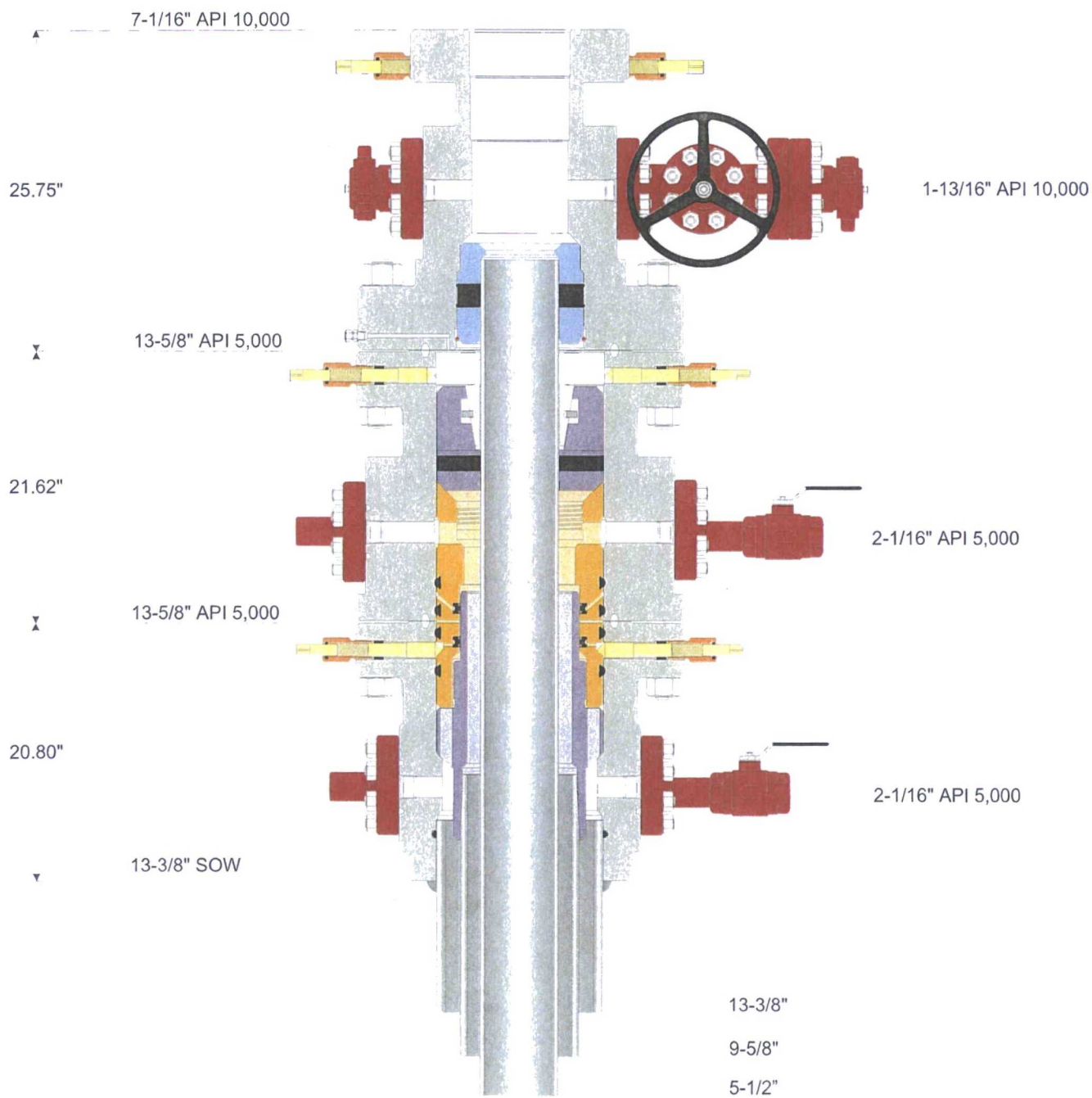


NOTE: THIS DRAWING IS NOT TO SCALE. THE DIMENSIONS REFLECTED ON THIS DRAWING ARE ESTIMATED DIMENSIONS AND ARE FOR REFERENCE ONLY.



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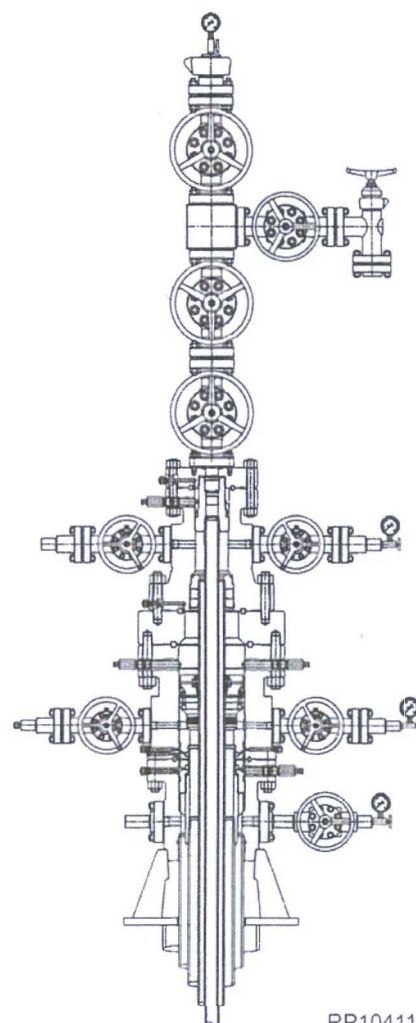
# Weatherford®

## Wellhead Field Service Manual

### WFT-SB Wellhead System Running Procedure


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RP104114

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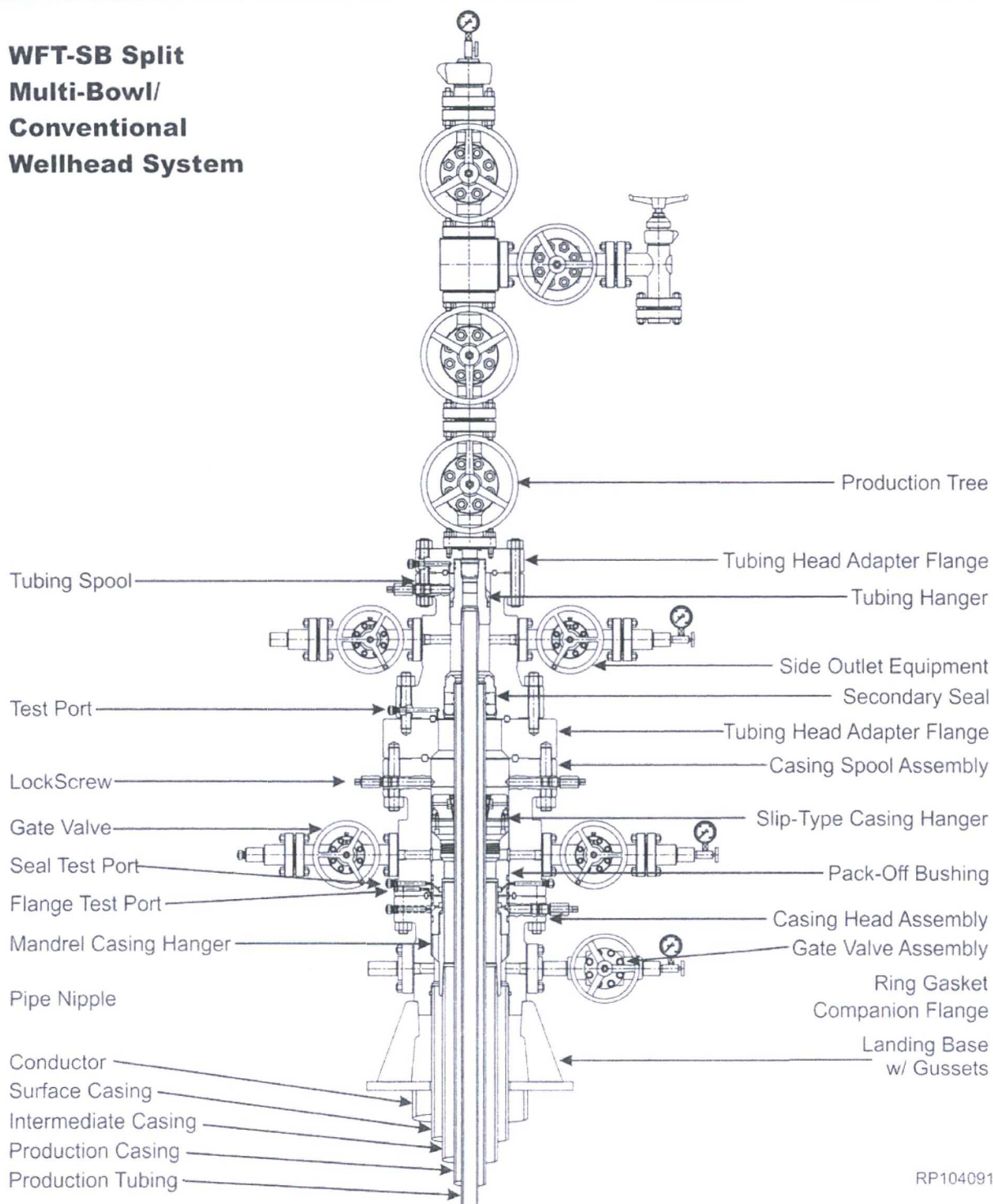
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## WFT Split Bowl (SB) Wellhead System

### WFT-SB Split Multi-Bowl/ Conventional Wellhead System



RP104091



**Weatherford**

5-3-GL-GL-WES-00XXX

#### Field Service Manual

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**SM-13-1**

**Rev WIP**

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## WFT Split Bowl (SB) Multi-Bowl/Conventional Wellhead System (Continued)

### WFT-SB Casing Head/Spool Assembly Rig Up and Installation

1. Determine the correct elevation for the wellhead system, and cut the conductor pipe at a comfortable elevation, below the surface casing final cut.

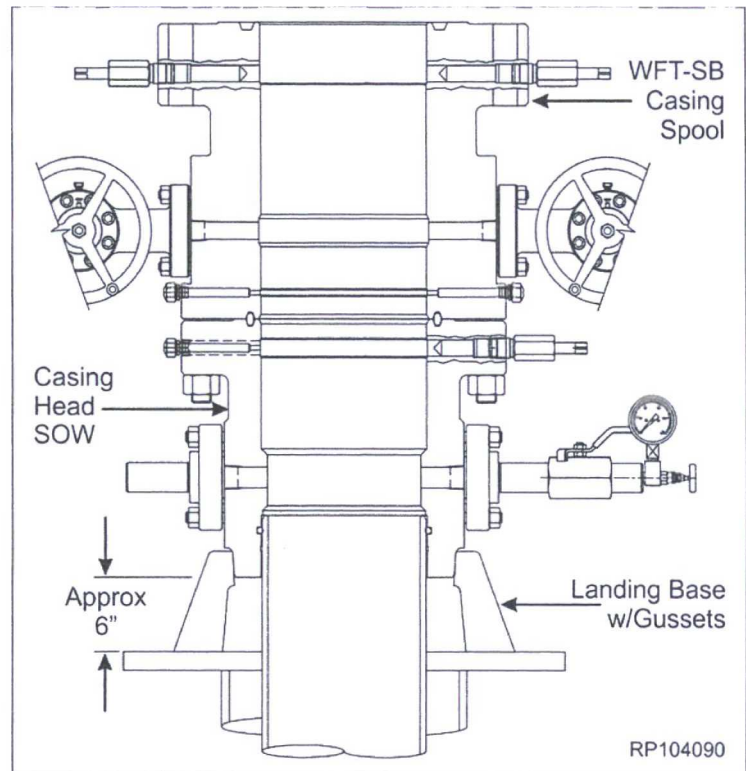
#### NOTE

Ensure that the cut on the conductor is level, as this will determine the orientation of all remaining wellhead equipment.

