
Pragma Multi-Lateral Entry System

Outline Operating Guidelines



This document is intended to provide guidance on running the Pragma Multi-Lateral Entry System, it is not intended to cover all eventualities and if you have questions at all please do not hesitate to contact your Pragma representative.

Example ML Entry System – Basic BHA

- High Torque Indexing
- Hydraulic Knuckle Joint
- Pump Out Choke Probe

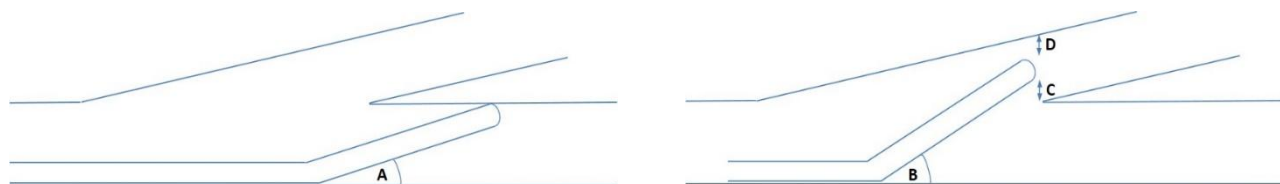
Suggested Pre-Job Planning

Review the tools technical manuals.

Watch a yard test video <https://www.youtube.com/watch?v=XAtm7zp8JU> or use link on the website page for the Multi-Lateral Entry System

The length of the Pump Out Choke Probe should be matched to the well geometry. The length should be selected so that the articulated angle of the Hydraulic Knuckle Joint in the main bore is in the range of 7°-10° (angle A). The same length of Pump Out Choke Probe should allow 15° articulation when the junction window has been found (angle B). When the junction window has been located, 15° articulation must lift the lower end of the Pump Out Choke Probe sufficiently to clear the junction and enter the lateral wellbore (C).

The Pragma Multi-Lateral Entry System calculator, downloadable from our website, can be used to ensure an appropriate length of Pump Out Choke Probe has been selected or contact your DTI representative for assistance.



The Hydraulic Indexing Tool is generally supplied for 30° rotation on each pressure cycle. Well geometry determines if the Hydraulic Indexing tool should be set to 15°, 30° or 45°.

Only one choke should be present in the BHA and this should be in the Pump Out Choke Sub or Nozzle. New Indexing Tools and Hydraulic Knuckle Joints may be supplied with chokes that should be removed.

When the Hydraulic Knuckle Joint articulates to 15° additional flow ports open which result in a pressure drop. This is an indication that the lateral junction has been located. The pressure drop is larger when operating the tools with a lower flow rate and smaller choke orifice.

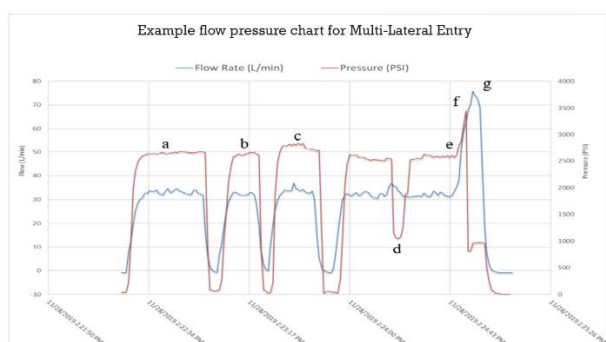
The choke orifice in the Pump Out Choke Sub or Nozzle should be selected to achieve 2500-3000 psi at the intended flow rate and be small enough to show a large pressure drop when the lateral junction window has been located.

Suggested Pre-Job Testing

- Make up the upper BHA then the High Torque Indexing Tool, Hydraulic Knuckle and Pump Out Choke Probe.
- Rig up the CT for pre-job test with the BHA inside the lubricator.
- Increase the flow rate to the intended rate, the BHA differential pressure should be 2500-3000 psi.
- Lower the BHA so the Choke Probe and Knuckle Joint are below the lubricator, the choke probe can now fully articulate, and a pressure drop should be seen. Shut down the pump and record the flow rate and the pressure drop observed.
- Adjust the choke size and flow rate as required to achieve a clearly observable pressure drop.
- Pull the BHA up inside the lubricator and repeat the test. The indexing tool should have rotated the Hydraulic Knuckle Joint and Choke Probe by the correct amount.
- Repeat the test as necessary to ensure the tools are orienting each pressure cycle, the Knuckle is articulating, and a clearly observable pressure drop is seen.

Locating the Lateral

- RIH 30ft below the known lateral junction depth circulating at low flow rates.
- Increase flow to the same rate as used in pre-job testing.
- POOH 30ft past the lateral junction, if a pressure drop is not observed stop pumping.
- RIH below the lateral junction and resume pumping at the same rate.
- POOH past the lateral junction, if a pressure drop is not observed stop pumping.
- Repeat above steps until a pressure drop is observed.
- When a pressure drop is observed stop moving the CT and maintain the same pump rate. RIH slowly to enter the lateral well bore. The pressure will increase again. Lower pump rate and run into the lateral bore.
- If tagging TD to confirm the lateral wellbore entry the maximum recommended set down loads are 2,000 lbs. for the 1 11/16", 3,500 lbs. for the 2 1/8" and 5,000 lbs. for the 2 7/8" tool strings.



- a) 30° Index rotation and pass lateral window.
Reposition BHA below window.
- b) 30° Index rotation and pass lateral window.
Reposition BHA below window
- c) 30° Index rotation and pass lateral window.
Reposition BHA below window
- d) Lateral located on 4th pass
- e) Hydraulic knuckle angle reduced showing lateral entered.
- f) Choke sheared in sub.
- g) Optimum clean our rate.