Wood Group Pressure Control

Wellhead Equipment
Running Procedures
for:

Origin Energy

9-5/8" x 7" x 2-7/8"
Conventional Wellhead Assembly with
11" 5M Casing Head

Publication # RP-768
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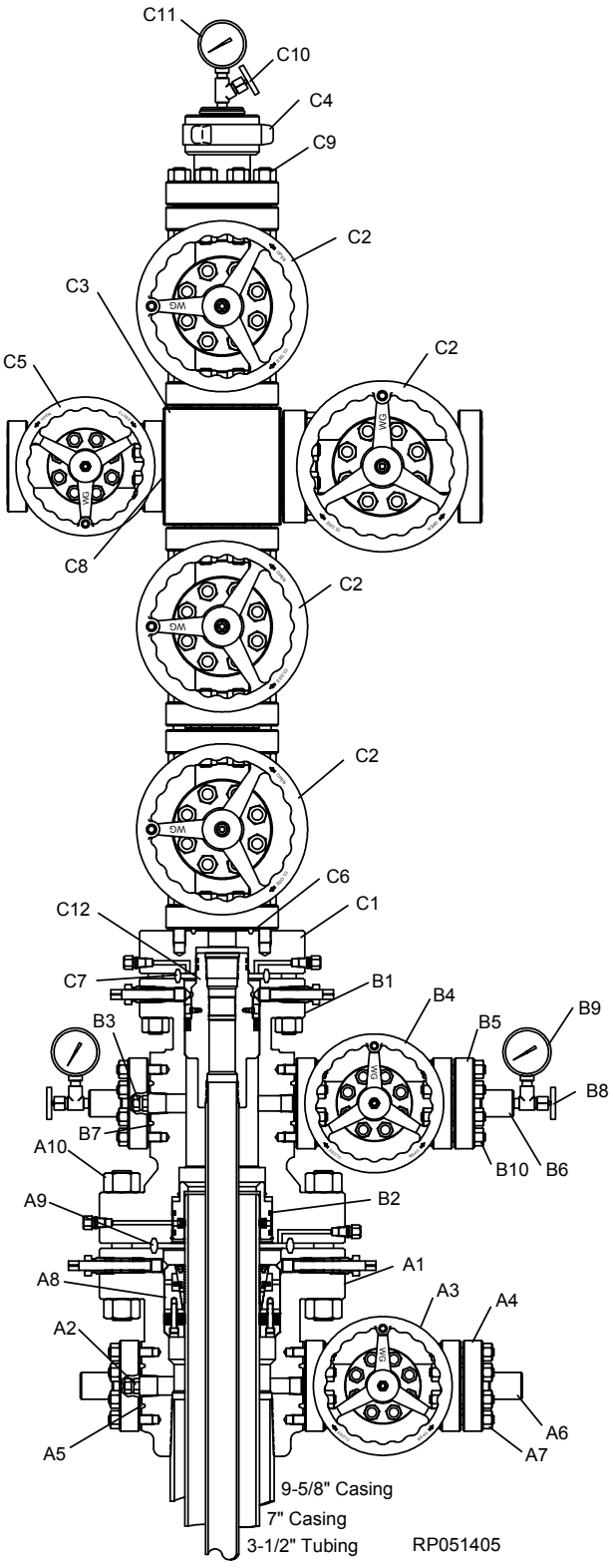
Bill of Materials



Wood Group Pressure Control	Origin Energy 9-5/8" x 7" x 2-7/8" Conventional Wellhead Assembly	RP-768 Page 1

CASING HEAD ASSEMBLY

Item	Qty	Description
A1	1	Casing Head, WG-22-BP, 11" 5M x 9-5/8" buttress box bottom and two 2-1/16" 5M studded outlets Part # 306495
A2	1	Valve Removal Plug, 1-1/2" Part # 304915
A3	1	Gate Valve, manual, 2000W-SF, 2-1/16" 5M, flanged Part # 338300
A4	2	Companion Flange, 2-1/16" 5M x 2" line pipe Part # 306230
A5	3	Ring Gasket, RX-24, PSL4 Part # RX24
A6	2	Bull Plug, tapped, 2" line pipe x 1/2" npt Part # 323250
A7	8	Studs, with two nuts each, 7/8" x 6-1/4" long, B7/2H Part # SN078-0614B7
A8	1	Casing Hanger, WG-22, 11" x 7" Part # 318636
A9	1	Ring Gasket, RX-54, PSL4 Part # RX54
A10	12	Studs, with two nuts each, 1-7/8" x 14-1/2" long, B7/2H Part # SN178-1412B7

TUBING HEAD ASSEMBLY

Item	Qty	Description
B1	1	Tubing Head, TCM-X, 11" 5M x 7-1/16" 5M with two 2-1/16" 5M studded outlets and bottom prepped for X bushing Part # 306220
B2	1	Secondary Seal, WG-X, 11" x 7" Part # 306222
B3	1	Valve Removal Plug, 1-1/2" Part # 304915
B4	1	Gate Valve, manual, 2000W-SF, 2-1/16" 5M, flanged Part # 338300
B5	2	Companion Flange, 2-1/16" 5M x 2" line pipe Part # 306230
B6	2	Bull Plug, tapped, 2" line pipe x 1/2" npt Part # 323250
B7	3	Ring Gasket, RX-24, PSL4 Part # RX24
B8	2	Needle Valve, angled, 1/2" npt Part # 23-125A
B9	2	Pressure Gauge, 0-5M, 1/2" npt Part # 65776
B10	8	Studs, with two nuts each, 7/8" x 6-1/4" long, B7/2H Part # SN078-0614B7

CHRISTMAS TREE ASSEMBLY

Item	Qty	Description
C1	1	Adapter, double studded, A4-EN, 7-1/16' 5M x 3-1/8" 5M Part # 311840
C2	4	Gate Valve, manual, 2200C, 3-1/8" 5M, flanged Part # 306162
C3	1	Cross, studded, 3-1/8" 5M run and one outlet x 2-1/16" 5M outlet Part # 305798
C4	1	Tree Cap, Bowen, 3-1/8" 5M x 3-1/2" uptbg internal lift threads Part # 233-2-AS1
C5	1	Gate Valve, manual, 2000W-SF, 2-1/16" 5M, flanged Part # 338300
C6	6	Ring Gasket, RX-35, PSL4 Part # RX35
C7	1	Ring Gasket, RX-46, PSL4 Part # RX46
C8	1	Ring Gasket, RX-24, PSL4 Part # RX24
C9	16	Studs, with two nuts each, 1-1/8" x 7-3/4" long, B7/2H Part # SN118-0734B7
C10	1	Needle Valve, straight, 1/2" npt Part # 24-125
C11	1	Pressure Gauge, 0-5M, 1/2" npt Part # 65776
C12	1	Tubing Hanger, WG-EN, 7-1/16" x 3-1/2" uptbg box top and bottom with 4-7/8" OD neck and 3" type H back pressure valve prep Part # 311964