2. Remove any excess conductor pipe and set aside.
3. Grind the conductor pipe and remove any sharp edges, ensuring that the conductor pipe cut is level.
4. Run the surface casing to the required depth and cement casing in place. Allow the cement to set.
5. Lift the blow-out preventer (BOP) or diverter and prepare to cut off the surface casing at a sufficient height above the cellar deck to facilitate the installation of the WFT-SB Casing Head/Spool Assembly with Base Plate.
6. Once the surface casing is released from the rig floor, cut it approximately 12 inches (or more) above the final cut location.
7. Remove the excess surface casing, and the BOP or diverter, and set aside.
8. Bevel the surface casing outer diameter (3/16" x 3/8") and inner diameter (1/8" x 45 degrees). Remove any sharp edges.

9. Examine the Casing Head with Slip-On Weld (SOW) bottom prep. Verify the following:

- O-ring seal, bore, ports and exposed ring grooves are clean and in good condition.
- Test fittings, studs and nuts, valves, flanges and bull plugs are intact and in good condition.




10. Determine the correct elevation for the wellhead assembly. Measure depth of the surface casing socket in SOW with O-ring bottom prep.
11. Lightly lubricate the casing stub with an oil or light grease.



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

12. Align and level the WFT-SB Casing Head/Spool Assembly over the casing stub, orienting the outlets to drilling equipment, per the drilling supervisor's direction.

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## WFT Split Bowl (SB) Wellhead System (Continued)

14. Slowly and carefully lower the assembly over the casing stub until the stub bottoms in the casing socket.
15. Remove the test fitting from the casing head test port, and set aside.
16. Ensure that the WFT-SB Casing Head/Spool Assembly is plumb and level.
17. Weld and test the surface casing using the recommended welding procedure located in the Appendices Section of this manual.

### Testing the BOP Stack

1. Examine the Test Plug/Running & Retrieval Tool. Verify the following:
  - Elastomer seals, threads and plugs are intact and in good condition.
  - Drill pipe threads are correct size, clean and in good condition.
2. Install a new, appropriately sized ring gasket in the ring groove of the WFT-SB Spool and make up the BOP stack.

### NOTE

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

3. Orient the test plug with elastomer down/ACME threads up, and make up a joint of drill pipe to the test plug.

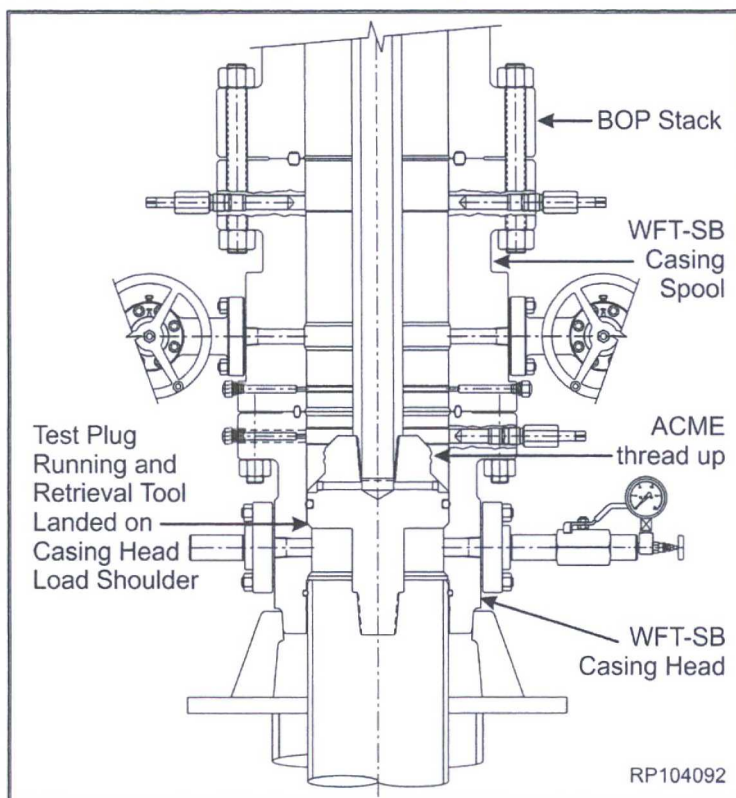
### NOTE


If pressure is to be supplied through the drill pipe, remove the pipe plug from the weep port.



Ensure that the test plug elastomer is down and Acme threads are up when testing.

4. Fully retract all lockscrews in the entire WFT-SB casing head/spool assembly.
5. Lubricate the test plug elastomer seal with a light oil or grease.
6. Lower the test plug through the BOP stack into the WFT-SB assembly, until it lands on the casing head load shoulder.



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- Open lower casing head side outlet valve. Monitor any leakage past the test plug seal.
- Close the BOP rams on the drill pipe, and test to **5,000 psi or as required by the drilling supervisor**.
- After a satisfactory test is achieved, release pressure and open the rams.
- Remove as much fluid from the BOP stack as possible.
- Retrieve the test plug assembly slowly to avoid damage to the seal.
- Close all outlet valves on WFT-SB Casing Head/Spool Assembly.
- Repeat Steps 1 thru 12, as required during drilling of the hole.
- Examine the Bowl Protector Running/Retrieval Tool. Verify the following:
  - Threads are clean, undamaged and free of debris
  - Ports are clean and unobstructed.
  - Drill Pipe threads are correct size, clean and in good condition.
- Orient the Bowl Protector Running Tool with Acme threads down.



**Ensure that the left hand (LH) Acme threads are down prior to engaging Bowl Protector Running Tool into Long Bowl Protector.**

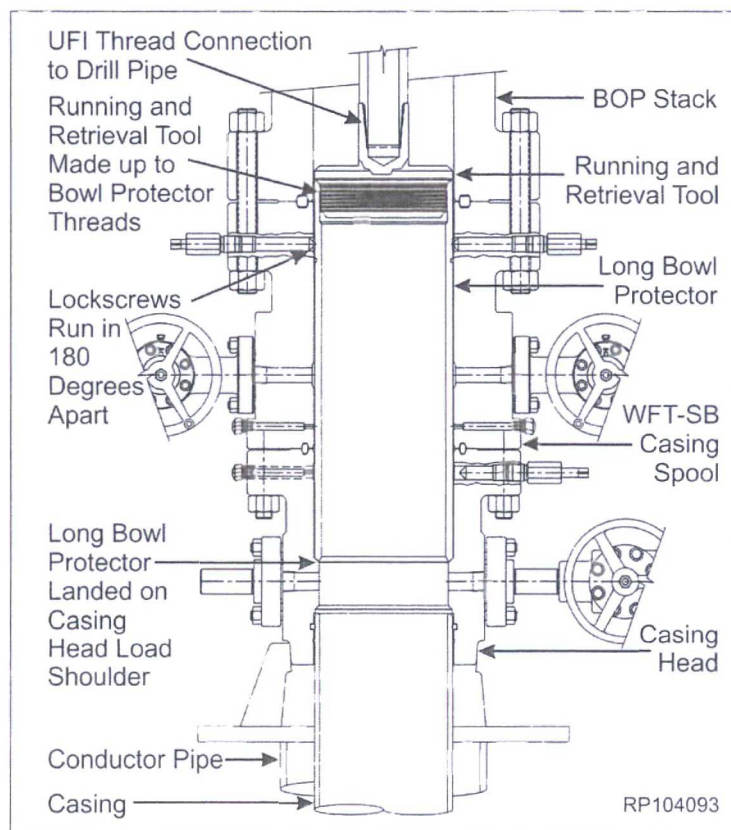
### Running and Retrieval of the Long Bowl Protector

#### NOTE


Always use a bowl protector while drilling to protect wellhead load shoulders from damage by drill bit or rotating drill pipe. The bowl protector must be retrieved prior to running the casing string.

#### Running in the Bowl Protector prior to Drilling

- Examine the Long Bowl Protector. Verify the following:
  - Bore drift is correct size, clean, in good condition, and free of debris
  - Threads are clean and undamaged
  - O-ring seals are properly installed, clean, and undamaged.



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## WFT Split Bowl (SB) Wellhead System (Continued)

4. Make-up a drill pipe joint to the Running Tool.
5. Thread Running Tool into the Long Bowl Protector, rotating two turns counterclockwise.
6. Verify that all lockscrews in the WFT-SB Casing Head/Spool Assembly are fully retracted.
7. Slowly lower the Running Tool/Bowl Protector Assembly through the BOP stack and into the WFT-SB Casing Head/Spool Assembly, until it lands securely on the casing head load shoulder.
8. On WFT-SB Casing Spool, run in two Lockscrews ("snug" tight **ONLY**), 180 degrees apart, to hold Bowl Protector in place.



**Do NOT over tighten the lockscrews, as this will cause damage to the Bowl Protector and the lockscrews.**

9. Remove the running tool from the bowl protector, by rotating the drill pipe clockwise two turns while lifting straight up.
10. Drill out and prepare to run the casing string per the drilling supervisor's instruction.

### Retrieving the Bowl Protector after Drilling

1. Make-up the retrieval tool to the drill pipe, with Acme threads down.
2. Slowly lower the retrieval tool through the BOP Stack into the Bowl Protector.
3. Rotate the retrieval Tool counterclockwise, two turns, to engage with bowl protector Acme threads.

4. Fully retract both lockscrews on the WFT-SB casing spool, and retrieve the bowl protector.

### NOTE

**Ensure that all lockscrews in both the upper flange (casing spool) and lower flange (casing head) of the wellhead Assembly are fully retracted from well bore.**

5. Remove the bowl protector and the running and retrieval tool from the drill floor.

### Hanging off the Intermediate Casing

1. Run the intermediate casing as required and space out appropriately for the mandrel casing hanger.


### NOTE

**If the intermediate casing becomes stuck and the mandrel casing hanger cannot be landed, refer to STAGE 4B.**

2. Examine the WFT-SBD-SN Mandrel Casing Hanger. Verify the following:
  - Bore drift is correct size, clean and free of debris
  - All threads are clean and undamaged.
  - Flow-By flutes are clear and unobstructed.
  - Slick Neck seal area is clean and undamaged.
3. Examine the Mandrel Casing Hanger Running Tool. Verify the following:
  - Threads are clean and in good condition.
  - O-ring seals are clean and undamaged.
4. Thread the mandrel hanger onto the last joint of casing to be run. Torque the connection thread to manufacturer's optimum "make-up" torque value.
5. Make up a landing joint to the top of the running tool. Torque the connection to thread manufacturer's maximum "make-up" torque valve.



**If Steps 4 and 5 were performed prior to being shipped to location, the hanger running tool should be backed off and made back up to ensure it will back off freely.**

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## WFT Split Bowl (SB) Wellhead System (Continued)

6. Liberally lubricate the outer diameter of the hanger neck and inner diameter of the running tool O-ring seals with a light oil or grease.



