Tool from the Wear Bushing by rotating the drill pipe counterclock-wise until thread jump is felt to disengage the Tool from the Wear Bushing and lifting straight up.

3.3.10. Remove the Tool from the drill string.

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

3.3.12. Drill as required.



3.4. Retrieve the Wear Bushing After Drilling

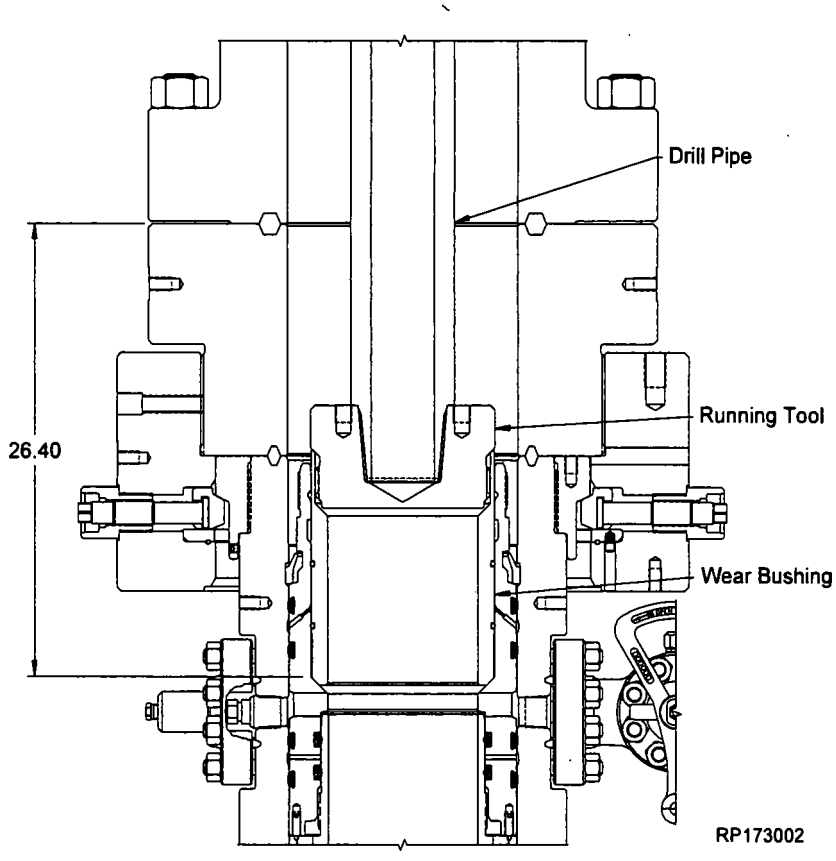
3.4.1. Make up the Tool to the drill pipe with the threads down.

3.4.2. Slowly lower the Tool into the Wear Bushing.

3.4.3. Rotate the Tool counter clockwise until thread jump can be felt, slack off all weight then rotate clockwise to a positive stop.

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

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

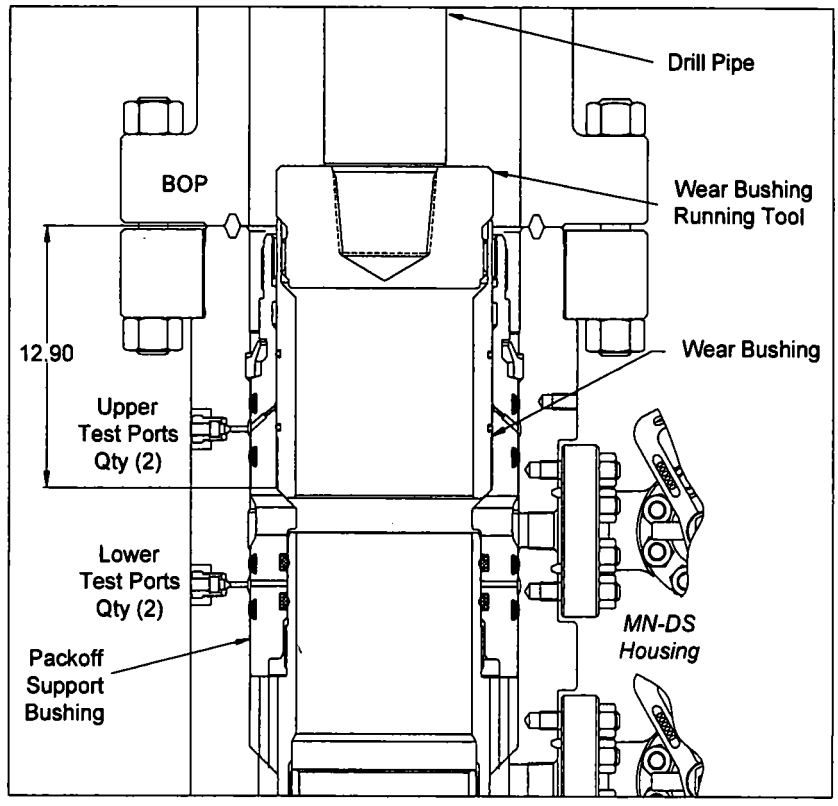


3.5. Contingency to retrieve a wear bushing that has become stuck due to debris

3.5.1. If the wear bushing becomes stuck due to debris, follow the steps below:

- Pump grease or hydraulic oil into test ports on the MN-DS housing to remove debris
- Pump fresh water through the upper most 2" 5K outlet valves for 15 minutes to wash out around the wear bushing

NOTE Communicate with company representative on desired overpull. Pull over in 10,000 lb increments (to maximum allowed, per engineering specification and tool ratings.)



Always wear proper PPE (Personal Protective Equipment) especially gloves to handle and install the slip type casing hanger.

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.**

3.6. Hang off the Casing

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.

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

3.6.2. Drain the Casing Head bowl through its upper side outlet.

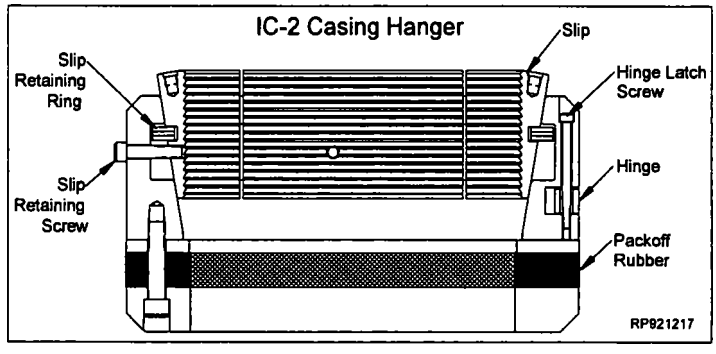
3.6.3. Center the casing, flush with water and verify returns are clean and free of debris.