RECOMMENDED SERVICE TOOLS

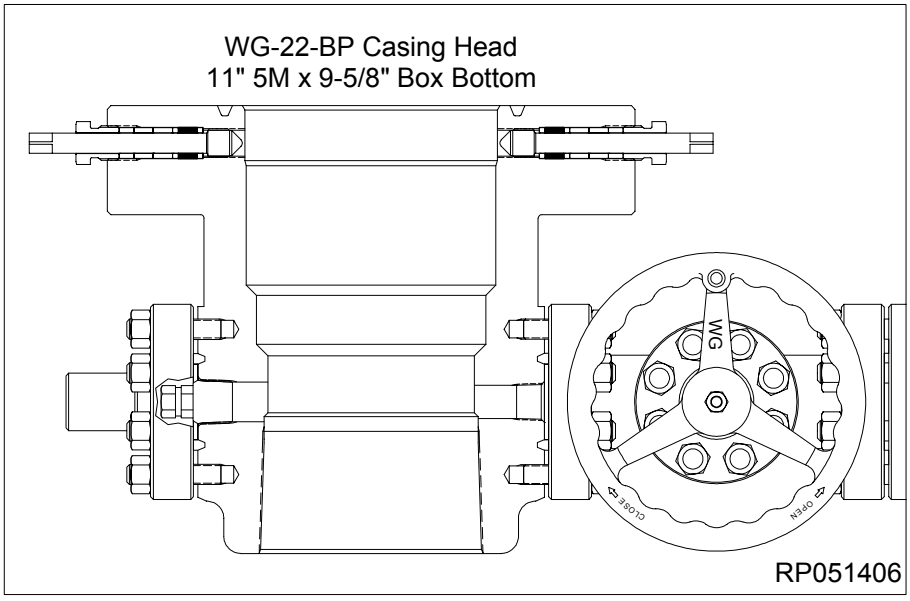
Item	Qty	Description
ST1	1	Combination Tool, WG-22, 11" nominal x 4-1/2" IF box top and bottom
ST2	1	Wear Bushing, 11" nominal
ST3	1	Combination Tool, WG-22, 7-1/16" nominal x 3-1/2" IF box top x pin bottom
ST4	1	Back Pressure Valve, one way, 3", type H

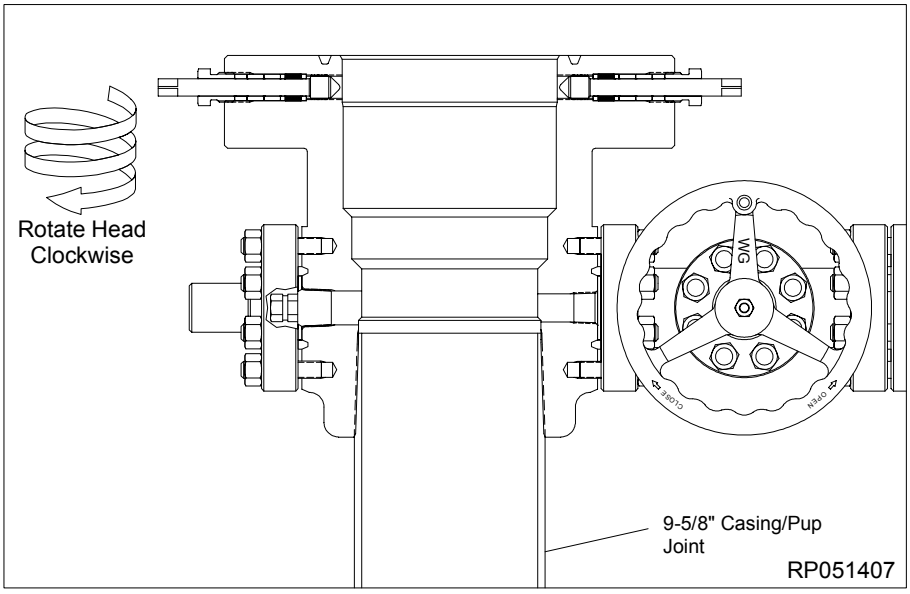
Stage 1 — Install the Casing Head Assembly

1. Run the 9-5/8" surface casing to the required depth and space out appropriately.
2. Examine the ***WG-22-BP 11" 5M x 9-5/8" Box Bottom Casing Head (Item A1)***. Verify the following:
   - threads, bore, and exposed ring grooves are clean and undamaged
   - outlet equipment is intact and undamaged
   - pup joint is properly installed, secure and undamaged, if required

Note: If desired, a pup joint may be placed in the bottom of the Head.

4. Thoroughly clean and dry the mating threads of both the Casing Head and casing and apply a thread manufacturers recommended lubricant to the threads.
5. Carefully lower the Casing Head onto the casing until the mating threads make contact.
6. Balancing the weight of the Casing Head such that it is unloaded, rotate the Casing Head clockwise to the thread manufacturer's recommended optimum torque.





Stage 2 — Test the BOP Stack

1. Examine the ***11" Combination Tool (Item ST1)***. Verify the following:
   - elastomer seals, lift lugs, and plugs are intact and in good condition
   - drill pipe threads are clean and in good condition
2. Install a new Ring Gasket in the ring groove of the Casing Head and make up the BOP stack.

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.

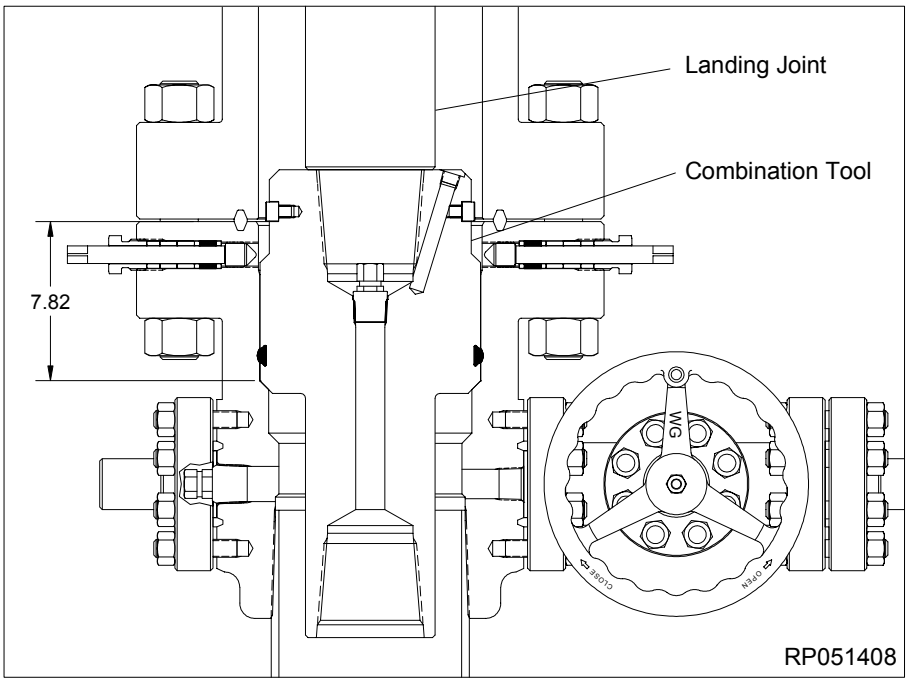
3. Orient the Tool with elastomer down and lift lugs up.
4. Make up a joint of drill pipe to the top of the Tool.

WARNING: Make sure the **elastomer is down** and the **lift lugs are up**.

5. Remove 1/2" NPT pipe plug if pressure is to be supplied through the drill pipe.
6. Lubricate the elastomer seal of the Tool with a light oil or grease.

WARNING: When operating lockscrews, the gland nut is at no time to be backed off to operate the lockscrew.

7. Ensure the lockscrews of the casing Head are fully retracted from the bore following the instructions in the back of this manual.



8. Lower the Tool through the BOP until it lands on the load shoulder in the Casing Head, 7.82" below the top of the Casing Head.
9. Close the BOP rams on the drill pipe and test to ***5,000 psi*** or as required by drilling supervisor.
10. After a satisfactory test, release pressure, and open the rams.
11. Remove as much fluid from the BOP stack as possible.
12. Retrieve the Tool slowly to avoid damage to the seal.
13. Repeat this procedure as required during the drilling of the hole.

Stage 3 — Run the Wear Bushing

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

1. Examine the ***11" Wear Bushing (Item ST2).*** Verify the following that the internal bore is clean and in good condition

Running the Wear Bushing before drilling

2. Orient the ***11" Combination Tool (Item ST1)*** with the lift lugs down and the elastomer up.

WARNING: Make sure the **lift lugs are down** and the **elastomer is up** when latching into the Wear Bushing.