**Do NOT use pipe dope or other metal based compounds. This will cause galling.**

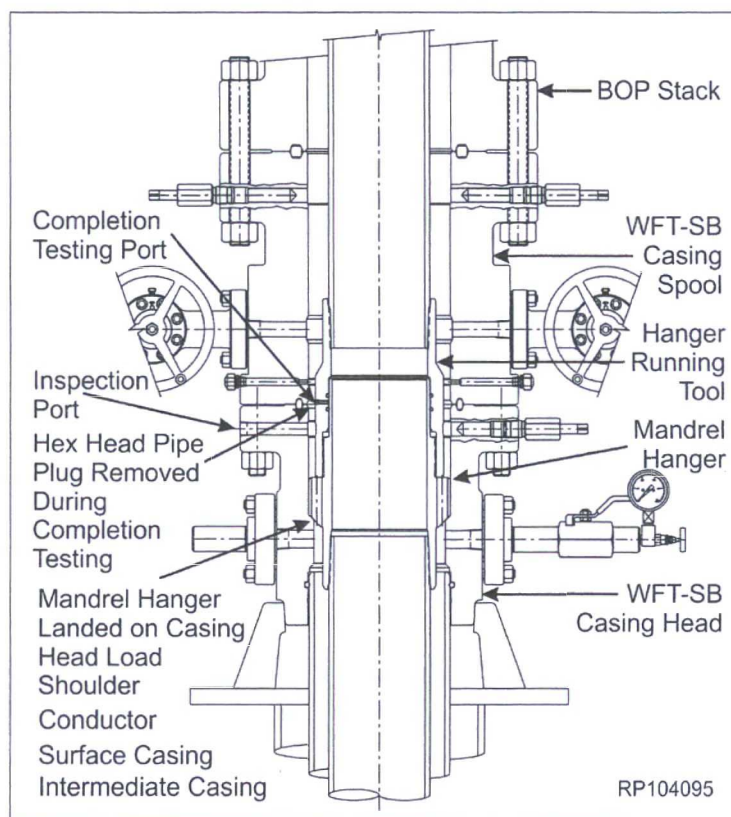
7. Maintaining a neutral weight, rotate the hanger running tool with chain tongs, first clockwise until a thread "jump" can be felt, then counterclockwise, approximately eight turns, to a positive stop, and then back off (clockwise) one quarter (1/4) turn.




**Do NOT torque the running tool to the casing hanger connection. Do NOT back off more than one quarter (1/4) turn.**

8. Remove the flush fitting hex head pipe plug from the outer diameter of the running tool and attach a test pump.
9. Apply hydraulic test pressure to **5,000 psi and hold for 15 minutes or as required by the drilling supervisor.**
10. Upon completion of a successful test, bleed off test pressure through the test pump and remove the pump. Replace the pipe plug.
11. Locate indicator groove machined in outer diameter of Running Tool, coat with white paint.

12. Verify that all lockscrews in the WFT-SB casing head/casing spool assembly are fully retracted.
13. Slowly and carefully lower the mandrel hanger through the BOP stack, and land the hanger onto the casing head load shoulder.
14. Slack off weight on the casing.
15. Check that the well is stable and no pressure buildup or mud flow is occurring.



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## WFT Split Bowl (SB) Wellhead System (Continued)

16. Drain the BOP stack through the casing head side outlet valves.
17. Remove the pipe plug from the casing head flange port marked "Inspection Port."
18. Visually verify that the running tool groove is in the center of the inspection port, and that the mandrel hanger has landed properly.
19. Reinstall the pipe plug and tighten securely.
20. Place a paint mark on the landing joint level with the rig floor, and cement casing as required.

### NOTE

If the casing is to be reciprocated during cementing, it is advisable to pick up the mandrel hanger a minimum of eight feet above the landing point. Place a mark on the landing joint, level with the rig floor, and then reciprocate above that point. If at any time resistance is felt, land the mandrel casing hanger immediately.


21. Retrieve the hanger running tool and landing joint by rotating landing joint clockwise (to the right), fourteen full turns.

## Hanging off Intermediate Casing – Contingency Completion

### NOTE

The following procedure should **ONLY** be followed if the intermediate casing should become stuck in the hole. If the casing did **NOT** get stuck and is successfully hung off with the mandrel casing hanger, skip this stage.

1. Cement the intermediate casing in accordance with the program, taking returns through the flow-by flutes of the mandrel casing hanger as required.
2. Drain the casing head bowl through the side outlet.
3. Separate the WFT-SB casing spool from the casing head.
4. Pull up on WFT-SB casing spool and suspend it above casing head, high enough to install a WFT-21 Slip Type Casing Hanger.
5. Wash out as required.
6. Examine the WFT-21 slip type casing hanger. Verify the following:
  - Hanger is correct size, clean and undamaged.
  - Slip segments are sharp and in proper position.
  - All screws are in place.
7. Remove the latch screw to open the slip type 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. Prepare to lower the hanger into the casing head bowl.
11. Grease the WFT-21 slip type casing hanger body and remove the slip retaining cap screws.
12. Remove the boards and allow the hanger to slide down into the casing head.

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13. Once the hanger has landed securely on the casing head bowl load shoulder, pull tension on the casing to the desired hanging weight, and then slack off.

### NOTE

A sharp decrease on weight indicator will signify that the hanger has taken weight. If this does not occur, pull tension again and slack once more.

14. Rough cut the casing approximately eight inches, or more, above the top of the casing head flange. Remove the excess casing.
15. Final cut the casing at  $2\frac{1}{2}" \pm 1/8"$  above casing head flange.
16. Bevel the casing outer diameter ( $1/4"$  x 30 degrees) and inner diameter ( $1/8"$  x 30 degrees).
17. Remove and discard the used gasket ring from the casing head.
18. Clean the mating ring grooves on the WFT-SB casing spool and casing head. Lightly wipe with oil or grease.



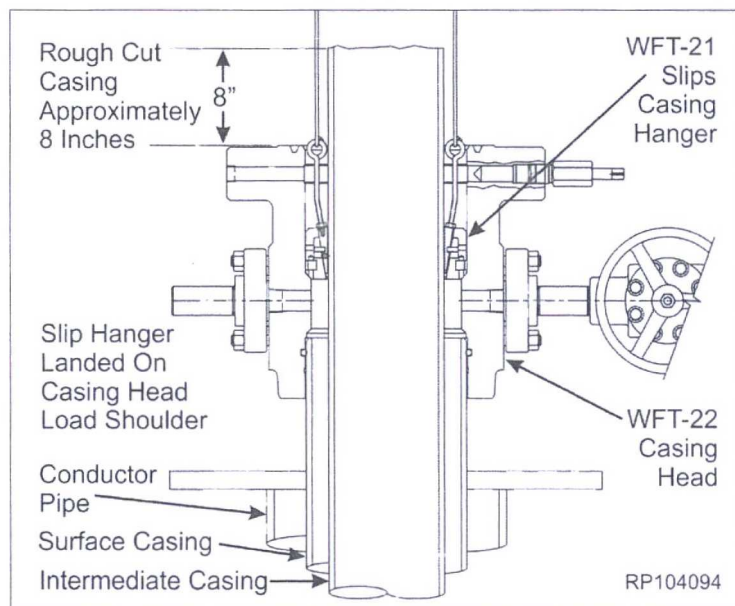
### WARNING

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

19. Install a new appropriately sized ring gasket into the casing head groove.
20. Loosely reconnect or make up the WFT-SB casing spool to the casing head.

### NOTE

The casing spool to casing head connection will be fully tightened after the pack-off bushing is run and proper setting is verified.




## Installation of the Pack-Off Bushing and Energizing the P-Seals

### WFT-SB Pack-Off Bushing Installation

### NOTE

Installation procedure is identical for both Standard and Emergency WFT-SB Pack-Off Bushings.

1. Determine which pack-off bushing to use:
  - If casing has been run normally and is hung off with a mandrel casing hanger, use a standard packoff bushing.
2. Examine the appropriate pack-off bushing. Verify the following:
  - All elastomer seals are in place and undamaged.
  - Bore, ports and alignment lugs are clean and in good condition.
  - Coat the lockscrew relief groove with white paint.
3. Liberally lubricate the inner diameter of the double P-seal grooves and outer diameter of dovetail seals with a light oil or grease.

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4. Examine the pack-off bushing running tool. Verify the following:
  - All elastomer seals are properly installed, clean and undamaged
  - Threads are clean, undamaged and free of debris
  - Bore and ports are clean and unobstructed.
5. Make-up a landing joint to the running tool and rack back assembly.
6. Run two or three stands of heavy weight drill pipe or collars in the hole and set floor slips.

### NOTE

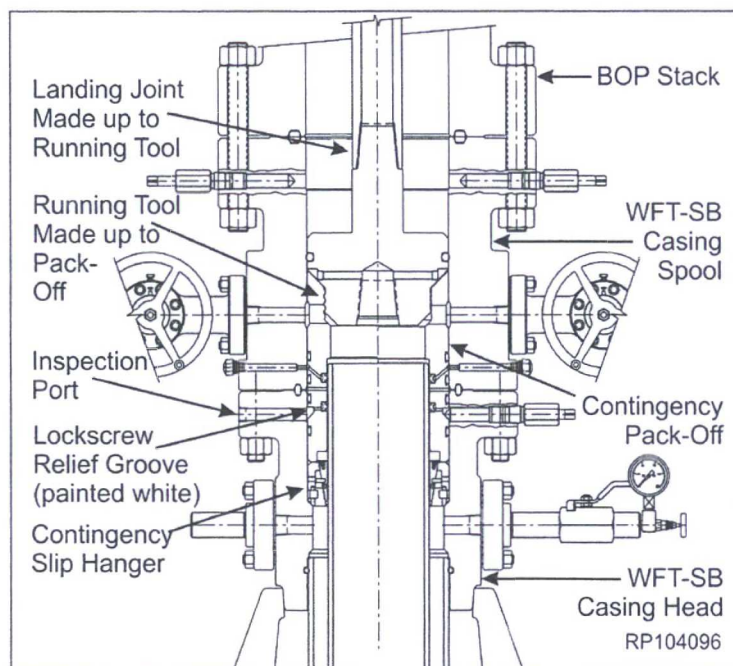
Use heavy weight drill pipe or drill collars. Weight required to push Pack-Off Bushing into Casing Head, over Mandrel Hanger slick neck, is approximately 14,000 lbs.

### WARNING


When lowering the drill pipe into the well, extreme caution must be taken to not damage the top of the mandrel hanger with the end of the drill pipe. It is recommended that the drill pipe be centralized to the hanger inner diameter, as closely as possible, when entering the hanger.

7. Carefully lower the bushing over the drill pipe and set it on top of floor slips.
8. Make up the landing joint/running tool assembly to the drill pipe suspended in floor slips.
9. Carefully pick up the pack-off bushing, thread the bushing into the running tool, then rotate the bushing approximately two turns counterclockwise (to the left), coming to a positive stop.

10. Lower the assembly through the BOP Stack and the WFT-SB spool assembly until the pack-off bushing lands on the casing hanger.