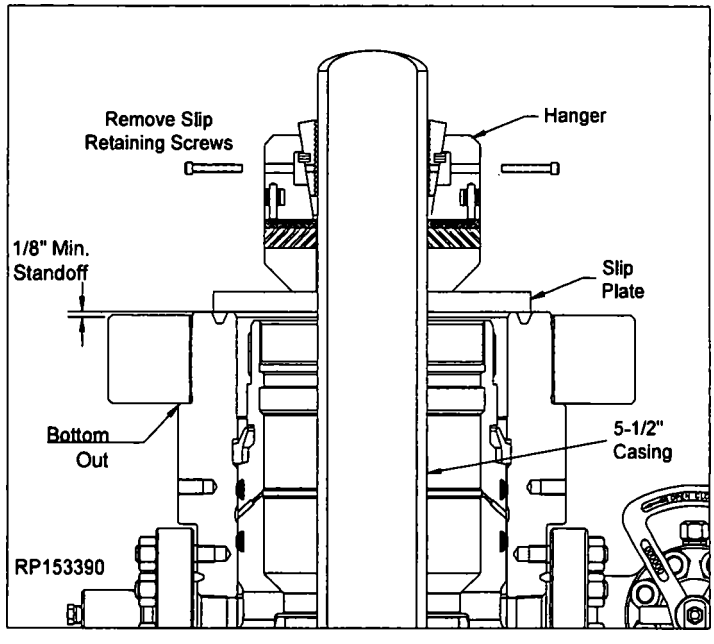
3.6.4. There are two methods used to install the Casing Hanger:

- from the rig floor through a full opening BOP stack, provided no casing collars are between the rig floor and the Head
- alternative method - 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.

3.6.5. Examine the ***IC-2 Casing Hanger (Item A17/A17a).*** 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





3.6.6. Remove the latch screw to open the Hanger

3.6.7. Place a slip plate against the casing to support the Hanger.

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

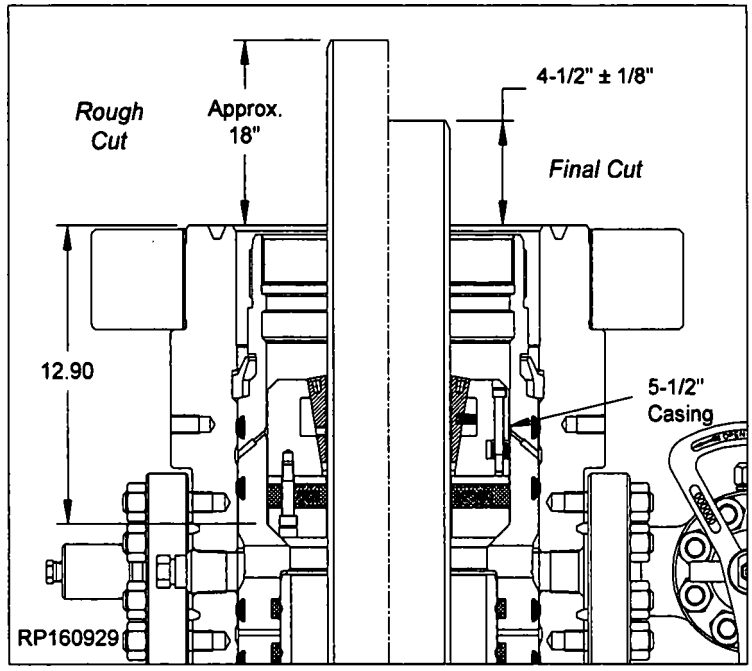
Stage 3.0 — 5-1/2" or 7" Casing

3.6.9. 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.

3.6.10. Confirm load shoulder to rig floor dimension. (11" Test plug tally).

3.6.11. Install eye bolts to hanger. Install rope to eyebolts. Ensure enough rope is available to lower and land hanger on load shoulder.

3.6.12. Prepare to lower the Hanger through the BOP stack.



DO NOT Drop the Hanger!

3.6.13. Grease the Hanger body and packoff rubber and remove the slip retaining screws.

3.6.14. Remove the slip plate and carefully lower the Hanger into the Housing controlling decent with ropes, until the Hanger lands on the load shoulder of the Packoff Support Bushing. Use a cat-line to center the casing, if necessary. Measure and record.

NOTE Establish desired weight to be set on slips before lowering slips.

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

NOTE Approximately 70,000 lb ft is needed to set 5-1/2" hanger, 55,000 lb ft is needed to set the 7" hanger.

NOTE A sharp decrease on the weight indicator will signify that the Hanger has taken weight and at what point. If this does not occur,pull tension +1-1/2" again, tug on the soft lines to try to align the Hanger in the bowl and slack off once more.

3.6.16. Lift the BOP Stack as high as possible.

3.6.17. Rough cut the casing approximately 18" above the top of the Housing flange.

3.6.18. 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.

3.6.19. Final cut the casing at 4-1/2" +/- 1/8" above the top of the Housing Flange.

3.6.20. Place a 15° bevel on the casing stub and remove all burrs and sharp edges.

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

Stage 4.0 — Install the Capping Flange

4.1. Install the Temporary Abandonment Cap

NOTE **Verify the height/standoff measured from the top of the Housing to the top of the Mandrel Hanger as indicated on page 60.**

4.1.1. Examine the ***Temporary Abandonment Cap (TA Cap, Item C1)***. 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 C3/C3a)*** is properly installed, clean and undamaged

4.1.2. Orient the TA Cap as illustrated.

4.1.3. Clean the mating ring grooves of the Housing and TA Cap. Wipe each groove, the 'P' seal of the TA Cap and the OD of the casing stub with a light oil or grease.

Excessive oil may prevent a positive seal from forming.