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3. Attach the Tool to a joint of drill pipe.
4. Lower the Tool into the Wear Bushing and rotate the Tool 1/4 turn clockwise.
5. Ensure the lockscrews of the Casing Head are fully retracted from the bore.
6. Apply a heavy coat of grease, not dope, to the OD of the bushing.
7. Slowly lower the Tool/Bushing Assembly through the BOP stack and land the Wear Bushing on the load shoulder in the Casing Head, 7.82" below the top of the Casing Head.

WARNING: When operating lockscrews, the gland nut is at no time to be backed off to operate the lockscrew.

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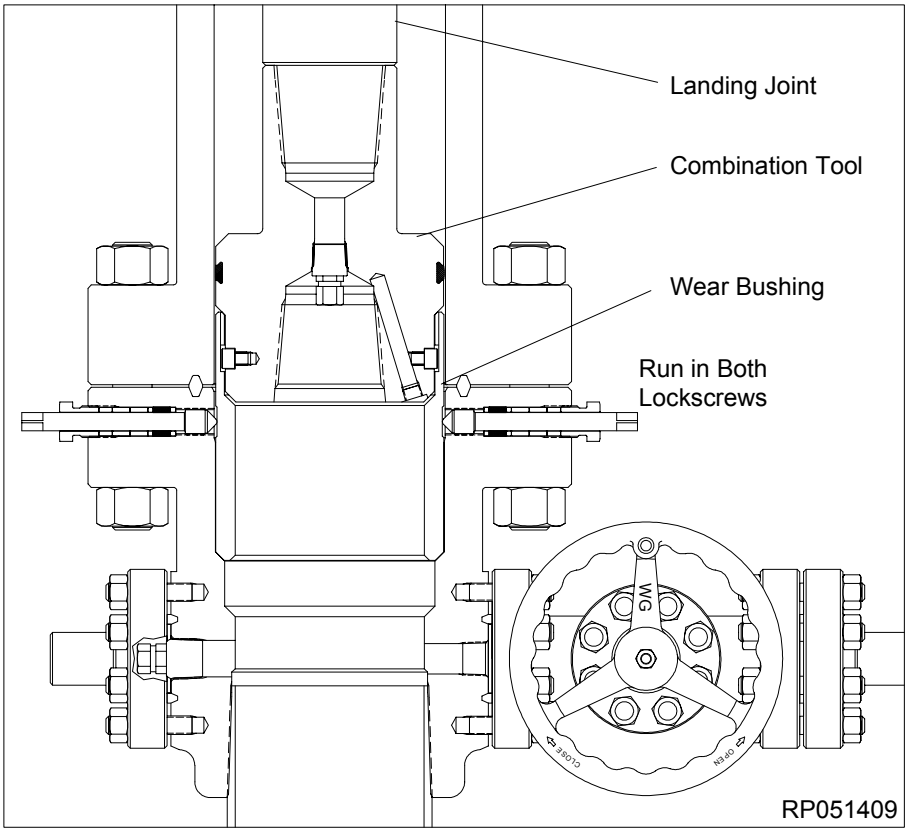
8. Holding a backup on the gland nut, run in both of the lockscrews in an alternating cross fashion until the lockscrews just contact the OD of the Bushing. (Reference the back of this manual for detailed lockscrew operation).

Warning: Do Not overtighten the lockscrews!



9. Remove the Tool from the Wear Bushing by rotating the drill pipe counterclockwise 1/4 turn and lifting straight up.
10. Drill as required.

Note: It is highly recommended to retrieve, clean, inspect, grease, and reset the wear bushing each time the hole is tripped during the drilling of the hole section.

Retrieving the Wear Bushing after drilling

11. Make up the Tool to the drill pipe with the lift lugs down and the elastomer up.
12. Slowly lower the Tool into the Wear Bushing.
13. Rotate the Tool clockwise until the drill pipe drops approximately 2". This indicates the lugs have aligned with the Wear Bushing slots.
14. Slack off all weight to make sure the Tool is down.
15. Rotate the Tool clockwise 1/4 turn to fully engage the lugs in the Wear Bushing.
16. Fully retract both lockscrews of the Casing Head in the manner previously described.
17. Retrieve the Wear Bushing, and remove it and the Tool from the drill string.

Stage 4 — Hang Off the 7" Casing

1. Run the 7" casing string as required, space out appropriately and cement as required.
2. Drain the Casing Head bowl through the side outlet and ensure the lockscrews are fully retracted from the bore.
3. Examine the ***11" x 7" WG-22 Slip Casing Hanger (Item A8).*** Verify the following:
   - slips and internal bore are clean and in good condition
   - all screws are in place
   - packoff rubber is in good condition

Note: Ensure that the packoff rubber does not protrude beyond the O.D. of the casing hanger body. If it is, loosen the cap screws in the bottom of the hanger.

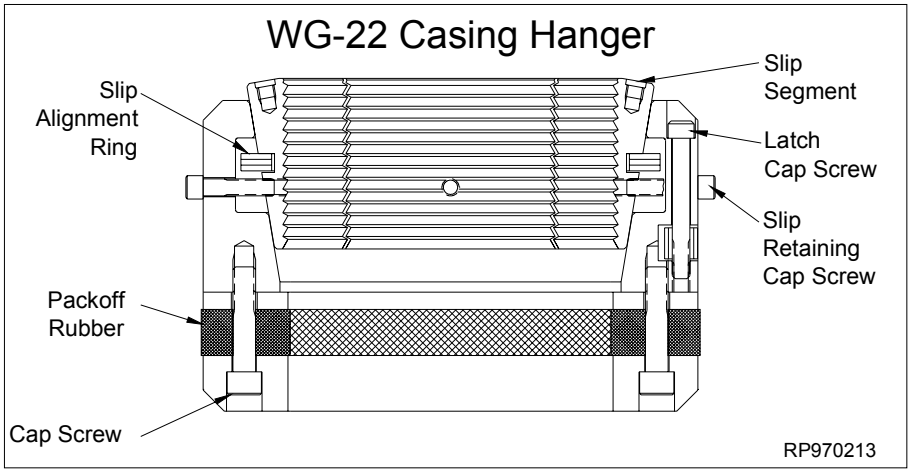
4. Separate the BOP from the Casing Head and lift the BOP approximately 12" to 16" above the Casing Head and secure BOP with safetyslings.
5. Note the location of the casing collar.

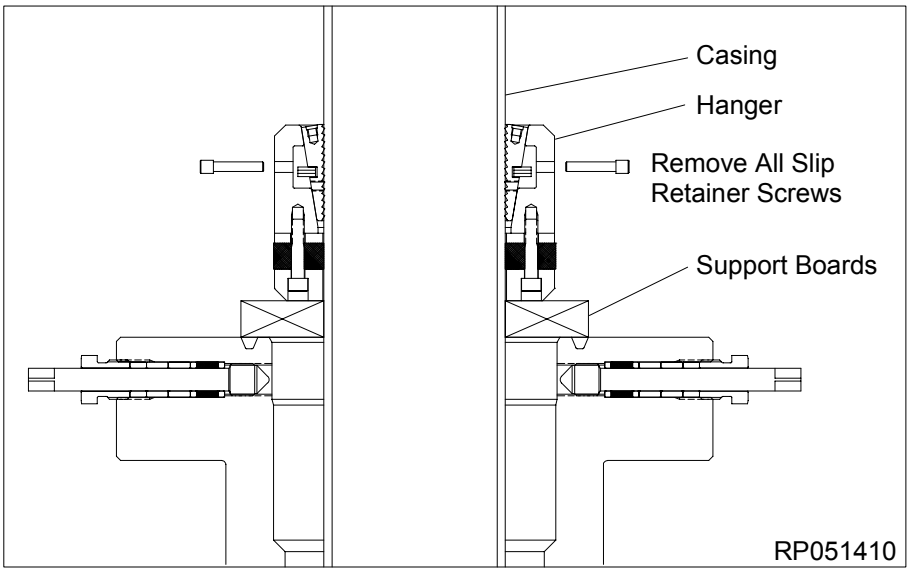
Note: If the collar is located in a position too low to allow the Hanger to be installed, the collar must be lifted.