11. Verify, through inspection port that the pack-off bushing has landed properly after:
  - ensuring well is stable and no pressure buildup or mud flow is occurring.
  - drain BOP Stack through Casing Head side outlet valves.
  - remove Pipe Plug (1"-NPT) from Casing Head flange port marked "Inspection Port".
  - Check, to ensure, bottom of Lockscrew relief groove (painted white) on Support Bushing is at bottom of inspection port.
  - Reinstall Pipe Plug and tighten securely.
12. Fully run in all Casing Head Lockscrews (lower flange), in an alternating cross pattern.
13. Using two chain tongs, 180° apart, rotate Landing Joint/Running Tool approximately 2 turns clockwise (to the

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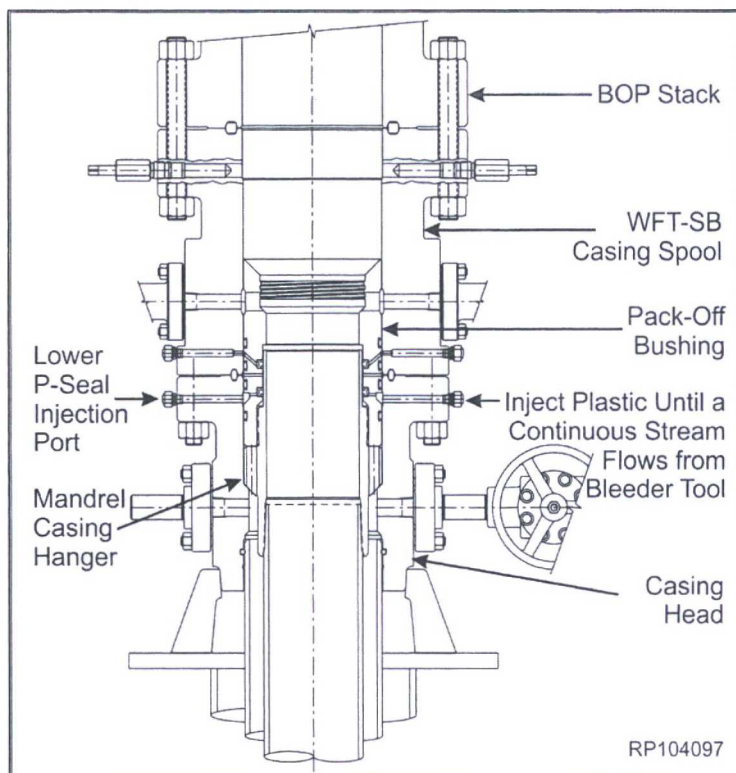
right), coming to a stop and carefully lift tool to Drill Floor, set aside.

### NOTE

If the Contingency Pack-Off Bushing is being installed, it is now necessary to make up the Speed Head Casing Head/Casing Spool connection. Tighten all studs in an alternating cross pattern until the flange bolting is fully made up.

### Energizing the P-Seals


1. Locate the two lower injection fittings ("INJ"), located 180 degrees apart on the casing head. Remove the dust cap from one fitting and remove the second fitting entirely.
2. Attach a bleeder tool to the injection fitting without the dust cap, in the casing head. Open the bleeder tool.
3. Attach a plastic injection tool to the open port and inject plastic packing into the open port until a continuous stream flows from the bleeder tool. Close the bleeder tool.
4. Remove the injection tool. Reinstall the injection fitting into the open port and remove the dust cap. Reattach the injection tool.
5. Continue injecting plastic packing to **5,000 psi. or to 80% of casing collapse pressure, whichever is less.**



### NOTE

The strength of a mandrel casing hanger slick neck is equivalent to P110 Grade casing with the same weight as run in the casing string.

6. Hold and monitor pressure for 15 minutes or as required by the drilling supervisor.
7. If pressure drops, the plastic packing has not filled the seal area completely. Open the bleeder tool, bleed off the pressure and repeat Steps 5 and 6, until pressure is stabilized.
8. Remove the plastic injection tool and bleeder tool. Reinstall the dust caps on both injection fittings.
9. Repeat Steps 1 thru 8 to pack off and energize the upper P-Seal.

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10. Locate the "SEAL TEST" fitting, slightly below and 90 degrees from the injection fittings. Remove the dust cap from this fitting.
11. Attach a test pump to the fitting.
12. Pump clean test fluid between the P-Seals until a test pressure of **5,000 psi or 80% of casing collapse pressure is attained, whichever is lower.**

### **WARNING**

**Do NOT exceed 80% of casing collapse pressure when a slip type casing hanger and contingency pack-off bushing are utilized.**

13. Hold test pressure for **15 minutes or as required by the drilling supervisor.**
14. If pressure drops, a leak has developed. Take the appropriate action per the following table:

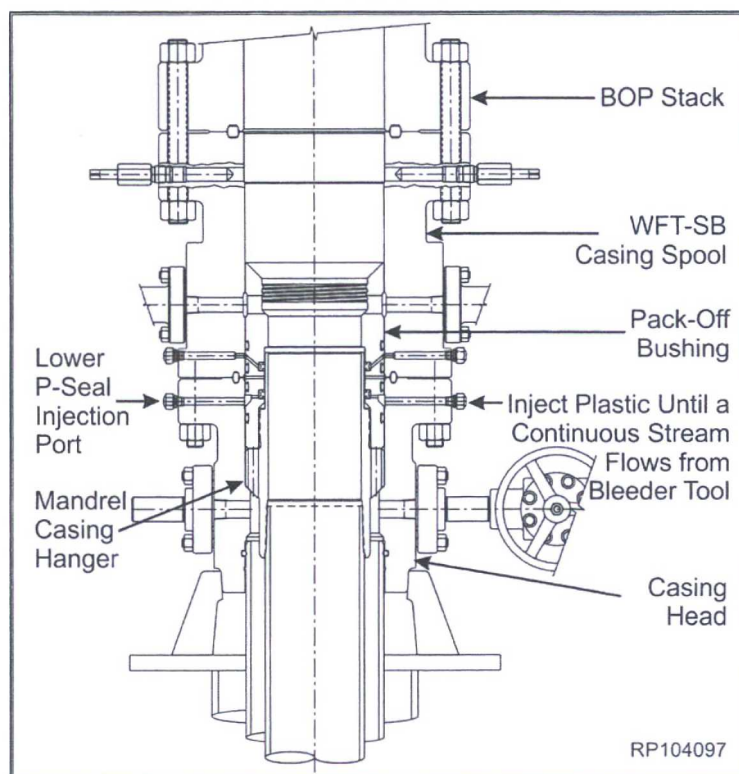
Leak Location	Cause	Action
Into the bore of the casing head	Upper P-seal leaking	Bleed off pressure and re-inject plastic packing into leaking upper P-seal port.
Around the casing	Lower P-Seal leaking	Bleed off pressure and re-inject plastic packing into lower P-seal port.


15. Repeat Steps 12 thru 14 until a satisfactory test is achieved.
16. Once a satisfactory test is achieved, carefully bleed off pressure and remove Test Pump.
17. Attach the bleeder tool to the test port fitting and open the tool to vent any remaining trapped pressure.

### **CAUTION**

**Always direct the bleeder tool port away from people and property.**

18. Remove the bleeder tool and reinstall dust cap in Test Port Fitting.



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## WFT Split Bowl (SB) Wellhead System (Continued)

### Retesting the BOP Stack

1. Examine the Test Plug/Running Tool. Verify the following:

- Elastomer seals are intact and in good condition.
- Drill pipe threads are clean and in good condition.

#### NOTE

Immediately after testing the support bushing seals and periodically during conditioning of the hole prior to running tubing, the BOP stack (flanged connections and rams) must be tested.

2. Orient the test plug with elastomer down/ACME threads up. Make up a joint of drill pipe to the test plug.

#### NOTE

Remove the pipe plug from the weep port if pressure is to be supplied through the drill pipe.

#### CAUTION

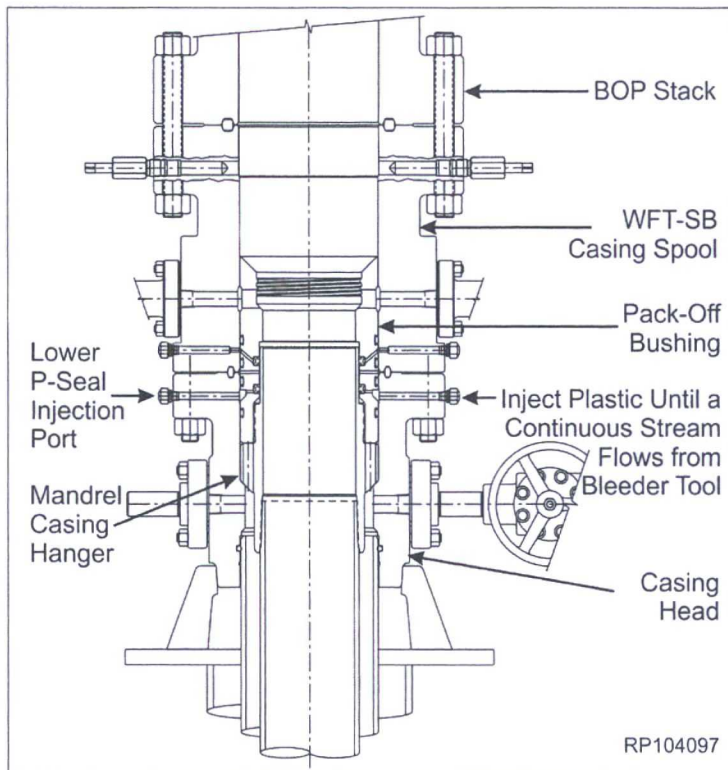
Make sure the elastomer is down and ACME threads are up when testing.

3. Fully retract all lockscrews in the upper WFT-SB Spool Assembly.

#### WARNING


Do NOT retract the lockscrews located in the casing head (lower flange). Doing so could allow the pack-off support bushing to rise out of position.

4. Lubricate the test plug elastomer seal with light oil or grease.



RP104097

5. Lower the test plug through the BOP stack into the WFT-SB spool assembly until it lands on top of the pack-off bushing.
6. Open the upper WFT-SB casing spool side outlet valves. Monitor for any leakage past the test plug seal.
7. Close the BOP rams on the drill pipe and test to **10,000 psi or as required by the drilling supervisor**.
8. After a satisfactory test is achieved, release all pressure and open the rams.
9. Remove as much fluid from the BOP stack as possible.
10. Retrieve the test plug assembly slowly to avoid damage to the seal.
11. Close all outlet valves on the WFT-SB casing head/spool assembly.

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## WFT Split Bowl (SB) Wellhead System (Continued)

### Running and Retrieving the Short Bowl Protector

#### NOTE

Always use a bowl protector while drilling to protect the wellhead load shoulders from damage by the drill bit or rotating drill pipe. The bowl protector must be retrieved prior to running the casing string!

#### Running the Bowl Protector Prior to Drilling

1. Examine the short bowl protector. Verify the following:
  - Bore drift is correct size, is clean, in good condition, and free of debris.
  - Threads are correct size and type.
  - Threads are clean and in good condition.
2. Orient the bowl protector running tool with ACME threads down.

#### NOTE

The running tool is the same tool used for handling the long bowl protector.

#### CAUTION

Make sure that the left hand (LH) ACME threads are down prior to engaging the bowl protector running tool into the short bowl protector.

3. Make-up a drill pipe joint to the running tool.
4. Thread the running tool into the short bowl protector, rotating two turns counterclockwise (to the left).
5. Verify that all upper lockscrews in the WFT-SB spool assembly are fully retracted. Slowly lower the running

tool/bowl protector assembly through the BOP stack into the WFT-SB spool assembly until it lands on top of the pack-off bushing.

#### WARNING

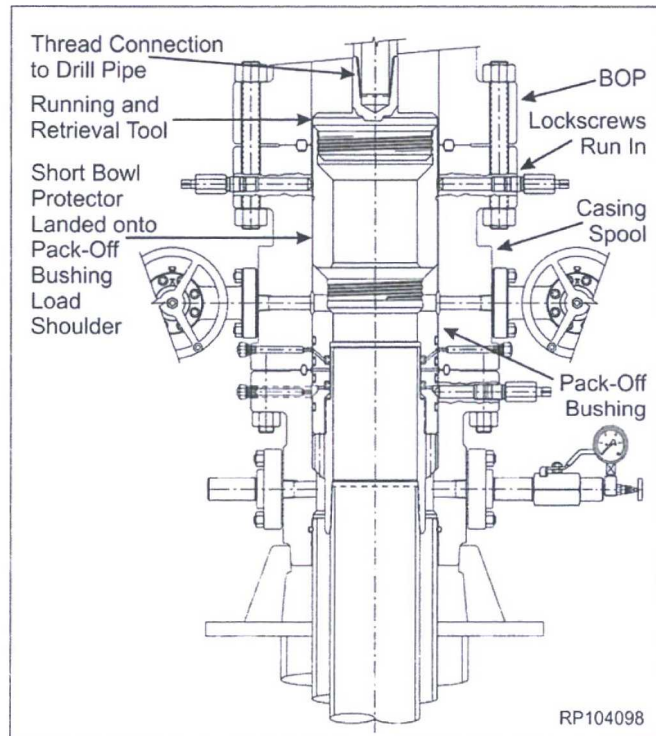
Do NOT retract the lower lockscrews located in the WFT-SB casing head, as this could allow the pack-off bushing to rise out of position.


