

*Inflatable Straddle Drill Stem Test – Procedure and Tools*

**Make up of the Tool String:-**

A Drag Spring device is run on the bottom to provide drag & prevent the tool from rotation during the inflation & setting process.

The Bottom packer assembly is installed immediately above the Drag Spring.

Sufficient Drill Collars and Spacing are installed to space the packers the required distance apart across the desired interval. An Outside recorder carrier is run at the top of the Interval, the ORC can carry multiple electronic or mechanical, dual or single sensor tools for Pressure & Temperature evaluation.

The Top packer assembly is installed incorporating the Ported Sub as the lower sub in the assembly, this tool allows the Interval formation passage to surface.

A Screen assy. Is installed immediately above the Top Packer and below the Pump, the screen which has multiple slots, filters out all coarse particles in the drilling mud before being used by the Pump to inflate the packers.

The Pump, which is the heart of the string is then made up, the pump is powered by right hand rotation of the drill pipe. Drilling fluid is drawn into the pump thru the screen from the well bore & pumped into the packers simultaneously inflating the packers.

Once Inflation pressure reaches approx. 1700 psi above hydrostatic pressure a relief valve lets the fluid by-pass so that over inflation does not occur. Inflation pressure is retained in the packers by means of a check valve system.

Pump output is ~ 1 gallon /minute @ ~ 30rpm which is normal rotation speed for inflation.

The rest of the tool string is completed by installing, a Safety Joint (back off is achieved by 60% of make up torque in a left hand rotation) , set of Jars (generally single action up), A Pressure Relief Valve, Inside Recorder carrier, Sample chamber (2.5 lit), a Multiple Shut-In Hydraulic Valve, a Recovery recorder carrier plus two reversing subs.

Drill pipe is run to surface and a Rotating Control Head incorporating a flow line swivel is installed to permit pipe rotation.

*General Instructions for Assembly*

1. Drillers must be on the brake when Making up, RIH, POOH with test tools. During assembly, all tool joints should be made up with lubricant to the DST Supervisors recommended make up pressure. Minimum 6000 #/sq in
2. All O'ring seals & seal areas should be inspected & oiled prior to make up.
3. Initial tool connections should be made up firmly by hand prior to attempting final makeup with Rig Tongs.
4. After the hand assembled tool is comfortably hanging in the derrick,
5. RIH but not **before tightening all joints with rig tongs prior to descending below the table.**
6. **Caution:- Set tool weight on the rotary during final makeup to ensure No accidental "backing out" of loose joints.**
7. Measure all tools prior to RIH.
8. Seek instruction from the DST Supervisor for all operations. These operations are subject to change depending on rig size & performance.

*General Instructions for Running in the Hole*

1. While RIH it is important that Drillers abide by the DST supervisors instructions. A pipe tally will be left with the driller indicating to him how many DCs, DPs, Pup joints be RIH, **maximum passage through the table is 1 joint per 30 seconds** or 1 foot per second.  
Several reasons for this; a) the element is bigger than the DP so it is possible to charge the formation while RIH, b) the tools may be washed if too much pressure is applied to them causing a misrun.  
**If tight hole is encountered Pick Up drill string immediately,**  
**Caution:-**  
**2 minutes of set down weight may open the tools & flood them prematurely. Result may be a substantial lowering of the annular mud causing a possible underbalance resulting in the well flowing prematurely.**  
Any tight hole situation should be reported to the DST Supervisor.  
**Caution:-**  
**Do not rotate pipe during RIH operation as rotation will inflate packers.**
2. Check pipe periodically while RIH for blow, if blow we know we have a fluid leak.
3. The last couple / few joints of pipe should be straight to alleviate pipe whip whilst rotating to inflate.
4. Ensure a minimum of 10 feet of Stick Up to enable unseating the tool at test end.
5. After last joint of DP lowered into hole install Head & flow hose,  
**Check that all valves are open.**  
**Lock swivel in traveling block.**
6. Pick up & down, determine up, down & static weights & note any hole drag.
7. Attach flow hose, manifold, flare line.
8. **Pressure Test.** ( Blow lines with air )

9. Close Floor Manifold, open bubble hose.
10. Lower testing string ~ 8feet below test interval & pick up to test interval straddle position. This will ensure a) Pump slip joint is extended, b) Jar is extended & c) hydraulic tool is extended in closed position.
11. Set the slips in the rotary.

#### Inflating the Tools

1. Set DP in slips, slack off the elevators, rotate ~ 6 turns, release clutch & check for backlash or excessive torque.
2. Rotate @ ~ 60 rpm for 20 mins or twice the time it takes to pump required inflation volume.
3. As the packer goes thru its square off period the pump will “kick” in & out of gear as pressure increases & subsides.
4. Inflation pressure is trapped by the master check valve, pump seats & poppet caps.
5. When desired inflation time has passed, slow rotation speed steadily so as not to preset equalization mode in pump.
6. To ensure packers are fully set/inflated, pick up the drill string sufficiently to remove slips, and pull 20,000 lbs more than string weight to determine that the tool is fully anchored. Hold for 5 minutes, if no movement you are ready to test, If not re-inflate for 10 minutes.

#### Testing – Opening the Tool

1. Check that annulus is full.
2. Test rig pumps, on annular side.
3. Slack off with elevators to set down 15 to 20,000 lbs on hydraulic tool to open the tool, Observe Free point in pump & set down.
4. Opening time will vary slightly but is usually about 2 minutes.  
This rapid opening following a delayed movement, minimizes the cutting of the valve ports & provides a positive indication at surface that the valve has opened.
5. Indications of Tool opening are a)Change in weight indicator, b)air flow thru bubble hose, c)shock felt at surface

#### Closing The Tool

1. To close, pick up to string weight, then pick up a further 10,000 lbs above string weight. Fluid flow into the string during the flow period will change string weight.
2. Check bubble hose to ensure closure, flow should diminish, it may not cease due to percolation.

#### Test Periods

1. Multiple test periods can be carried out, generally the length and number of these periods is determined by consultation with the Co-Man and the Geologist prior to commencement of the test.

Deflating

1. Ensure annular is full.
2. Determine the free point then apply ~5000lbs down, set slips.
3. **Take care not to open hydraulic tool with prolonged set down period.**
4. Rotate string ¼ turn at tool., this positions pump in equalize position
5. Pick up with 10k lbs of overpull to deflate.
6. Wait for a minimum of 30 minutes to give elements time to return to their original shape.
7. Work pipe free.
8. Reverse circulate.

POOH

1. Fill annular
2. Pull first stands slowly & watch for overpull.
3. Do not rotate String, this will inflate packers & cause swabbing.  
**NOTE: POOH is as critical as RIH do not swab.**
4. POOH.
5. Break down tools.