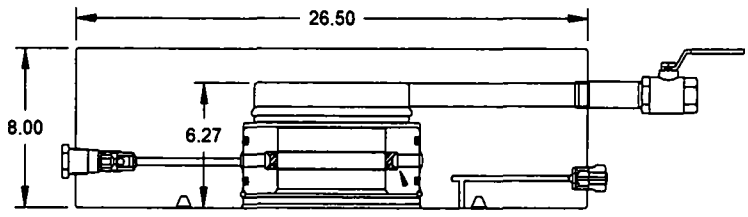
4.1.4. Install a new ***BX-160 Ring Gasket (Item C2)*** into the ring groove of the MN-DS Housing.

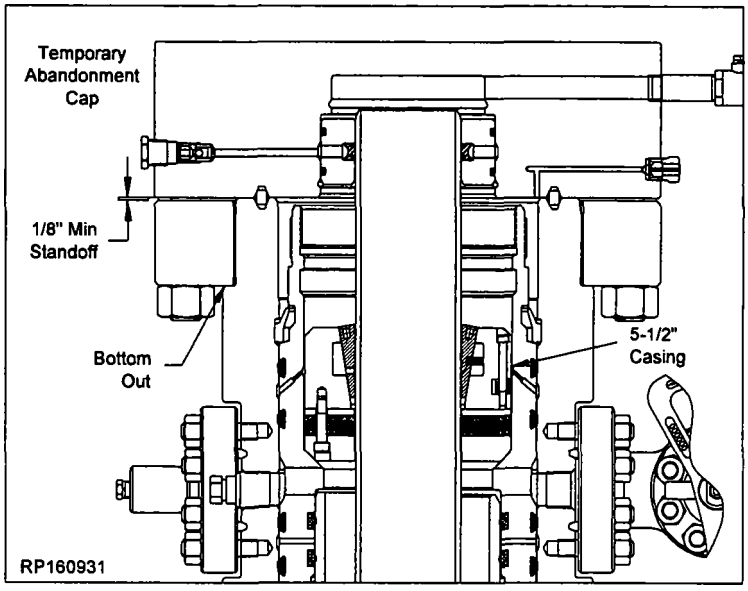
4.1.5. Fill the void above the Casing Hanger with clean oil to the top of the MN-DS Housing.

DO NOT overfill the void. Oil that becomes trapped under the ring gasket will prevent formation of a positive seal.

4.1.6. 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.

Capping Flange
13-5/8" API 5K bottom





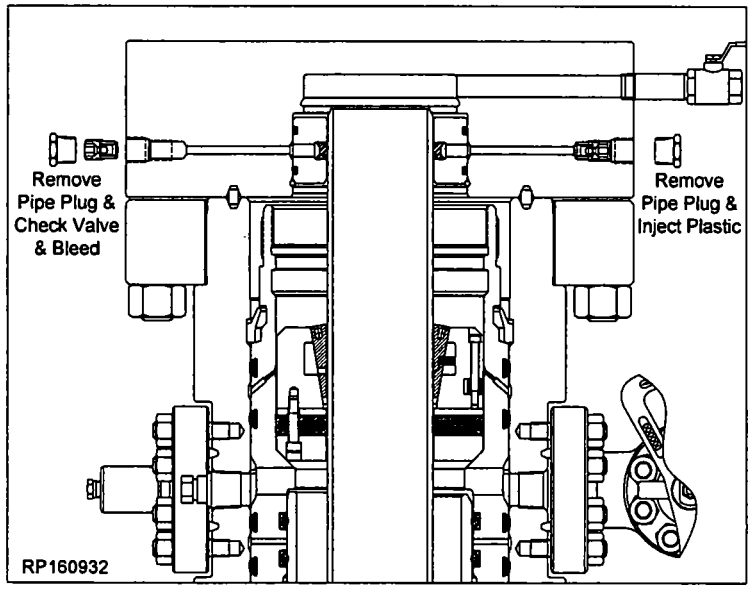
Do Not damage the 'P' seal or their sealing ability will be impaired.

4.1.7. 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.

Stage 4.0 — Install the Capping Flange

4.2. Energize the NX Bushing 'P' Seal

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



4.3. Test the Void Between 5-1/2" or 7" Casing Hanger & Capping Flange 'NX' Bushing

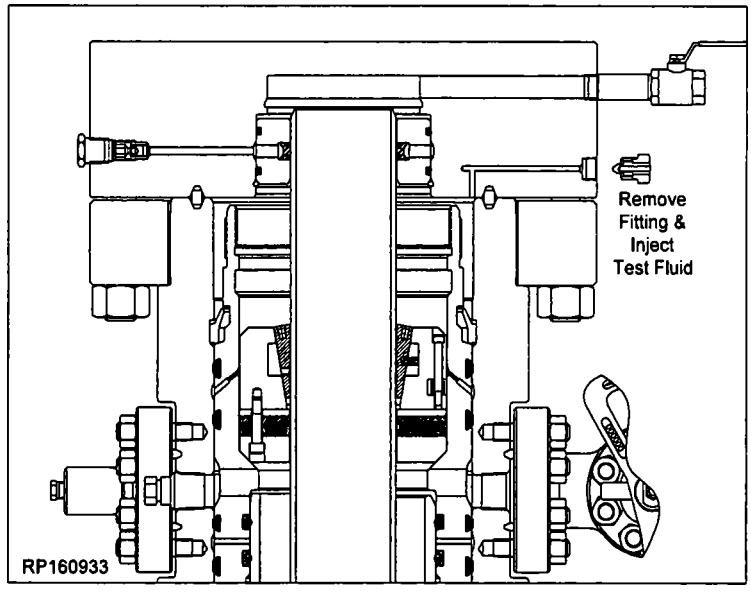
4.3.1. Locate the port on the OD of the Capping Flange for testing the connection and remove the fitting.