6. On the upper WFT-SB spool assembly, run in two lockscrews ("snug" tight ONLY), 180 degrees apart, to hold the bowl protector in place.

#### WARNING

Do NOT over tighten the lockscrews, as this will cause damage to both the bowl protector and lockscrews.

7. Remove the running tool from the bowl protector, by rotating the drill pipe clockwise two turns while lifting straight up.
8. Drill out and prepare to the production casing string per the drilling supervisor's instructions.



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## WFT Split Bowl (SB) Wellhead System (Continued)

### Retrieval of the Short Bowl Protector After Drilling

1. Make up the retrieval tool to the drill pipe with ACME threads down.
2. Slowly lower the retrieval tool into the bowl protector.
3. Rotate the retrieval tool counterclockwise, two turns, to engage with the bowl protector ACME threads.
4. Fully retract both lockscrews on the casing spool (upper flange), and retrieve the bowl protector.
5. Remove the bowl protector and retrieval tool from the drill string.

### Running the Production Casing

1. Run the production casing to necessary depth and cement as required.

#### NOTE

There are two methods for installing WFT-22 Slip Type Casing Hangers:

- Under the BOP stack.
- Through the BOP stack.

### Installation of the Slip-Type Casing Hanger Under the BOP Stack

1. Drain the casing head through the uppermost side outlet valve.
2. Lift and suspend the BOP stack above the WFT-SB spool assembly to a minimum of 18 inches.
3. Wash out the WFT-SB casing head/spool assembly as required.
4. Confirm that ONLY the lockscrews in the casing spool (upper flange) are fully retracted.

5. Examine the WFT-22 slip-type casing hanger. Verify the following:

- Slip segments are clean and undamaged.
- All screws are in place.
- Packing element is clean and undamaged.

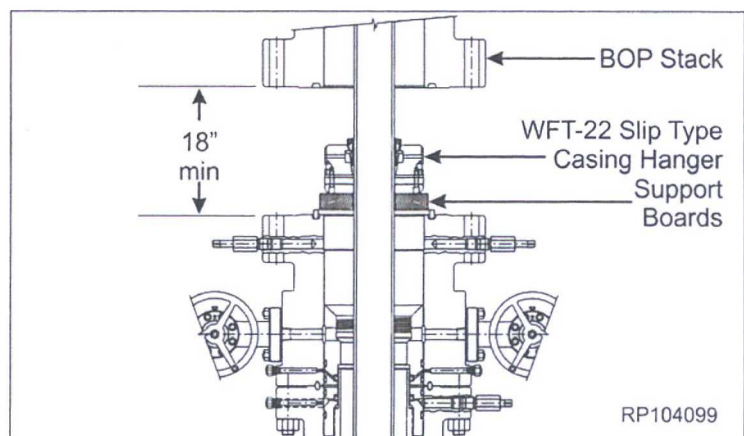



The packing element should not protrude past the casing hanger outer diameter. If the packing element does extend past the outer diameter, loosen the cap screws in the bottom of the hanger.

6. Place two boards across the casing spool face, against the casing, to support the hanger.
7. Disengage the spring loaded latch, open the hanger and wrap the hanger around the casing, allowing the support boards to carry weight.
8. Re-engage the casing hanger spring loaded latch.
9. Remove the slip retaining cap screws from the outer diameter of the hanger body, allowing the slip segments to settle around the casing.
10. Supporting the weight of the casing hanger, remove the support boards and lower the hanger into the WFT-SB casing head/spool assembly until it lands on the pack-off bushing load shoulder.



Do NOT drop the hanger; lower it carefully.



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## WFT Split Bowl (SB) Wellhead System (Continued)

### Installation of the Slip-Type Casing Hanger through the BOP Stack

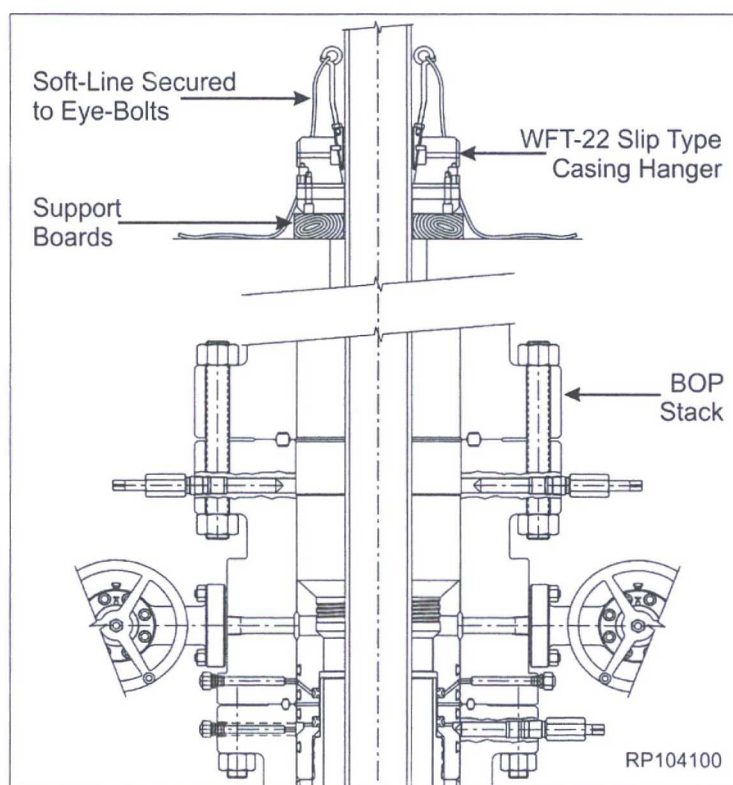
1. Drain the WFT-SB casing head/spool assembly and BOP stack through the side outlet valves on the spool assembly.
  2. Wash out the wellhead assembly until clean returns are seen.
  3. Examine the slip type casing hanger. Verify the following:
    - slip segments are clean and undamaged
    - all screws are in place
    - Packing Element is clean and undamaged.
- CAUTION**
- The packing element should not protrude past the casing hanger outer diameter. If the packing element does extend past the outer diameter, loosen the cap screws in the bottom of the hanger.
4. Place two boards across the rotary table, against the casing, to support the hanger.
  5. Disengage the spring loaded latch, open the hanger and wrap it around the casing, allowing the support boards to carry the weight.
  6. Re-engage the casing hanger's spring loaded latch.
  7. Measure the distance from the top flange of the WFT-SB casing spool to the drilling rig floor (RKB).
  8. Measure out two lengths of soft-line cord (rope) to the same length as the


RKB measurement, and adding an additional 10 feet to each line.

9. Mark the soft line cord at the required length.
10. Install two eyebolts into the tapped holes in the top of the casing hanger slip segments, 180 degrees apart.
11. Securely tie the soft-line cord to the eyebolts.

### NOTE

Measuring the soft-line cord and installing the eyebolts into the hanger segments should be done offline.



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## WFT Split Bowl (SB) Wellhead System (Continued)

12. Remove the slip retaining cap screws from the outer diameter of the hanger body, allowing the slip segments to settle around the casing.
13. Supporting the weight of the casing hanger, remove the support boards and carefully lower the hanger through the BOP stack into the WFT-SB casing head/spool assembly, until it securely lands on the pack-off bushing load shoulder.



Do NOT drop hanger; lower it carefully.

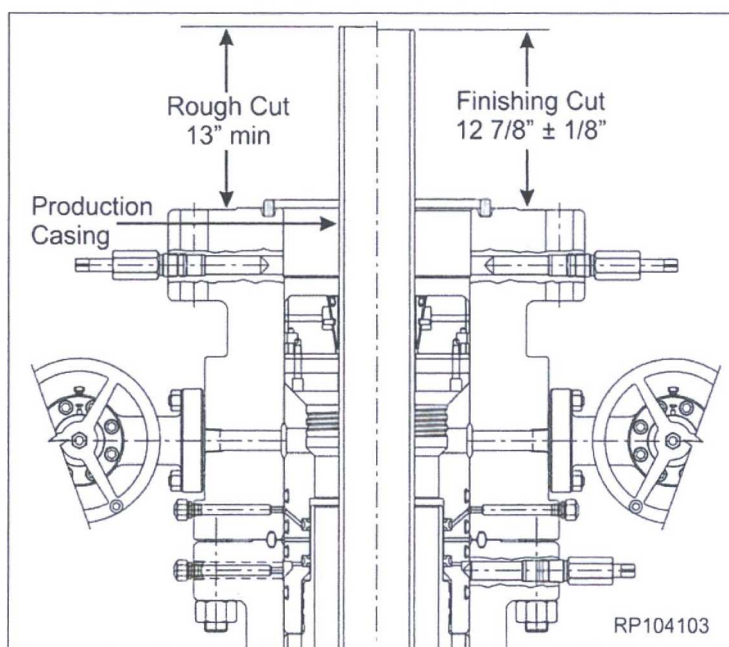
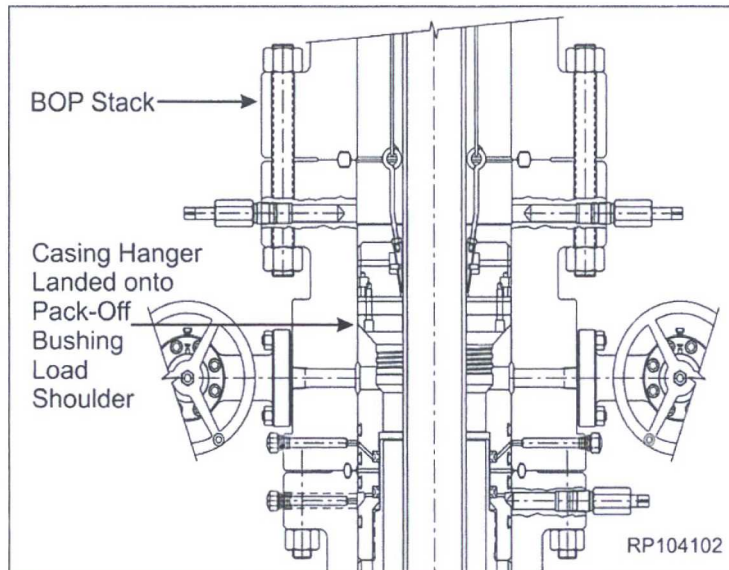
### Hanging off the Production Casing


1. With the casing hanger now landed onto the pack-off bushing load shoulder, 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. If this does not occur, pull tension again and slack off once more.

2. Rough cut casing approximately 16" above top of WFT-SB Spool top flange. Remove excess casing.
3. Carefully remove BOP stack, set aside.
4. Final cut the casing at about  $12\frac{7}{8}" \pm 1/8"$  above the face of the WFT-SB spool, which will allow room for the double studded adapter flange.
5. Grind the casing stub level and bevel the casing outer diameter ( $1/4" \times 1/8"$ ) and inner diameter ( $1/8" \times 45$  degrees).