6. Using a fresh water hose, thoroughly wash out the Casing Head bowl.

Note: Casing Head side outlet valve to remain open while setting the Hanger.

7. Remove the latch screw to open the Hanger.
8. Place two boards on the Casing Head Flange against the casing to support the Hanger.
9. Wrap the Hanger around the casing and replace the latch screw.
10. Grease the Casing Hanger's body and remove the slip retaining cap screws.





Stage 4 — Hang Off the 7" Casing

11. Ensure the lockscrews are fully retracted from the bore and remove the boards and allow the Hanger to slide into the bowl and land the Hanger on the load shoulder of the Head.

12. Pull tension on the casing to the desired hanging weight and then slack off.

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 again and slack off once more.

WARNING: Because of the potential fire hazard and the risk of loss of life and property, It is highly recommended to check the casing annulus and pipe bore for gas with an approved sensing device prior to cutting off the casing. If gas is present, do not use an open flame torch to cut the casing. It will be necessary to use a air driven mechanical cutter which is spark free.

WARNING: When operating lockscrews, the gland nut is at no time to be backed off to operate the lockscrew.

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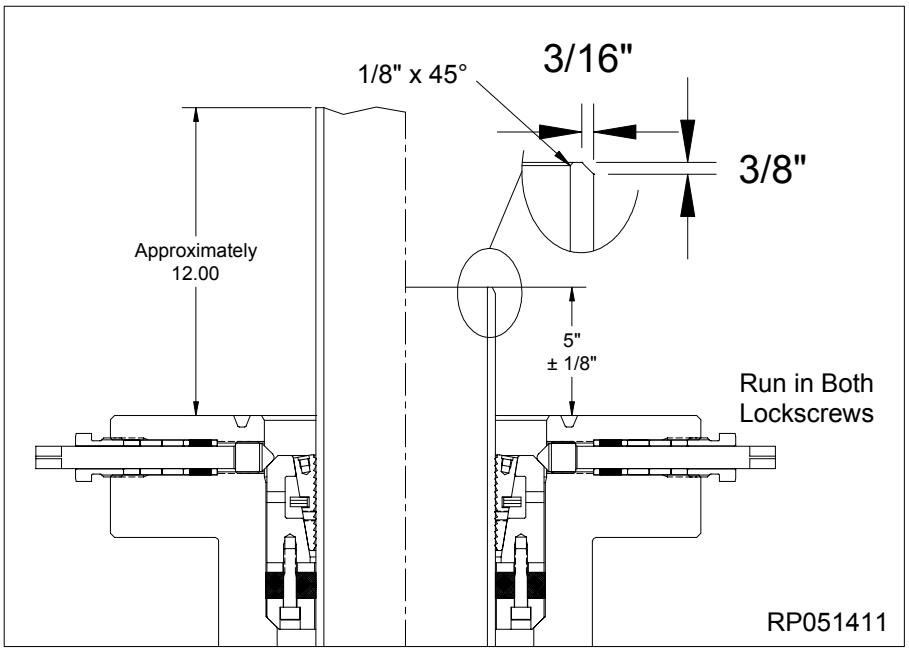
13. Holding a backup on the gland nut, run in both of the lockscrews in an alternating cross fashion to approximately 200 ft lbs. (Reference the back of this manual for detailed lockscrew operation).

14. Rough cut the casing approximately 12" above the top flange and move the excess casing and BOP out of the way.



15. Final cut the casing stub at 5" ± 1/8" above the top of the Head and grind a 3/8" x 3-16" bevel on the OD of the casing stub and place a small bevel on the ID of the casing stub.

16. Using a high pressure water hose, thoroughly clean the top of the Head, Hanger, and casing stub and blow dry with compressed air. Ensure all cutting debris are removed .

17. Fill the void above the Hanger with clean test fluid to the top of the Head.

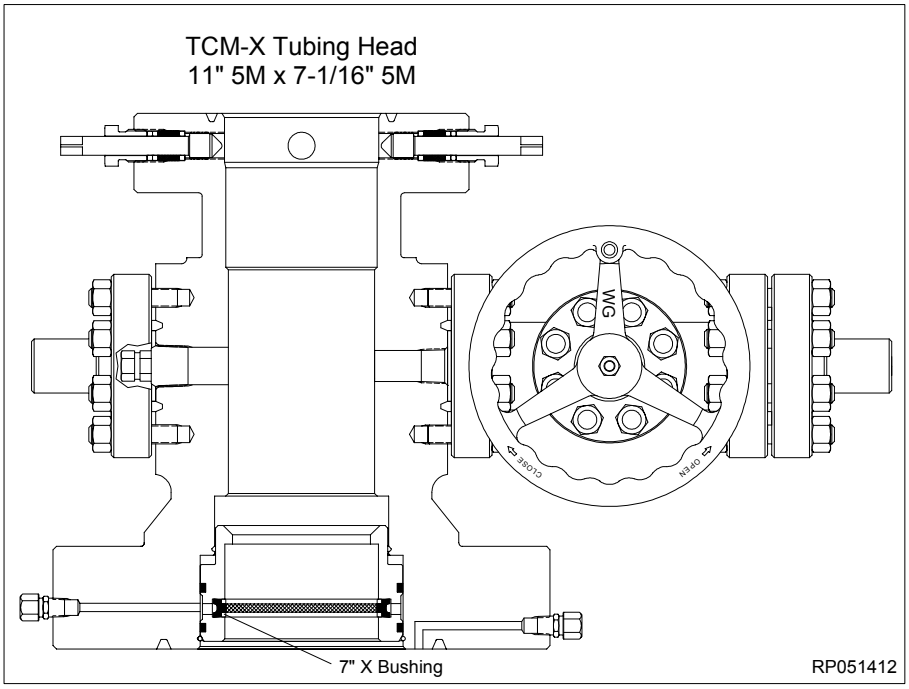
WARNING: Do **N**ot over fill the void with test fluid - trapped fluid under the ring gasket may prevent a positive seal from forming.