4.3.2. Install a test pump to the open port and inject test fluid to ***5,000 PSI maximum or 80% of casing collapse, whichever is less.***

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

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

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



4.3.5. Reinstall the fittings.

Stage 4.0 — Install the Capping Flange

4.4. Remove the Temporary Abandonment Cap

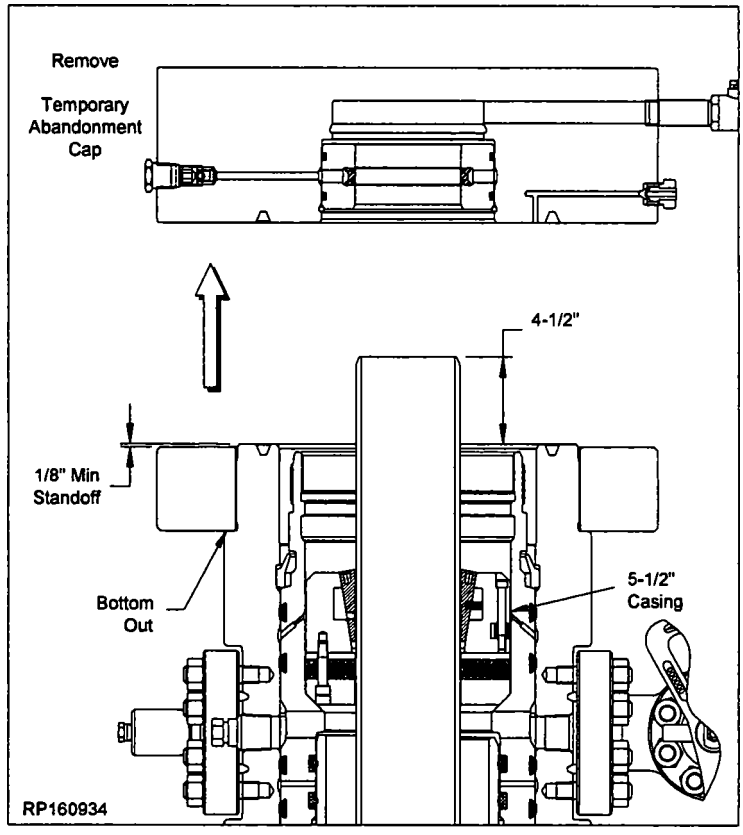
NOTE **Verify the well is safe and secure and that there is no trapped pressure in the well.**

4.4.1. Carefully remove the 1" NPT test plug and 9/16" allen internal check valve to relieve packing pressure on 'P' Seal.

4.4.2. With the appropriate lifting device, lift and suspend the Cap straight up.

4.4.3. Retrieve the Cap to the rig floor.

4.4.4. Inspect the Packoff for signs of damage and report immediately.



Stage 5.0 — Install the Tubing Spool

5.1. Install the Tubing Spool

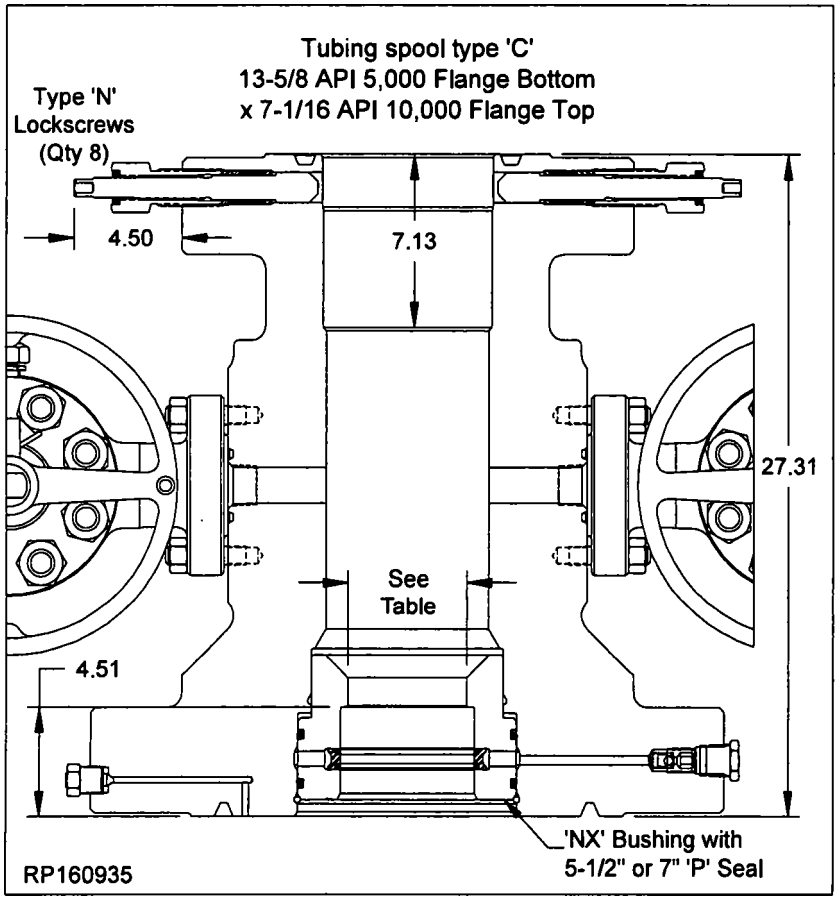
5.1.1. Examine the ***Tubing Spool (Item B1).*** Verify the following:

- bore is clean and free of debris
- ***NX Bushing(Item B2/B2a)*** is properly installed and undamaged.
- ring grooves and seal areas are clean and undamaged
- peripheral equipment is intact and undamaged
- ensure the lockscrews of the tubing spool are retracted from the bore as indicated