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## WFT Split Bowl (SB) Wellhead System (Continued)

### Installation of the Double-Studded Adapter (DSA) Flange

1. Examine the double studded adapter (DSA) Flange. Verify the following:
  - Ring grooves are clean and undamaged.
  - Stud threads are clean and undamaged.
2. Orient the DSA flange with the 10M side down.
3. Thoroughly clean the mating grooves of the DSA flange and the WFT-SB spool assembly. Wipe lightly with oil or grease.



**WARNING**

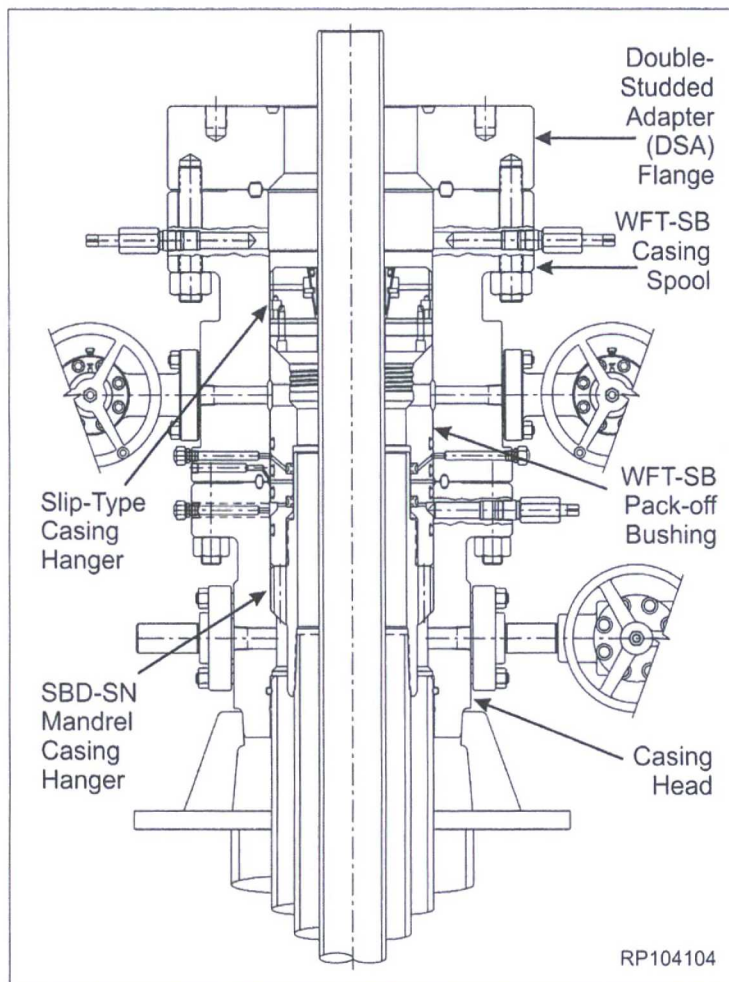
Excessive oil or grease will prevent a positive seal from forming.

4. Install a new appropriately sized ring gasket into the WFT-SB spool assembly groove.
5. Lift, while holding level, and carefully lower the DSA over the production casing stub until it lands on the ring gasket.
6. Make-up the flange connection with appropriate nuts, tightening in alternate cross pattern, as required by API 6A.
7. Fill the void area in the DSA around the production casing with a light weight oil.
8. Continue filling with a light weight oil to the top of the DSA.




**WARNING**

Do NOT allow oil to run into the ring groove. This may prevent a positive seal from forming.



RP104104

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## WFT Split Bowl (SB) Wellhead System (Continued)

### Installation and Testing of the Tubing Spool Assembly

#### Installation of the TCM Tubing Spool Assembly

1. Examine the tubing spool assembly. Verify the following:
  - bore is clean and free of debris
  - ring grooves and seals are clean and undamaged
  - PE-seal assembly is properly installed, clean and undamaged.
2. Thoroughly clean the mating ring grooves of the WFT-TCM Tubing Spool and WFT-SB Casing Spool.
3. Lightly lubricate the inner diameter of the PE-seal and outer diameter of the casing stub with oil or grease.



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

4. Install a new appropriately sized ring gasket into the WFT-SB casing spool assembly groove.
5. Orient the tubing spool assembly as required and carefully lower it over the casing stub, until it lands on the ring gasket.
6. Make up the flange connection with the appropriate studs and nuts, tightening in an alternating cross pattern, as required by API 6A.

#### Testing the Secondary Seal and Flange Connection Test

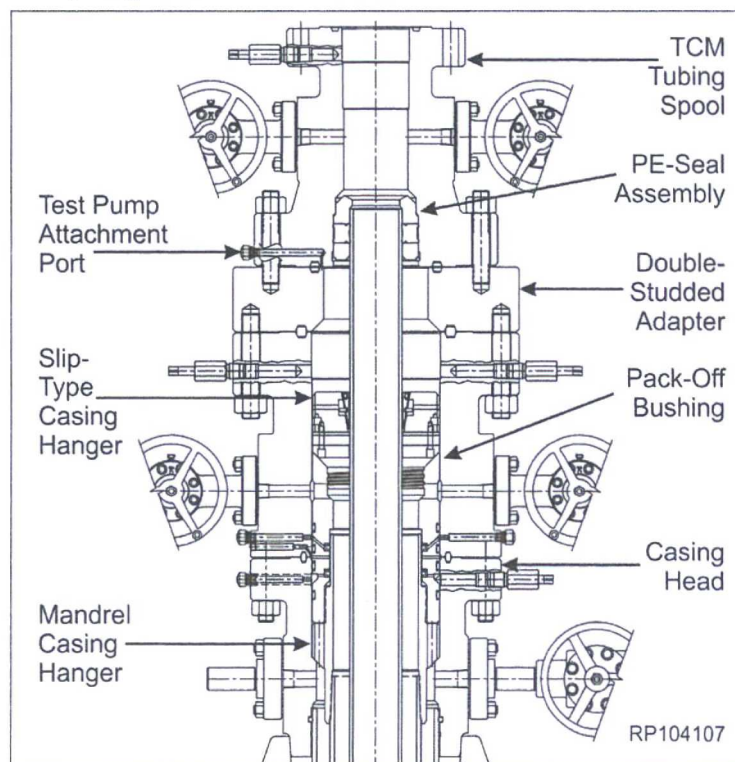
1. Locate the test port fitting on the OD of the tubing spool lower flange. Remove the dust cap from the fitting.
2. Attach a test pump to the test port fitting.


3. Pump clean test fluid into the void area between the flanges until a test pressure of **10,000 psi or 80% of casing collapse pressure is attained**, whichever is lower.
4. Hold and monitor pressure for 15 minutes or as required by the drilling supervisor.
5. Once a satisfactory test is achieved, carefully bleed off pressure and remove the test pump
6. Attach a bleeder tool to the test port fitting and open the tool to vent any remaining trapped pressure.



**Always direct the bleeder tool port away from people and property.**

7. Remove the bleeder tool and reinstall the dust cap on the test port fitting.
8. Install a new appropriately sized ring gasket into the tubing spool groove.



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## WFT Split Bowl (SB) Wellhead System (Continued)

### Testing the BOP

#### NOTE

Immediately after the make-up of the BOP Stack and periodically during drilling of hole for the next string, the BOP stack (flanged connections and rams) must be tested.

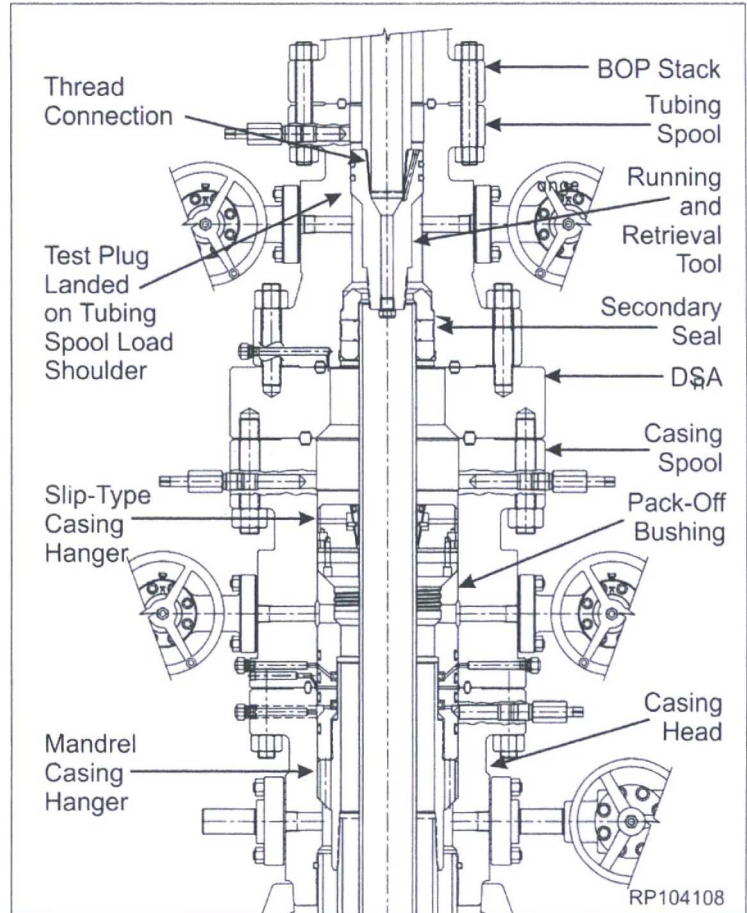
1. Examine the test plug. Verify that:
  - O-ring seals and plugs are properly installed, clean and undamaged.
  - All threads are clean and undamaged.
2. Orient the test plug with O-ring seals up and drill pipe pin connection down.
3. Make up a joint of drill pipe to the top of the test plug.


#### NOTE

If pressure is to be supplied through the drill pipe, the pipe plug should be removed from the weep port.

4. Fully retract all lockscrews on the WFT-TCM tubing spool assembly.
5. Open the side outlet valves on the tubing spool.
6. Wipe the test plug O-ring seals with a light oil or grease.
7. Lower the test plug through the BOP until it lands on the tubing spool load shoulder.
8. Close the BOP rams on the drill pipe and test to **10,000 psi maximum**.
9. Monitor the open outlets for signs of leakage past the test plug.

10. Once a satisfactory test is achieved, release pressure and open the rams.
11. Close the side outlet valves.
12. Remove as much fluid from the BOP stack as possible.
13. Slowly retrieve the test plug, avoiding damage to the seals.
14. Repeat this procedure, as required, during drilling or conditioning of the hole.



