

Operational Procedure

Subject: Plug Valve Lubrication (during flowback operations)

Effective lubrication of plug valves is vital to ensuring a good seal on the valve and to keep operating torques safely within normal parameters. Extreme conditions such as those seen during high-rate, high-temperature flowbacks can make effective and frequent lubrication a key to safely operating the equipment and to keeping damage to the valve at a minimum.

I. Daily Log

The operator must document frequency of greasing for each manifold used during the job.

Documented data shall include: the tested maximum output of the grease pump prior to the job, time/date of each complete manifold greasing along with upstream and downstream pressures.

II. Greasing Equipment

The operator is required to have at least one high-pressure grease pump at each wellsite on which plug valves or manifolds with plug valves are utilized for flowback operations. It is the responsibility of the operator to ensure that the grease pump and any equipment (i.e. air compressor) it relies upon to make it function is in proper working order prior to the start of the flowback. The operator should be aware of expected line pressures in which the valves will be operating and ensure that the grease pump to be used is capable of exceeding those pressures reliably and consistently. It is recommended that the operator use a grease pump that is capable of reaching the full rated working pressure of the valve to be greased and that it can do so at outside temperatures as low as 40°F. The operator must test and document the maximum output of the grease pump as read by the gauge closest to the end of the hose.

III. Acceptable Grease Compounds

The operator is expected to use a grease compound recommended by the valve manufacturer or other grease compounds proven to be effective in the expected working conditions of the well. Factors to consider are temperatures in excess of 200°F, condensates, high rates of flow, abrasives, and the presence of H₂S or CO₂. The operator must ensure that an adequate supply of grease is available throughout the job.

IV. Frequency of Greasing Valves (in service)

The operator is responsible for greasing all valves immediately prior to *every* opening or closing when the time elapsed since the last greasing exceeds one (1) hour. When the elapsed time between cycles is less than one (1) hour, grease as needed to ensure smooth valve operation. Any leaking valves should be fully greased immediately to reduce or stop the leak.

V. Greasing Procedure

Attach the grease pump to the grease fitting and turn on the pump. Use the output gauge on the grease pump to verify that the grease pressure is exceeding the line pressure of the valve being greased. When the line pressure has been exceeded by the grease pump, continue to pump grease into the valve for an additional 5 seconds (for 2" valves or smaller) or 10 seconds (for valves larger than 2"). Check to make sure that grease is not leaking between the coupler and the grease fitting.

The following steps should be taken when greasing a typical 8-valve manifold prior to switching the flow to the other side of the manifold. The valves adjacent to the center tees or crosses are referred to as the safety valves. The valves adjacent to the chokes and the corners below the choke are referred to as the torture valves:

1. **Document** the date, time, and hi/b pressures on the manifold.
2. **Grease the open valves:** Pump grease into all four valves on the "open" or flowing side of the manifold.
3. **Grease the closed valves:** ***Some valves can only be greased in the open position, while others are designed to allow closed-valve greasing. Follow the steps below that are appropriate to the type of valves in the manifold. This assumes all four valves of the non-flowing side are closed.

Valves Greasable in the Closed Position –

- A. Pump grease into the outside torture valves in the closed position.
- B. Fully open each torture valve and then close again. Repeat steps A and B as necessary until the valves operate smoothly. Return valves to closed position.
- C. Pump grease into the inside safety valves in the closed position.
- D. Fully open each safety valve and then close again. Repeat steps C and D as necessary until the valves operate smoothly. Leave the valves in the open position to prepare for flow switch.

Valves Greasable only in the Open Position –

- A. Open the outside torture valves and pump grease in the open position.
 - B. Fully close each torture valve. Repeat steps A and B as necessary until the valves operate smoothly. Return valves to closed position.
 - C. Open the inside safety valves and pump grease in the open position.
 - D. Fully close each safety valve. Repeat steps C and D as necessary until the valves operate smoothly. Leave the valves in the open position to prepare for flow switch.
4. **Switch the flow:**
 - A. Open the torture valve downstream of the choke on the non-flowing side of the manifold.
 - B. Simultaneously open the torture valve of the non-flowing side of the manifold and close the torture valve of the flowing side of the manifold.
 - C. Close the three remaining valves of the new non-flowing side of the manifold.
 5. **Bean inspection or change out:** If any valves appear to be leaking when bleeding off the chokes of the closed side for bean inspection or change out, follow the appropriate procedure for valve type in step 3 to grease the torture valves to stop or reduce the leaks. If necessary grease the safety valves as well.