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

5.1.2. Lubricate the ID of the NX Bushing 'P' seal and the OD of the casing stub with light oil or grease.

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



NX Bushing		
PN:	Size	Min. Bore
2161829-02-01	5-1/2"	4.92
2161829-17-01	7"	6.34

Stage 5.0 — Install the Tubing Spool

5.1.3. Install a new ***Ring Gasket BX-160 (Item A12)*** into the ring groove of the MN-DS Housing.

5.1.4. Fill the void above the Casing Hanger with clean oil to the top of the MN-DS Housing.

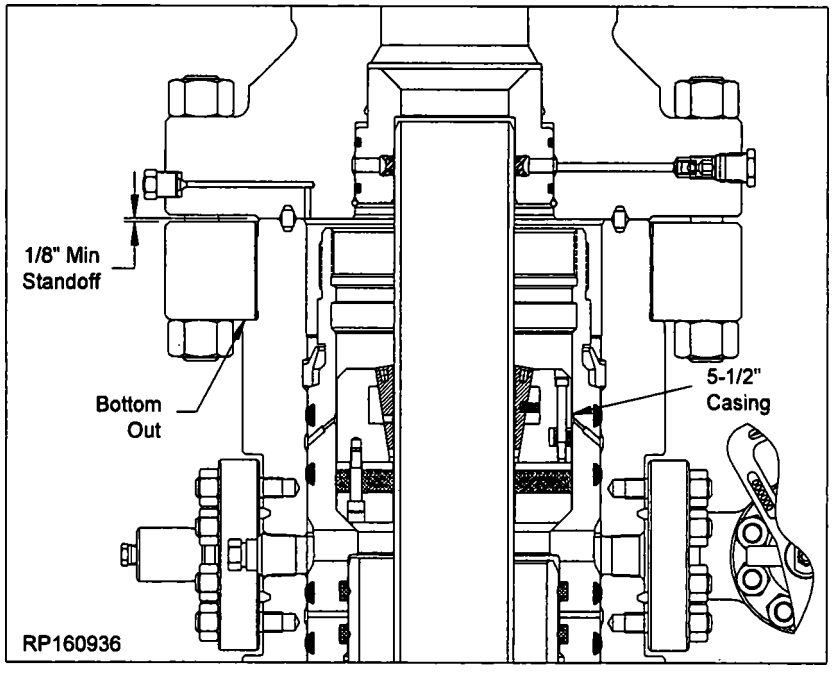
DO NOT overfill the void. Oil that becomes trapped under the ring gasket will prevent formation of a positive seal.

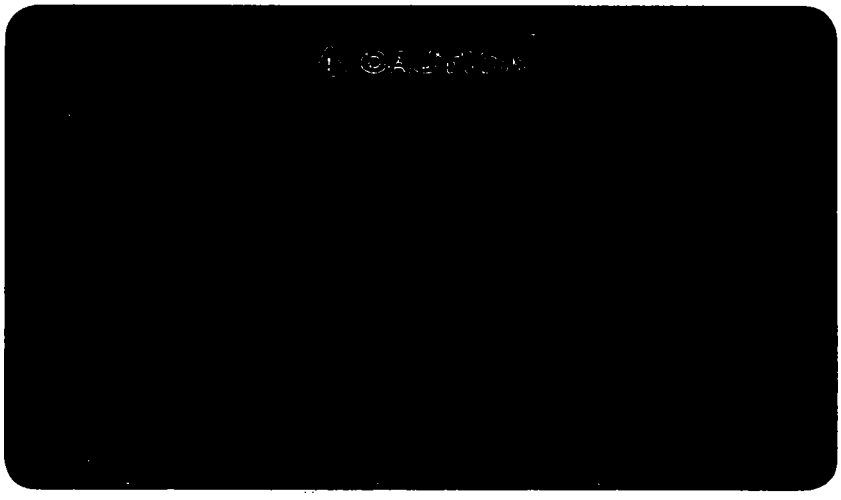
5.1.5. Lift and suspend the Tubing Spool over the casing stub, ensuring it is level. Align the spool outlets as required. Align the bolts of the Spool as required (two hole).

5.1.6. Carefully lower the Tubing Spool onto the casing stub and land it on the Housing flange.

Do Not damage the NX Bushing 'P' seal or its sealing ability will be impaired.

5.1.7. Make up the connection using the ***Studs and Nuts (Item A13 & A14)*** in an alternating cross fashion to the torque referenced in the chart in the back of this manual.

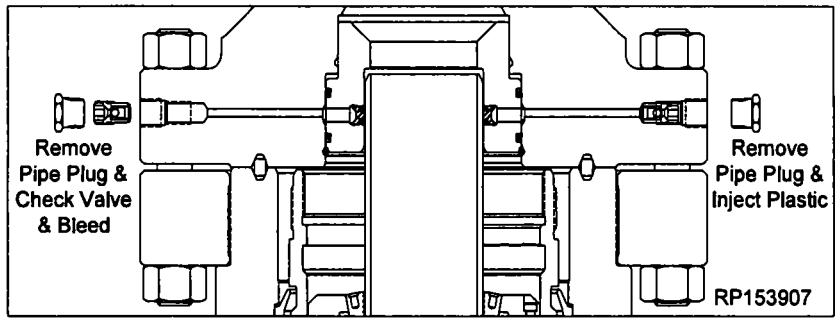




Stage 5.0 — Install the Tubing Spool

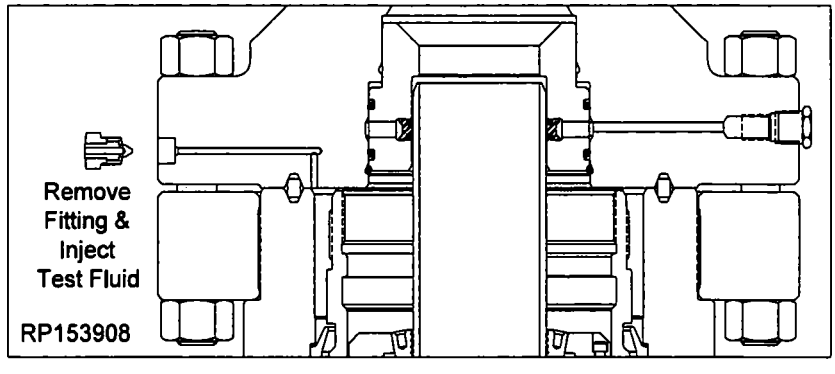
5.2. Energize the NX Bushing 'P' Seal

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



5.3. Test the Void Between 5-1/2" or 7" Casing Hanger & Tubing Spool 'NX' Bushing

5.3.1. Install the test pump into the port for testing the connection and inject test fluid to ***5,000 psi or 80% of casing collapse—whichever is less.***



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

5.3.2. Monitor the open port for signs of leakage.

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

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

5.3.5. Reinstall the fittings.

Stage 6.0 — 2-7/8" Tubing

6.1. Install the Tubing Hanger

6.1.1. Run the tubing as required and space out appropriately.

6.1.2. Examine the ***Tubing Hanger (Item D1).*** Verify the following:

- bore is clean and free of debris
- threads are clean and undamaged
- packing element is properly installed and undamaged
- compression ring is properly installed, moves freely and is properly retained

6.1.3. Orient the Hanger as illustrated.

6.1.4. At a predetermined position in the tubing string, set the tubing in floor slips and remove the tubing collar from the last joint run.

6.1.5. Pick up the Tubing Hanger and make it up to the tubing string, tightening the connection to thread manufacturer's recommended optimum torque.