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## WFT Split Bowl (SB) Wellhead System (Continued)

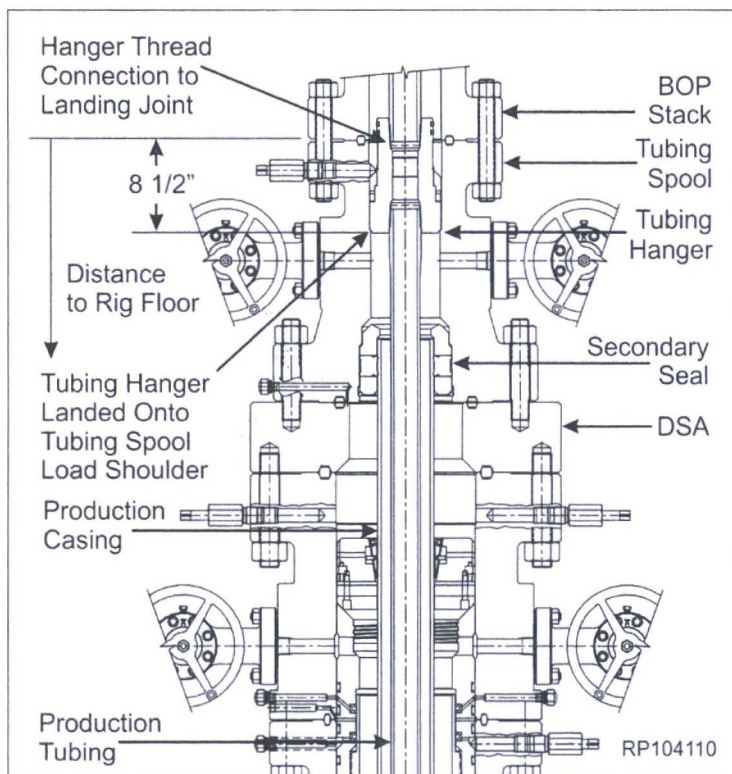
### Hanging off the Production Tubing String


1. Run the production tubing and space out appropriately for the tubing hanger.
2. Examine the TC1AEN Tubing Hanger. Verify the following:
  - Packing element is clean and undamaged.
  - S-seals are properly installed.
  - S-seals are clean and undamaged.
  - All threads are clean and undamaged.
3. Make-up a short handling joint to the top of the tubing hanger.
4. Pick up the tubing hanger and make it up to the tubing string, tightening the connection to the thread manufacturer's recommended optimum torque value.
5. Remove the short handling joint from the top of the hanger. Make up the landing joint to the top of the tubing hanger, tightening the connection to the thread manufacturer's recommended minimum torque values.
6. Ensure that all tubing spool lockscrews are fully retracted from the bore and open side outlet valves. Drain the BOP stack.

#### NOTE

The side outlet valves should remain open while landing the tubing hanger.

7. Calculate the distance from the tubing spool load shoulder to the rig floor. Measure from the face of the tubing spool.
8. Carefully lower the tubing hanger into the well, tallying the tubing every five feet, until the tubing hanger lands securely on the tubing spool load shoulder.
9. Run in all tubing spool lockscrews, in an alternating cross pattern, to 300 ft-lbs, in 75 ft-lb increments.
10. Remove the landing joint from the tubing hanger, and set it aside.



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## WFT Split Bowl (SB) Wellhead System (Continued)

11. Install the Type H Back Pressure Valve, carefully lowering the BPV through the BOP stack into the tubing hanger. Rotate the BPV counterclockwise (to the left) until it bottoms out in the tubing hanger BPV prep. Continue rotating counterclockwise, approximately 7 turns, to retrieve the running tool.

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

### Installation and Testing of the Production Tree

#### Installation

1. Examine the production tree assembly. Verify the following:
  - Bore is clean and free of debris.
  - All valves are in the fully open position.
  - All threads and seal areas are clean and undamaged.
  - All fittings, nuts and handwheels are intact and undamaged.
2. Thoroughly clean all exposed portions of the tubing hanger, tubing head adapter flange and bottom prep of the tubing head adapter.
3. Thoroughly clean mating ring grooves of the tubing head adapter flange and WFT-TCM tubing spool.
4. Lightly lubricate the tubing hanger neck outer diameter and tubing head adapter flange bottom prep with oil or grease.



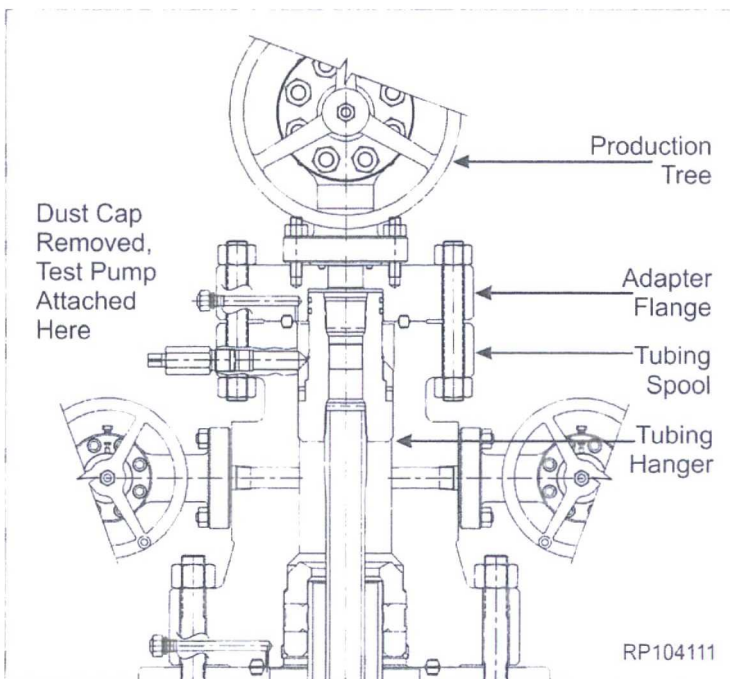
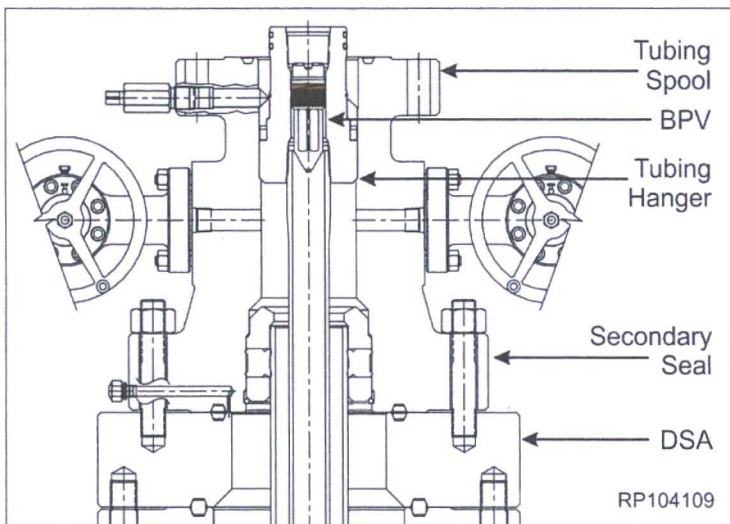
**Excessive oil or grease will prevent a positive seal from forming.**


5. Install a new appropriately sized ring gasket into the WFT-TCM tubing spool groove.

6. Fill the void area around the hanger with hydraulic fluid, to the top of the tubing spool assembly.



**Do NOT overfill the void area, allowing oil to run into the ring groove. This may prevent a positive seal from forming.**



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## WFT Split Bowl (SB) Wellhead System (Continued)

- Align and level the production tree above the tubing hanger and carefully lower it over the tubing hanger neck, landing it on the ring gasket.



**WARNING**

Do NOT damage the hanger neck seals, as this will impair their sealing ability.

- Make up the connection using the appropriate studs and nuts, and tightening in an alternating cross pattern, as required by API 6A.

### Testing the Production Tree Connection

- Locate the test port fitting on the outer diameter of the tubing head adapter flange. Remove the dust cap from the fitting.
- Attach a test pump to test port fitting, and open the pump.
- Pump clean test fluid into void area between flanges, test to 10,000 psi maximum.
- Hold and monitor pressure for **15 minutes or as required by the production supervisor**.
- Once a satisfactory test is achieved, carefully bleed off test pressure and remove the test pump.
- Attach a bleeder tool to the test port fitting, and open the tool to vent any remaining trapped pressure.

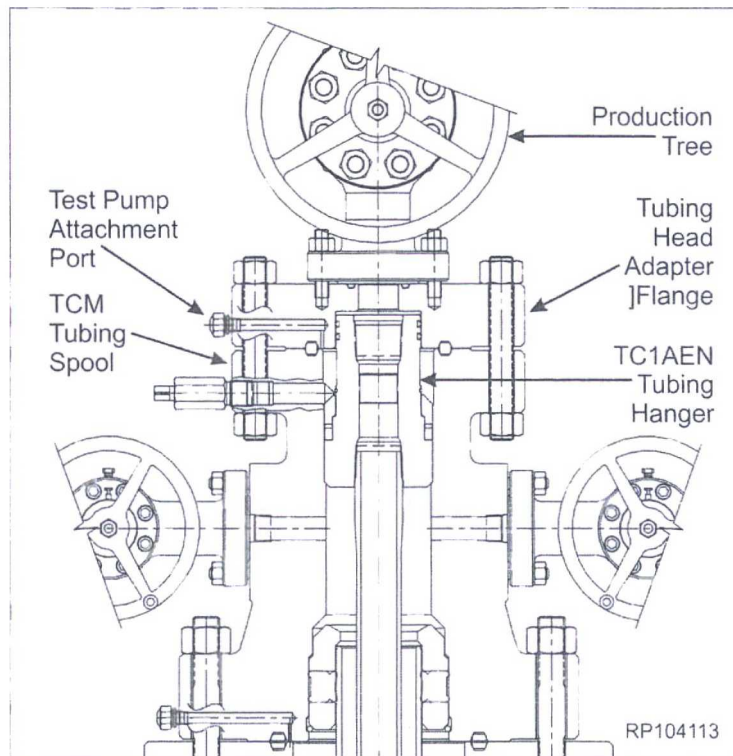



**CAUTION**

Always direct the bleeder tool away from people and property.

- Remove the bleeder tool and reinstall the dust cap on the test port fitting.

- Remove the type 'H' back pressure valve (BPV) through the production tree.
- Ensure that the well is safe and secure by closing all gate valves.



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Continental

continued

CONTITECH RUBBER  
Industrial Kft.

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Rig 94

Asset 24455

QUALITY CONTROL INSPECTION AND TEST CERTIFICATE				CERT N° 1592	
PURCHASER: ContiTech Oil & Marine Corp.			P.O. N°: 4500461753		
CONTITECH ORDER N° 539225		HOSE TYPE: 3" ID		Choke & Kill Hose	
HOSE SERIAL N° 68547		NOMINAL / ACTUAL LENGTH: 7,62 m / 7,66 m			
W.P. 68,9 MPa 10000 psi		T.P. 103,4 MPa 15000 psi		Duration: 60 min.	
Pressure test with water at ambient temperature					
See attachment. ( 1 page )					
<div style="display: flex; justify-content: space-between;"> <span>&gt; 10 Min.</span> <span>↑ 50 MPa</span> </div>					
COUPLINGS Type		Serial N°		Quality	
3" coupling with		2574 5533		AISI 4130	
4 1/16" 10K API Swivel Flange end				AISI 4130	
Hub				AISI 4130	
				A1582N H8572	
				58855	
				A1199N A'423N	
Not Designed For Well Testing				API Spec 46 C	
Fire Rated				Temperature rate:"B"	
All metal parts are flawless					
WE CERTIFY THAT THE ABOVE HOSE HAS BEEN MANUFACTURED IN ACCORDANCE WITH THE TERMS OF THE ORDER INSPECTED AND PRESSURE TESTED AS ABOVE WITH SATISFACTORY RESULT.					
STATEMENT OF CONFORMITY: We hereby certify that the above items/equipment supplied by us are in conformity with the terms, conditions and specifications of the above Purchaser Order and that these items/equipment were fabricated inspected and tested in accordance with the referenced standards, codes and specifications and meet the relevant acceptance criteria and design requirements					
Date: 04 September 2014.		Inspector		Quality Control	