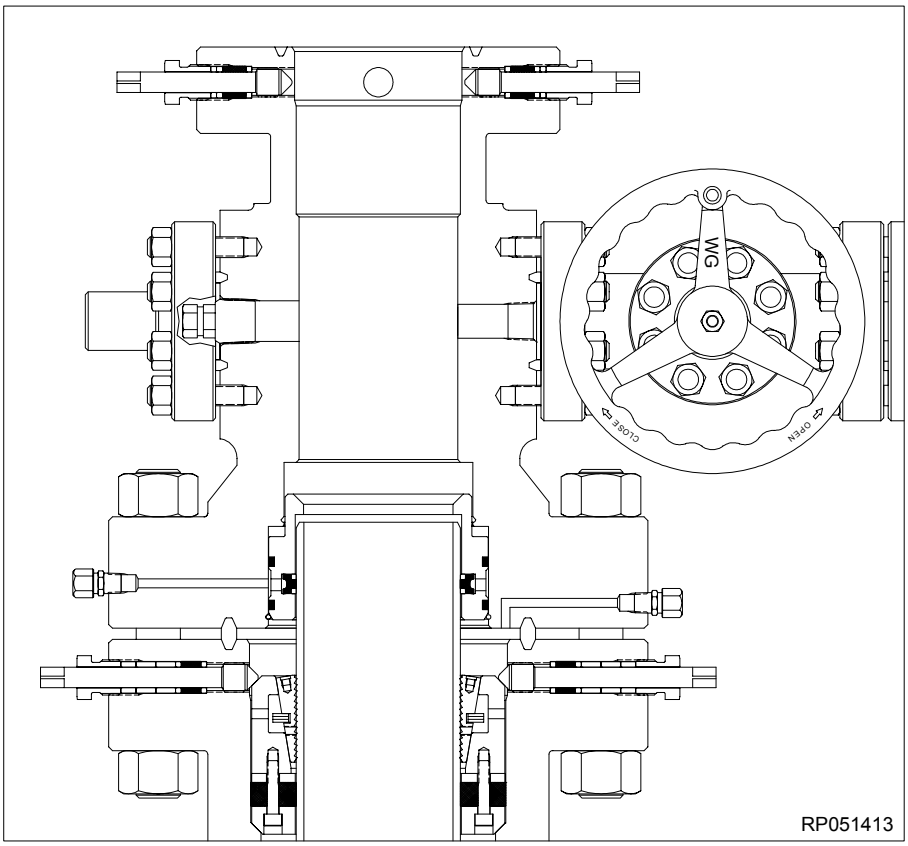
Stage 5 — Install the Tubing Head

1. Examine the ***11" 5M x 7-1/16" 5M TCM-X Tubing Head (Item B1)***. Verify the following:
   - ring grooves and bore are clean and undamaged
   - all peripheral equipment is intact and undamaged
   - ***X Bushing (Item B2)*** is properly installed and undamaged
2. Clean the mating ring grooves of the Tubing and Casing Head.
3. Install a new ***RX-54 Ring Gasket (Item A9)*** in the ring groove of the Casing Head.
4. Orient the Tubing Head as required and carefully lower it over the casing stub and land it on the ring gasket.

Warning: Do not damage the P seal or its sealing ability will be impaired!

5. Make up the flange connection with the appropriate ***Studs and Nuts (Item A10)***, tightening them in an alternating cross pattern.

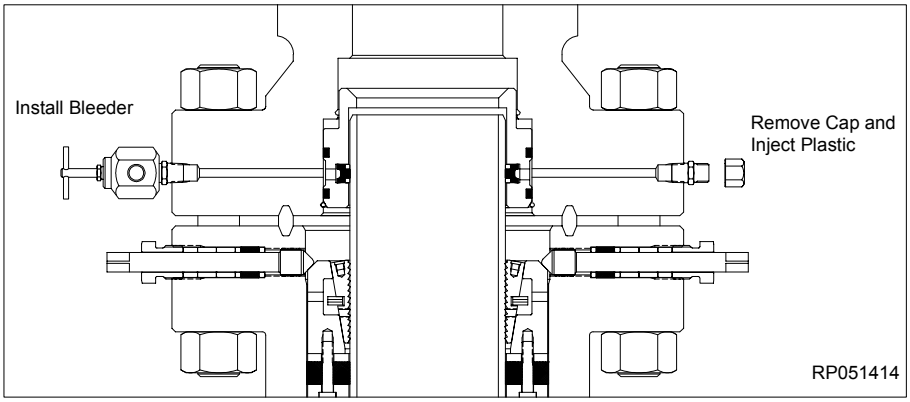




Stage 5 — Install the Tubing Head

Energize the P Seal

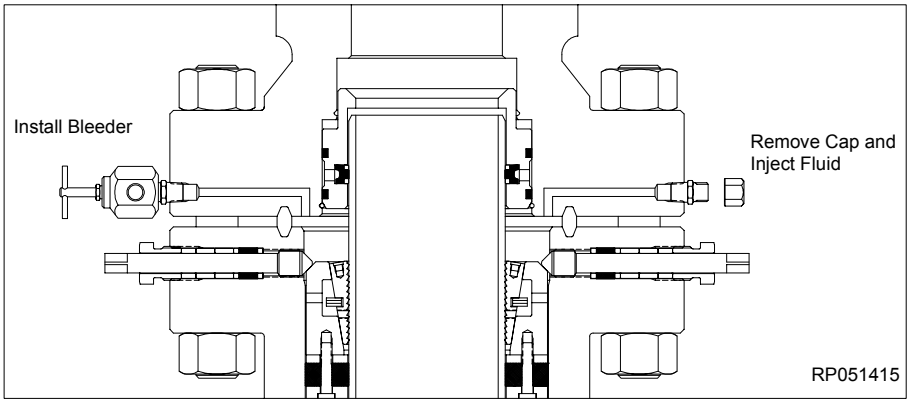
1. Locate the INJ fittings on the bottom flange of the Head and remove the dust caps.
2. Install a bleeder tool to the fitting and open the tool.
3. Attach a plastic injection tool to the opposite INJ fitting and inject plastic packing into the P seal to ***5,000 psi. or 80% of casing collapse — whichever is less.***
4. Hold the test pressure until it has stabilized.
5. Once the pressure has stabilized, remove the injection and bleeder tools.
6. Replace the dust caps.



Stage 5 — Install the Tubing Head

Flange Test

1. Locate the FLG TEST fittings on the bottom flange of the Head and remove the dust cap.
2. Attach a bleeder tool to one fitting and open the tool.
4. Attach a test pump to the opposite FLG TEST fitting and inject test fluid into the flange connection until a continuous stream flows from the opposite bleeder tool.
5. Close the bleeder tool and continue pumping test fluid to ***5,000 psi. or 80% of casing collapse — whichever is less.***
6. Hold and monitor the test pressure for 15 minutes or as desired by the drilling supervisor.
7. If pressure drops a leak has developed. Take the appropriate action from the adjacent chart.
8. Repeat steps this procedure until a satisfactory test is achieved.
9. Once a satisfactory test is achieved, remove the test pump and bleeder tool, drain test fluid, and reinstall the dust caps.



Leak Location	Action
Leak into tubing head bore-P seal leaking	Further energize the P seal, if leak persists, remove the tubing head and replace the bushing seals as required
Around lockscrews -Lockscrew packing leaking	Further tighten Gland Nut
Between Flanges -Ring Gasket leaking	Further tighten connection

Stage 6 — Test the BOP Stack

1. Examine the ***7-1/16" Combination Tool (Item ST3)***. Verify the following:
   - elastomer seals, lift lugs, and plugs are intact and in good condition
   - drill pipe threads are clean and in good condition
2. Install a new Ring Gasket in the ring groove of the Tubing Head and make up the BOP stack.

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.

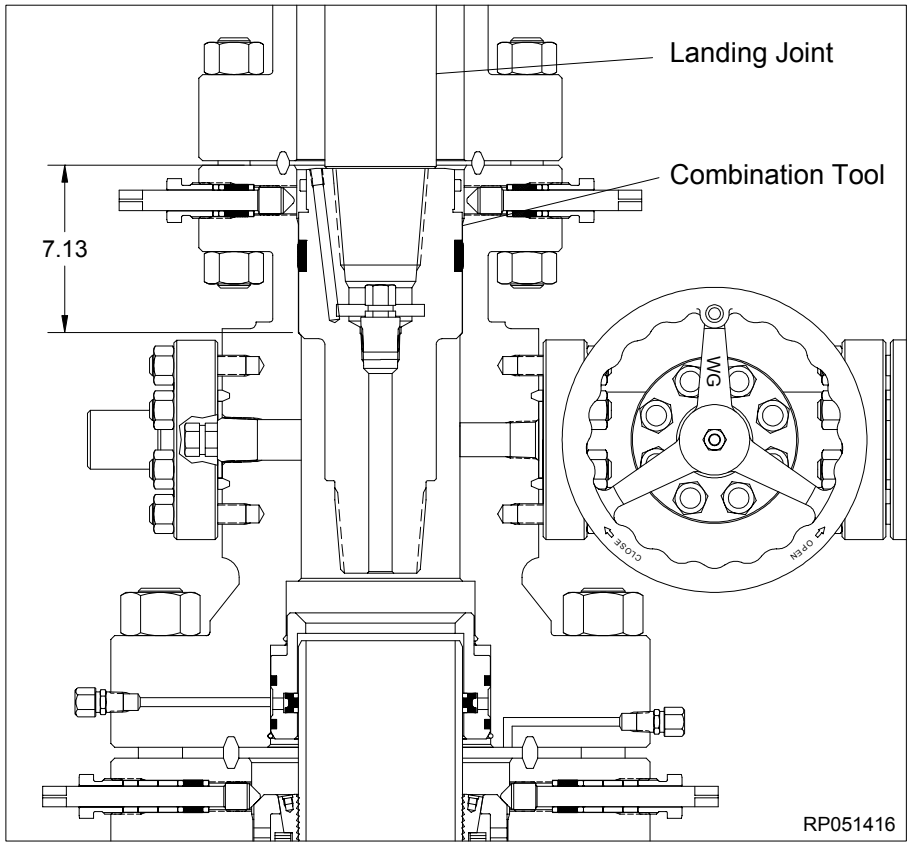
3. Orient the Tool with elastomer down and lift lugs up.
4. Make up a joint of drill pipe to the top of the Tool.