6.1.6. Make up the tubing to the top of the Hanger and tighten to the thread manufacturer's recommended shoulder torque.

6.1.7. Wipe the packing element with a light coat of oil.

Excessive oil may prevent a positive seal from forming.

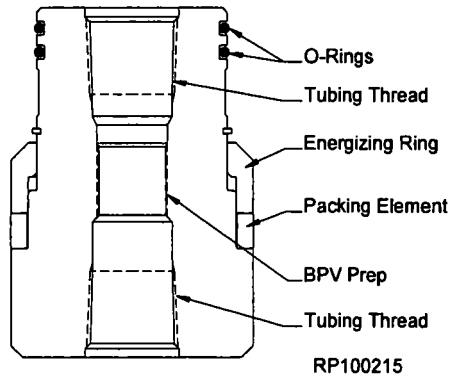
6.1.8. Ensure all of the lockscrews are retracted from bore of the Tubing Spool as indicated on page 47.

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

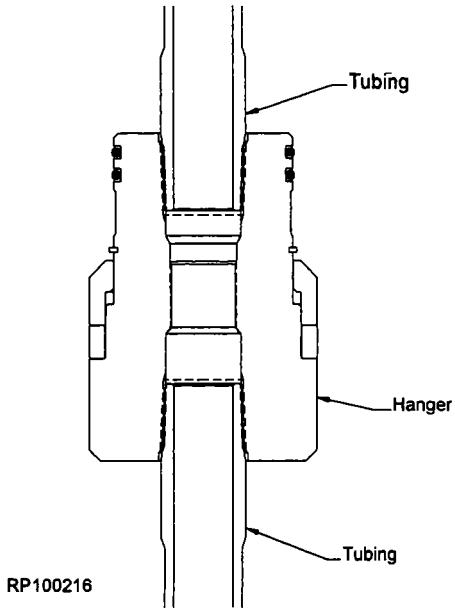
6.1.9. Open side outlet valve of the Tubing Spool and drain BOP.

NOTE **Side outlet valve to remain open while landing the Hanger.**

TC-1A-EN
Tubing Hanger



RP100215



RP100216

Stage 6.0 — 2-7/8" Tubing

6.1.10. Calculate the distance of the load shoulder of the Tubing Spool to the rig floor by measuring from the face of the Spool to the rig floor and add the distance from the flange face to the top of the load shoulder.

NOTE **The distance from the flange face to the top of the load shoulder is as follows: 7" Spool = 7.13"**

6.1.11. Pick up the tubing string, remove the floor slips. Carefully lower the Tubing Hanger into the well, tallying the tubing every five feet and land the Tubing Hanger on the load shoulder in the Spool. Slack off all weight.

6.1.12. With the Hanger properly landed, energize the tubing hanger packoff seal. Run in all the lockscrews of the Tubing Spool in an alternating cross pattern to the ***torque referenced in the chart in the back of this manual.***

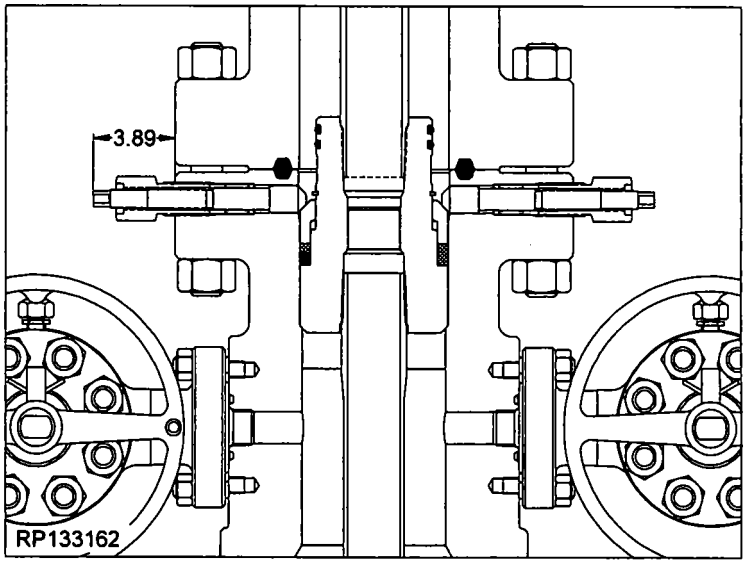
NOTE **Reference dimension shown, is to the point of lockscrew contact with the compression ring prior to energizing the Tubing Hanger Packoff seal.**

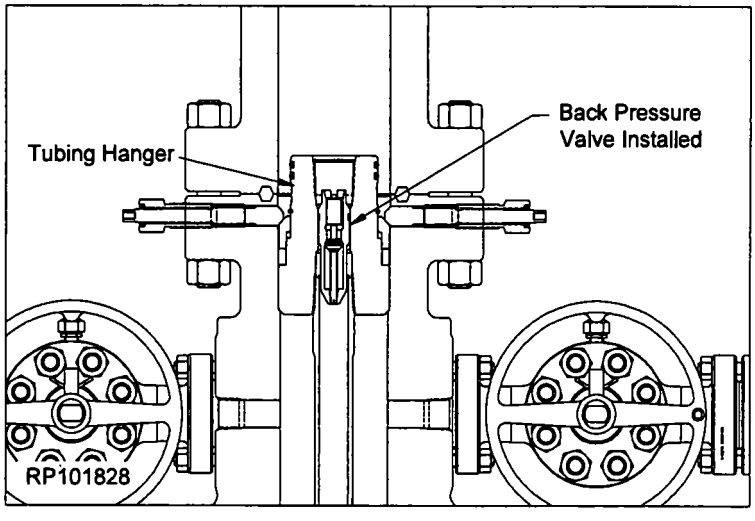
All Lockscrews *MUST* achieve positions as indicated. Otherwise contact Surface Engineering for guidance.