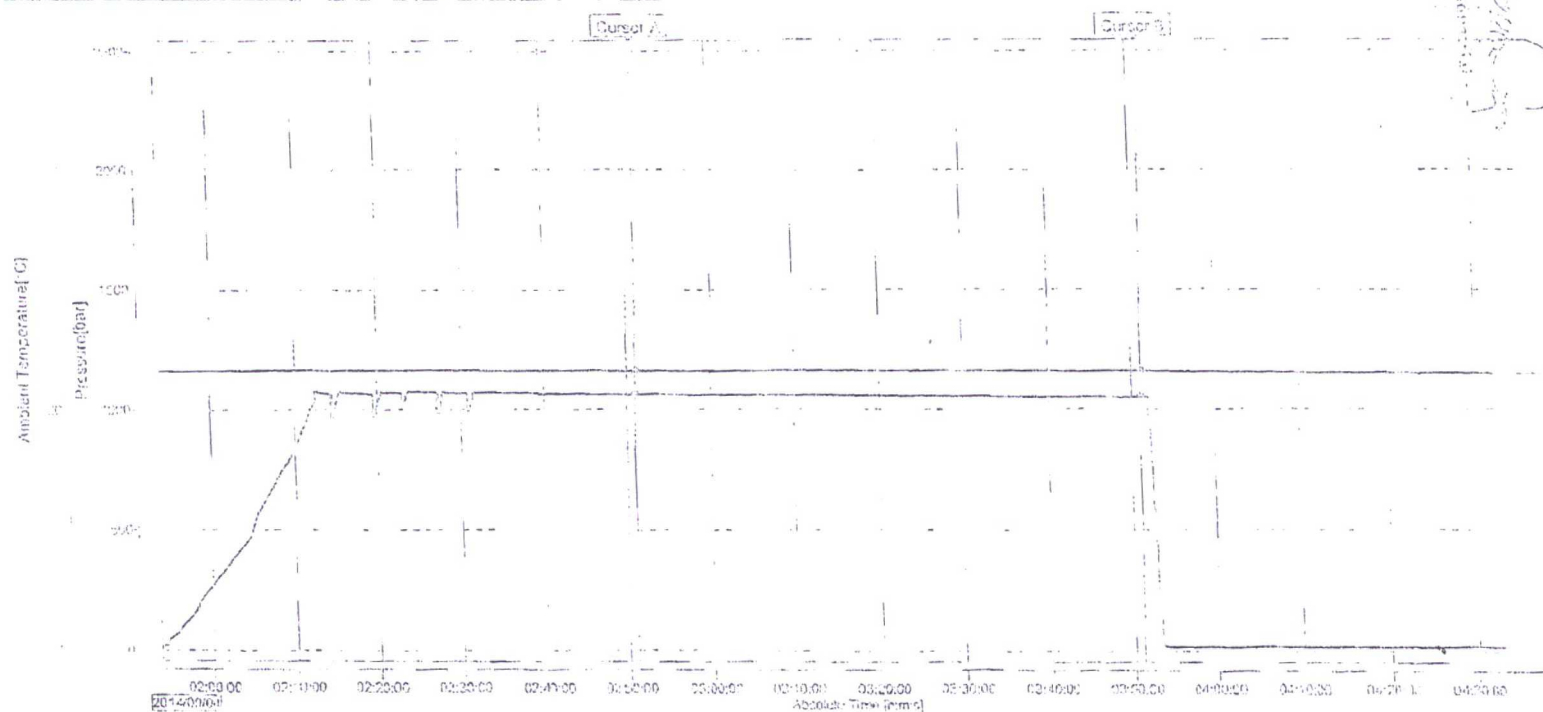


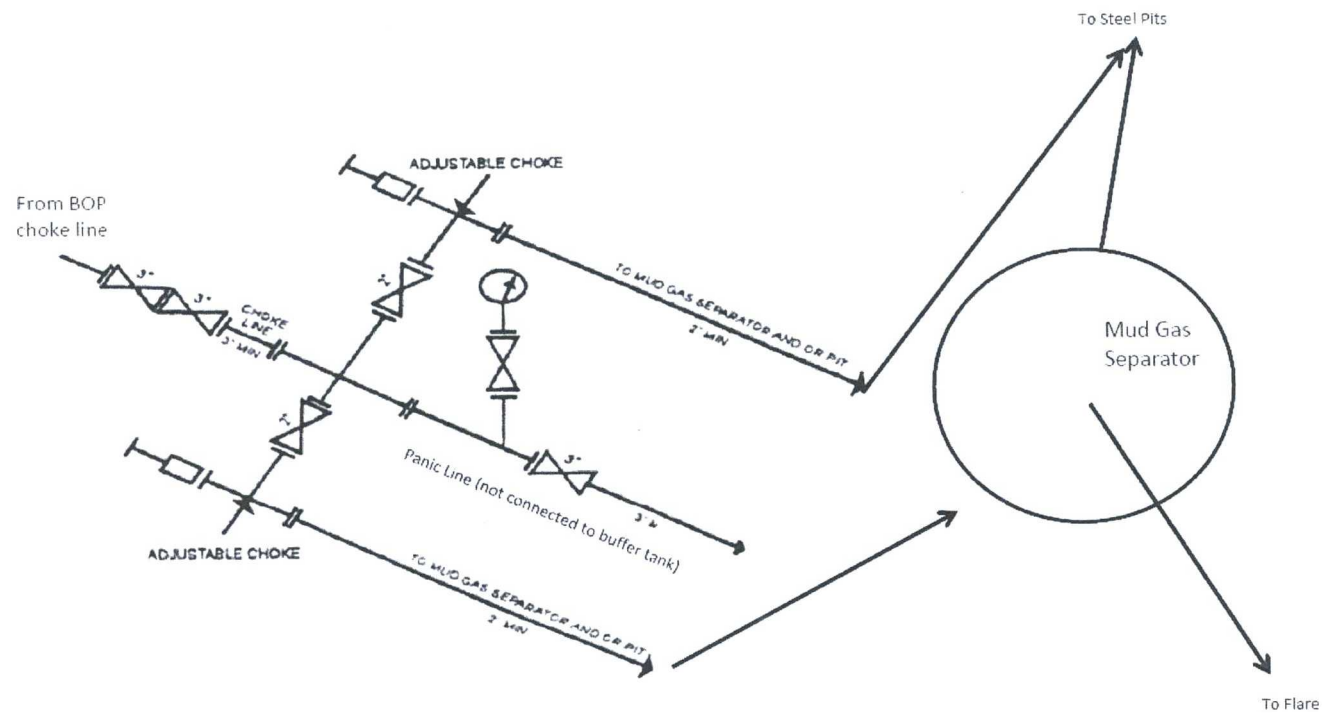
File Name : 000220\_68543,68545+547.GEV.....000230\_68543,68545+547.GEV  
 File Message : 68543,68545,52547  
 Device Type : GX10  
 Serial No. : SSP606399  
 Data Count : 6046

Sampling Int. : 1.000 sec  
 Start Time : 2014/09/04 01:53:54.000  
 Stop Time : 2014/09/04 04:39:39.000

Print Group : Press-Temp  
 Print Range : 2014/09/04 01:53:54.000 - 2014/09/04 04:39:39.000  
 Comment :

	Cursor A	Cursor B	Difference
Date No	3432	7032	7000
Altered Time	2014/09/04 02:51:00.000	2014/09/04 03:51:06.000	01:00:06.000
Cur Comment	Value A	Value B	Value B-A
Pressure[bar]	1062.92	1048.57	-14.35
Ambient Temperature[°C]	20.24	20.14	-0.10





3M choke manifold design

Exhibit A1



## 3,000 psi BOP Schematic

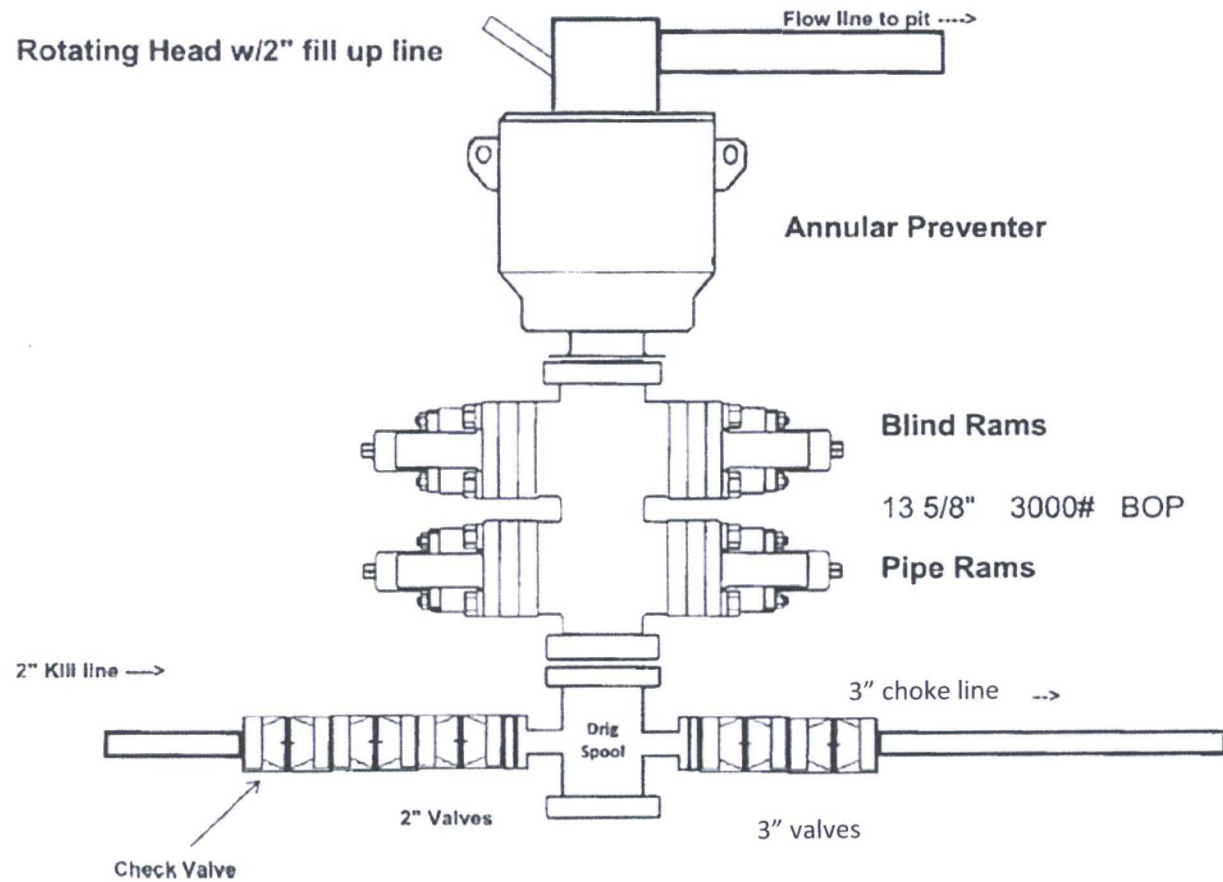


Exhibit A



BTA Oil Producers, LLC

Well: Rojo AE 7811 JV-P Fed Com #3H

Casing Assumption

Hole Size	Csg.Size	From (MD)	To (MD)	From (TVD)	To (TVD)	Tapered String	Weight (lbs)	Grade	Conn.	Collapse	Burst	Body Tension	Joint Tension	Dry/ Buoyant	Mud Weight (ppg)
17.500	13.375	0	1085	0	1085	No	54.5	J-55	STC	2.50	5.90	14.90	9.00	Dry	8.40
12.250	9.625	0	4957	0	4950	No	40.0	J-55	LTC	1.70	2.60	3.20	2.60	Dry	10.00
8.750	5.500	0	16952	0	9313	No	17.0	P-110	LTC	1.60	2.40	3.40	2.80	Dry	9.20