WARNING: Make sure the **elastomer is down** and the **lift lugs are up**.

4. Remove 1/2" NPT pipe plug if pressure is to be supplied through the drill pipe.
5. Lubricate the elastomer seal of the Tool with a light oil or grease.

WARNING: When operating lockscrews, the gland nut is at no time to be backed off to operate the lockscrew.

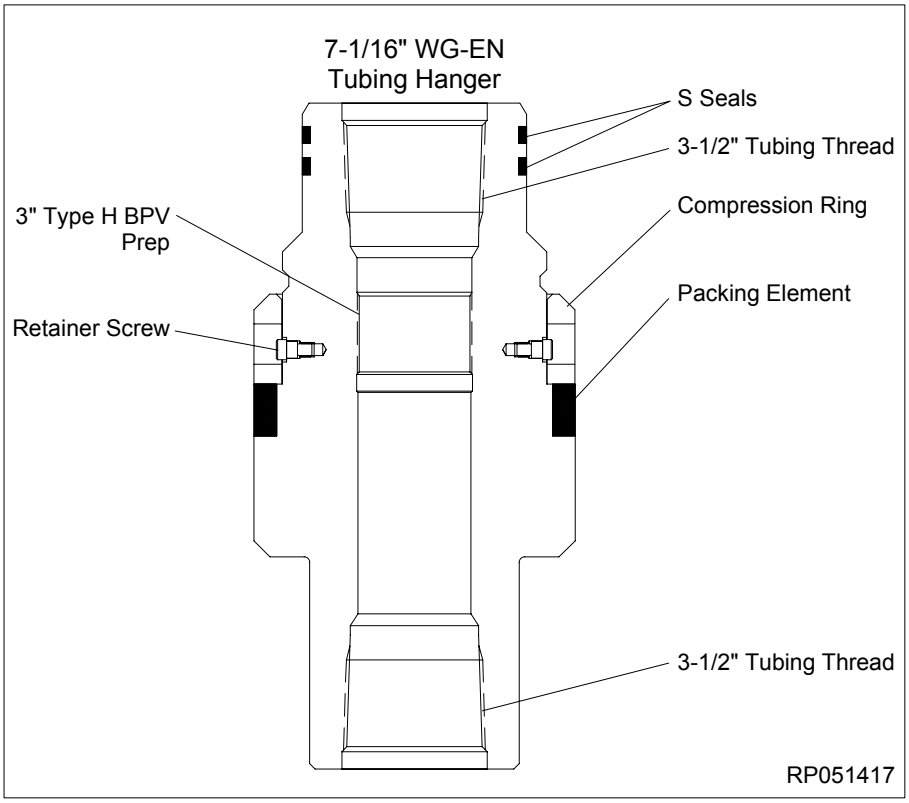
6. Ensure the lockscrews of the Head are fully retracted from the bore following the instructions in the back of this manual.



7. Lower the Tool through the BOP until it lands on the load shoulder in the Head, 7.13" below the top of the Casing Head.
8. Close the BOP rams on the drill pipe and test to ***5,000 psi*** or as required by drilling supervisor.
9. After a satisfactory test, release pressure, and open the rams.
10. Remove as much fluid from the BOP stack as possible.
11. Retrieve the Tool slowly to avoid damage to the seal.
12. Repeat this procedure as required during the drilling of the hole.

Stage 7 — Hang Off the 3-1/2" Tubing

1. Run the 2-7/8" tubing string to the required depth and space out appropriately.
2. Examine the ***7-1/16" Nominal x 3-1/2" WG-EN Tubing Hanger (Item C12).*** Verify the following:
   - packing element is intact and undamaged
   - bore and internal threads are clean and undamaged
3. Make up a short handling joint in the top of the Hanger and tighten securely
4. At a predetermined position in the tubing string, set the tubing in the floor slips. Pick up the Hanger and make it up in the tubing string. Torque the Tubing Hanger to the thread manufacturer's optimum make up torque.
5. Pick up the tubing string so that the bottom of the hanger is approximately 5 feet above the rig floor and reset the floor slips.
6. Remove the handling joint and install a 3-1/2" landing joint in the top of the Hanger and torque the landing joint to the thread manufacturer's minimum make up torque.



Stage 7 — Hang Off the 3-1/2" Tubing

7. Calculate the distance from the top of the Tubing Head to the top of the rig floor and add 7.13". Record this dimension.

8. Drain the BOP through the Tubing Head side outlet valves. Retract all lockscrews, and flush the Tubing Head bowl with clean fresh water to remove any debris that may keep the Hanger from properly landing.

Note: Side outlet valves to remain open while landing the Hanger.

9. Thoroughly clean and lightly lubricate the Hanger packing element with oil or a light grease.

10. Pick up the tubing string and remove the floor slips.

11. Carefully lower the Hanger into the well, tallying the tubing to the recorded dimension. Place a paint mark on the landing joint at the proper elevation of the recorded dimension.

12. Continue lowering the tubing into the well and land the Hanger in the Tubing Head and slack off all weight.

WARNING: When operating lockscrews, the gland nut is at no time to be backed off to operate the lockscrew.

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13. **Holding a backup on the gland nut, run in each of the lockscrews in an alternating cross fashion until the lockscrews contact the Hanger compression plate.**

14. **Continue to run in each of the lockscrews in an alternating cross pattern to 400 ft lbs. (Reference the back of this manual for detailed lockscrew operation).**

15. Refer to the dimensions on the OD of the Tubing Head flange for the length of the lockscrews from the OD of the flange for fully retracted, contact and fully engaged positions. Also during dry fit the lockscrew ends are painted yellow in the fully engaged position. Verify when fully engaged that there is no unpainted lockscrew visible outside the gland nut.

WARNING: Ensure all lockscrews are fully engaged, **Do Not leave any lockscrews in the retracted position** after the hanger is landed and during the BOP nipple down procedure. **Failure to do this could result in serious injury, death** and/or severe enviromental damage