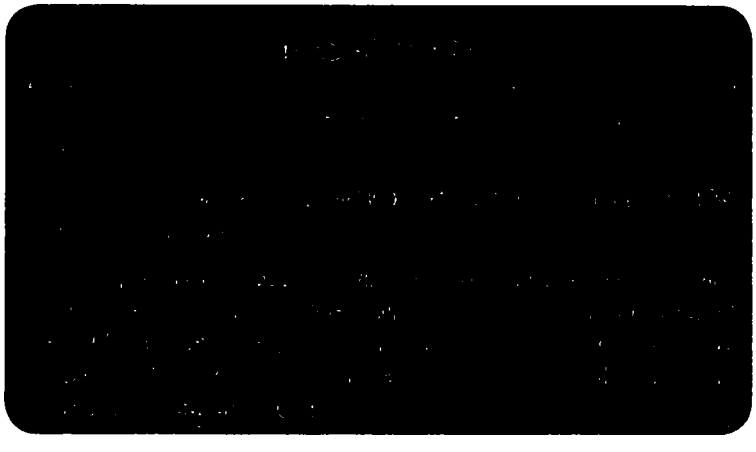
6.1.13. Remove the landing joint and install appropriate size back pressure valve.

NOTE **Installation and/or Removal of the Type 'H' Left Hand threaded Back Pressure Valve to be performed by a Qualified Cameron Technician.**

6.1.14. With the well safe and under control, the BOP stack may be removed.







6.2. Install the Christmas Tree

6.2.1. Examine the Christmas Tree Assembly. Verify the following:

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

6.2.2. Orient the Tree as illustrated.

6.2.3. Clean the mating ring grooves of the Spool and adapter. Wipe each groove, the hanger neck seals and the ID of the Adapter with a light coat of oil or grease.

CAUTION Excessive oil may prevent a positive seal from forming.

6.2.4. Place a new ***BX-156 Ring Gasket (Item B9)*** into the gasket prep of the tubing spool.

6.2.5. Fill the void above the Hanger with clean oil to the top of the Tubing Spool.

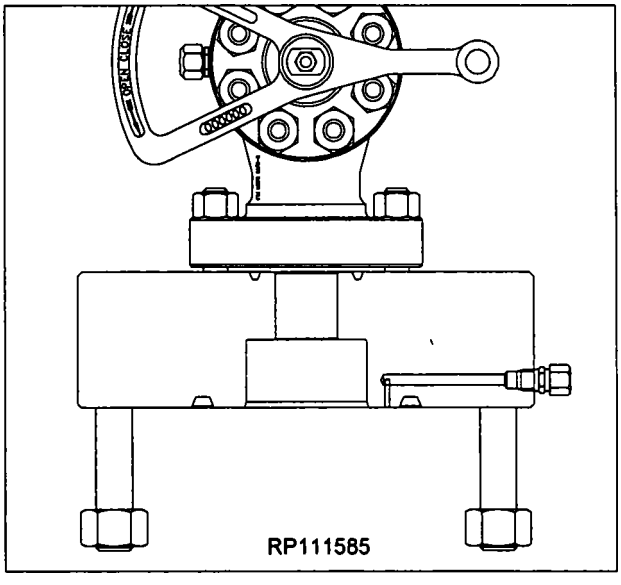
CAUTION DO NOT overfill the void. Oil that becomes trapped under the ring gasket will prevent formation of a positive seal.

6.2.6. Locate the port on the OD of the Adapter flange and remove the autoclave fitting. This will allow air to escape while landing Tree assembly over hanger neck.

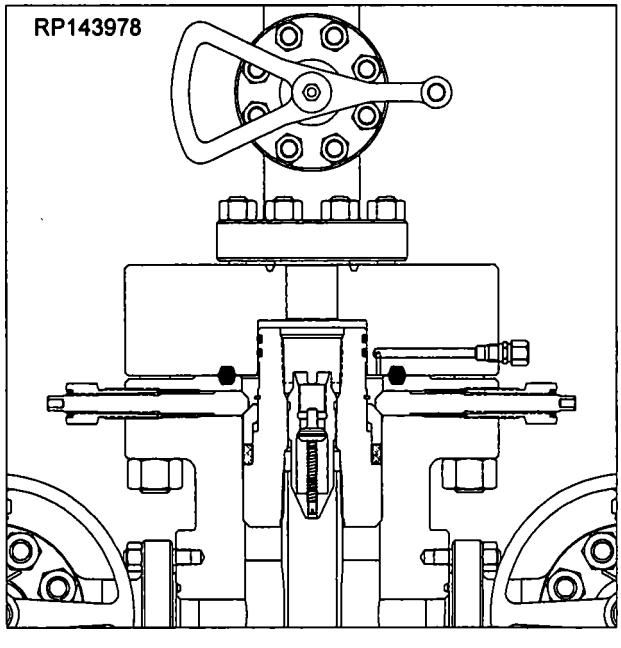
6.2.7. Lift and suspend Tree Assembly over Tubing Spool.

6.2.8. Orient the Tree Assembly as required per Drilling Supervisor and carefully lower the Tree Assembly until the Adapter lands on the ring gasket of the Tubing Spool.

6.2.9. Make up the connection with the ***Studs and Nuts*** of the Adapter, tightening them in an alternating cross patter to the torque referenced in the chart in the back of this manual.



RP111585


RP143978

6.3. Test the Connection

6.3.1. Locate the port on the OD of the Adapter flange and remove the autoclave fitting.

6.3.2. Install a test pump and inject test fluid to ***10,000 psi maximum.***

Do Not overpressurize!