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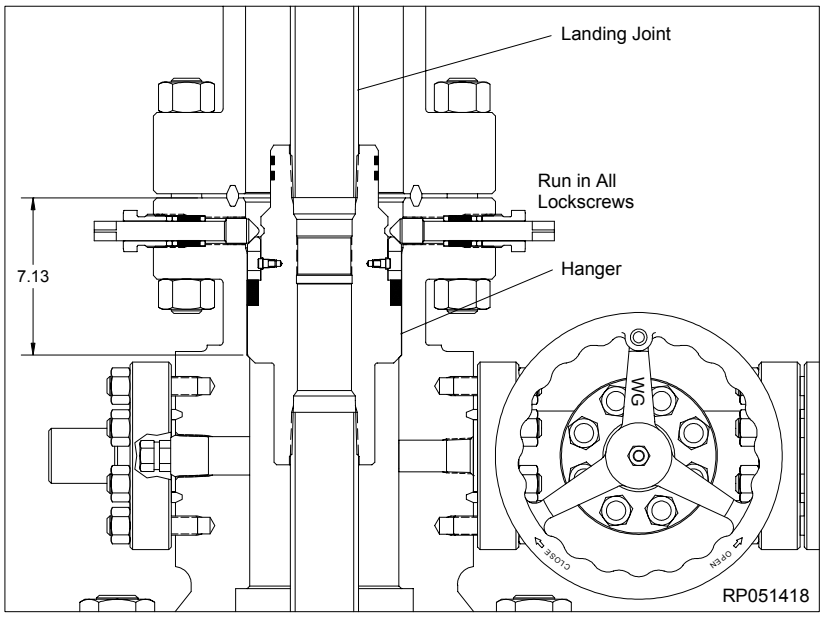
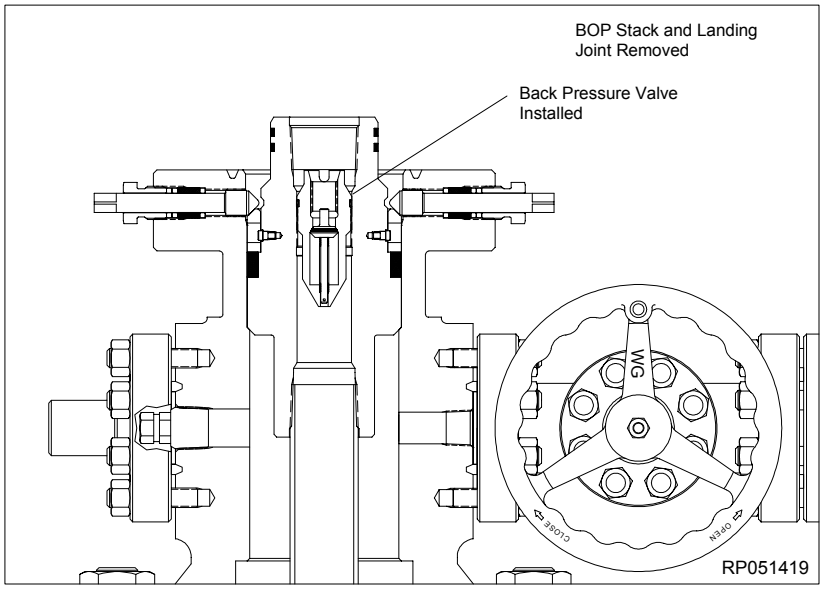




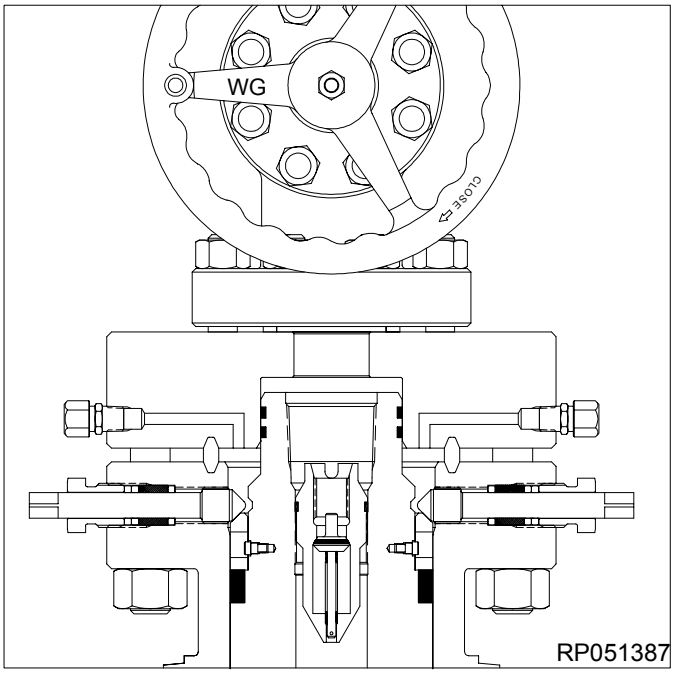
16. Retrieve the landing joint by rotating it counterclockwise until it comes free of the Hanger and retrieve it with a straight lift.

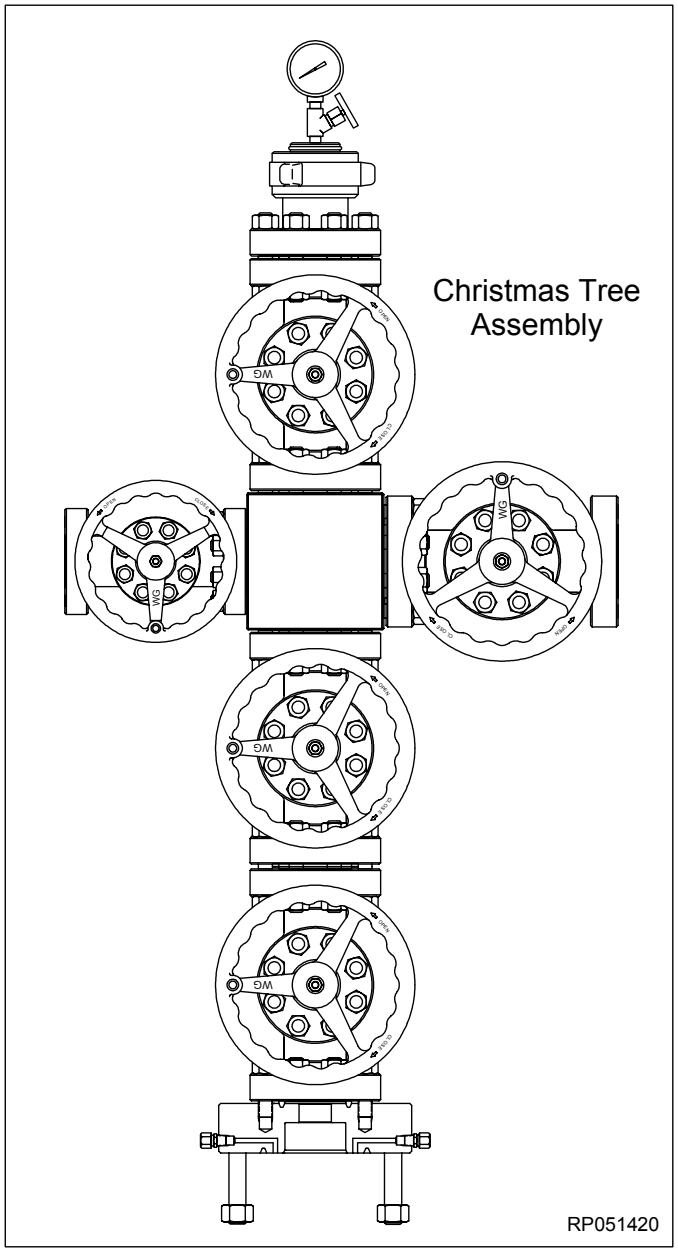
17. Using a dry rod, install a ***3" One Way Back Pressure Valve (Item ST4)*** in the Tubing Hanger bore.

18. Withe the well safe and under control the BOP Stack may be removed.

Stage 8 — Install the Production Tree

1. Using a high pressure water hose, thoroughly clean the top of the Tubing Head and the Tubing Hanger and blow dry with compressed air.
2. Place a new ***RX-46 Ring Gasket (Item C7),*** in the ring groove of the Tubing Head and fill the void above the hanger with clean test fluid.
3. Examine the appropriate size ***Tree Assembly with the 7-1/16" 5M x 3-1/8" 5M A4-EN Adapter Flange (Item C1)***. Verify the following:
   - internal bore and ring groove are clean and undamaged
   - all valves, handwheels and fittings are in place and undamaged
4. Wipe the neck seals of the Hnager and the seal prep in the Adapter with a light oil or grease.
5. Orient the Tree as required and carefully lower it over the Hanger neck and onto the ring gasket.
6. Make up the connection using hte studs and nuts of the Adapter in an alternating cross fashion.
7. Retighten the lockscrews to 400 ft lbs as previously described.



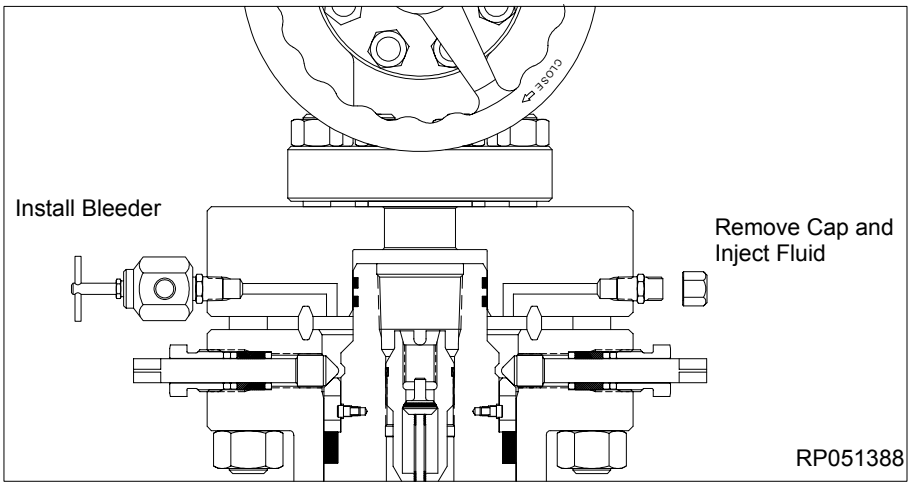


Stage 8 — Install the Production Tree

Test the Connection

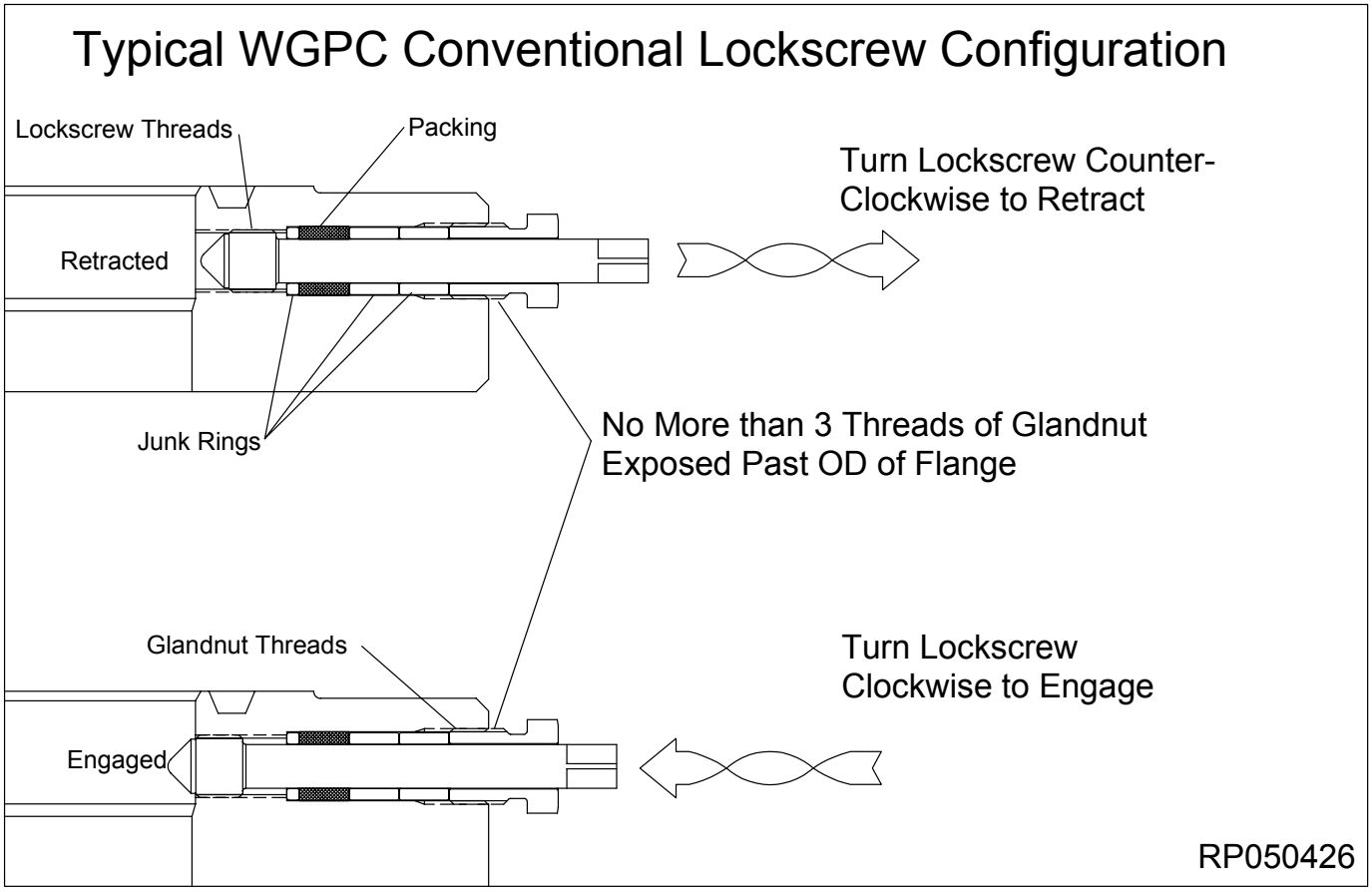
1. Locate the two FLG TEST fittings on the OD of the Adapter and remove the dust caps.
2. Install a bleeder tool to one fitting and open the tool.
3. Install a test pump to the opposite fitting and inject test fluid until a continuous stream flows from the bleeder tool.
4. Close the bleeder tool and continue to inject test fluid to ***5,000 psi maximum.***
5. Hold and monitor the test pressure for 15 minutes or as required by the drilling supervisor.
6. In the event of a leak, take the appropriate action from the adjacent chart.
7. Once a satisfactory test is achieved, carefully bleed off all test pressure, remove the test pump and bleeder tool and reinstall the dust caps.
8. Remove the back pressure valve as required.

Note: If desired, the tree may be tested by install a 3" one way check valve into the bore of the hanger and pressuring up on the tree per rig procedure.



Leak Location	Action
From tubing head outlets - Hanger packoff is leaking	Further tighten the lockscrews
From the lockscrew - lockscrew packing is leaking	Further tighten the gland nuts
From the flange connection - ring gasket is leaking	Further tighten the connection

Conventional Lockscrew Operation



These instructions are applicable to ONLY WGPC "Conventional" style lockscrews. This procedure does not cover lockscrews manufactured or installed in wellhead equipment not supplied by WGPC.

1. The Conventional lockscrew is threaded into the wellhead or flange with enough thread to back out clear of the bowl or to extend into the bowl. This will not disturb the seal/packing around the lockscrew shaft.
2. The seal around the shaft is a compression type with metal Junk Rings. The Packing is energized with the Glandnut on the outside diameter of the flange.
3. The lockscrew is normally backed out of the bowl. The lockscrews are extended into the bowl only after a hanger has been installed. The lockscrew must be backed out prior to removing the hanger.
4. To properly operate the lockscrew it is advised to first backoff (Counterclockwise) the Glandnut no more the one full turn and while holding a backup wrench on the gland nut, rotate the lockscrew in or out as required. Retighten the Glandnut. The Glandnut, when properly installed, should not expose more than 3 external threads past the OD of the wellhead.

Under a pressure situation the Glandnut should remain tight and the lockscrew rotated as required.

Always use the appropriate size wrench to rotate the Lockscrew. Do not use a pipe wrench.

For lockscrew of lockscrew packing replacement instruction, refer to OM-044.