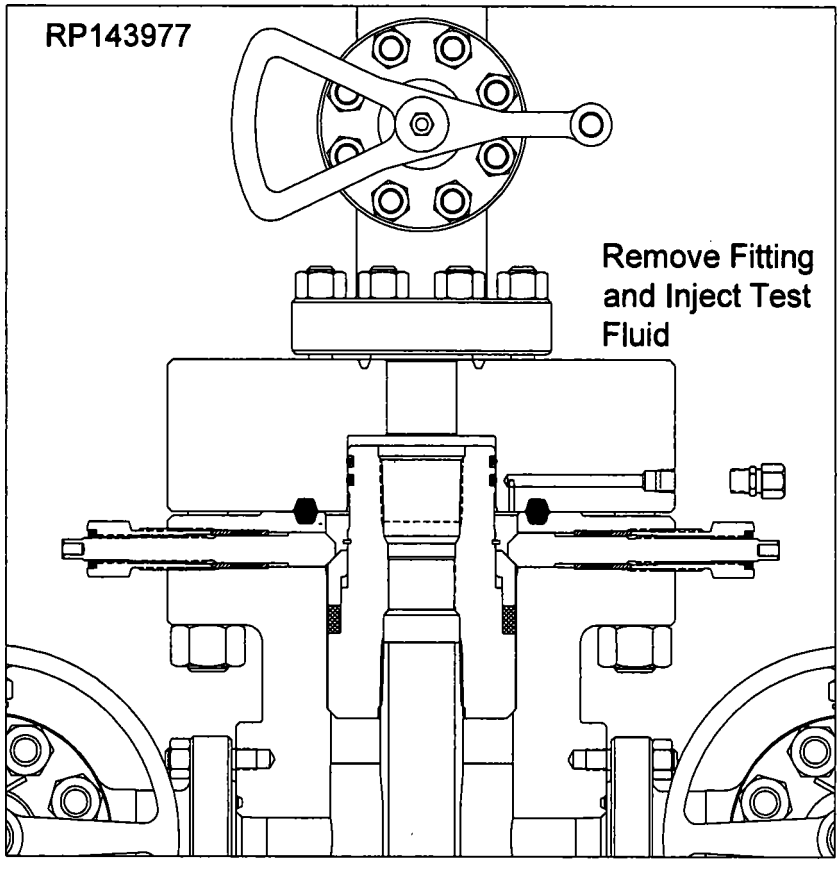
6.3.3. Hold and monitor test pressure for fifteen minutes or as required by Drilling Supervisor.

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

6.3.5. Reinstall the fitting.

6.3.6. Remove the Back Pressure Valve.

NOTE Installation and/or removal of the Type 'H' Left Hand one way back pressure valve to be performed only by a qualified Cameron Service Technician.



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)
9"	4-1/2"	46,000
	5-1/2"	42,000
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

RP-000573

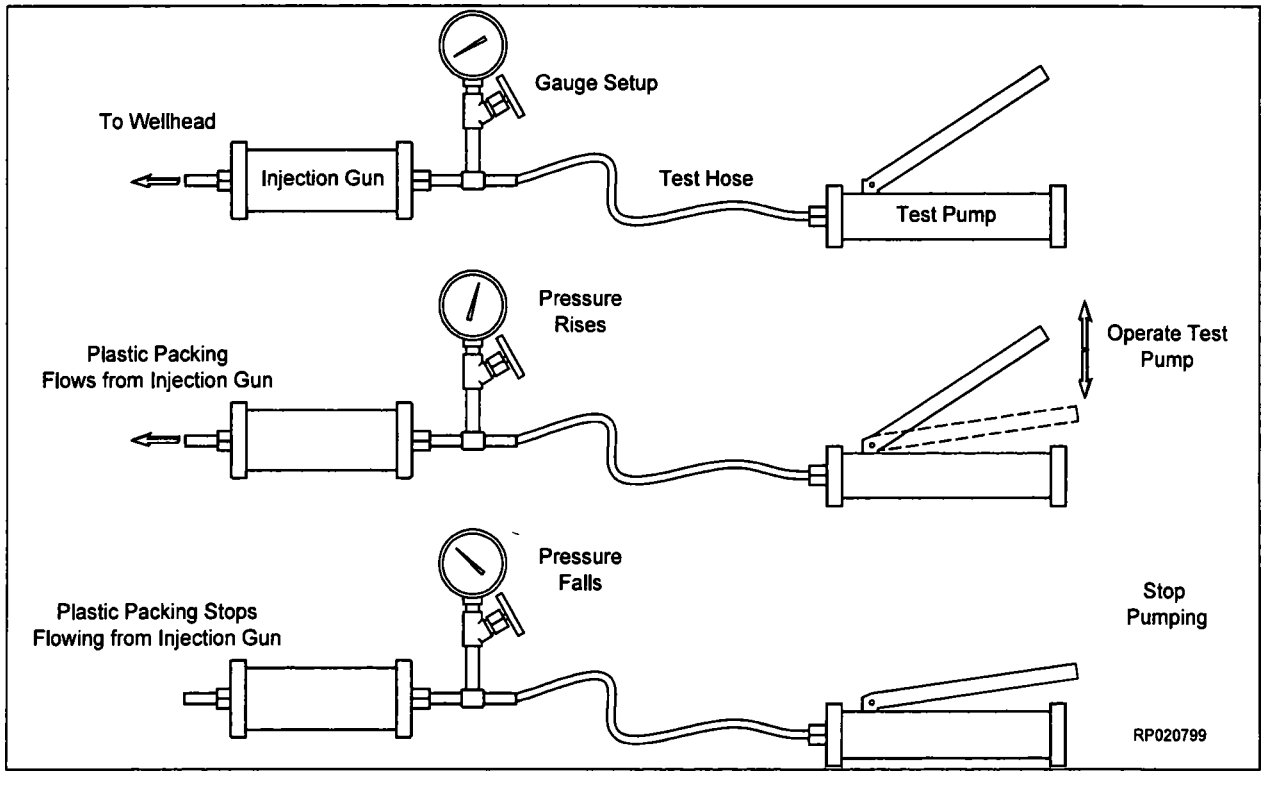
Injection Gun Preparation

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

Reference Documents

Refer to Operation and Maintenance Manuals and Standard Running Procedures.

Running Procedure	Description
TC-000148-02	Cameron Type FL & FLS Operation and Maintenance Manual
TC-009084-02	WKM Model M Power R-Seal Operation and Maintenance Manual
RP-002153	Make-up Requirements for API Flange Connections
RP-001558	Valve Removal Plugs
RP-003737	Standard MN-DS Housing with Landing Base Running Procedure
RP-003767	Standard MN-DS Housing through Rotary Table Running Procedure
RP-000654	Standard IC Test Plug Procedure for BOP Test
RP-003740	Standard MN-DS Intermediate Hanger Running Procedure
RP-003734	Standard Wash Tool Procedure
RP-003741	Standard MN-DS Intermediate Packoff Support Bushing Running Procedure
RP-003757	Standard MN-DS Production Packoff Running Procedure
RP-000573	Standard IC-2 Casing Hanger Running Procedure
RP-000592	Standard 'NX' Bushing Running Procedure

Document Control

Revision History

Revision	Date	Description	Prepared by:
01	April 26, 2016	Initial Release per 650205763 Houston Surface Systems Engineering	Maria Contreras
02	December 05, 2018	Revised Publication per 650356691	Eric Ayres

About this Revision

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