



PAR Valve allows ESP to Pump Through Gas Lock

One of the current challenges facing operators in an unconventional resource play is the ability to handle gas through their Electrical Submersible Pump (ESP). This causes the operator to run their ESP system with a high intake pressure, well above bubble point, in order to prevent the ESP from shutting down on underload and burning up the motor. While this can be an effective way to handle a gassy well, this does not get oil out of the ground as fast as possible thereby extending the payback period in a time when cash flow is of the utmost importance.

The answer to this challenge was solved with the use of a Pressure Actuated Relief Valve (PAR Valve) deployed above the discharge of the ESP. The PAR Valve was initially designed to prevent solids from settling on top of the pump during a shut down. This works by utilizing the pressure differential that exists between the annulus and discharge of the pump. As soon as there is no flow through the ESP, the hydrostatic head in the tubing will force the valve to actuate which in turn diverts all fluid and solids in the tubing out to the annulus. As soon as the well is approaching equilibrium, the valve will reseal and tubing isolation is again achieved allowing production like normal next time the pumping system is brought online.

A beneficial byproduct of having the valve actuate off pressure is to examine the situation that occurs inside the pump whenever an ESP gas locks. In this scenario, there is a high discharge pressure from the hydrostatic head, but the pump does not have the ability to compress the free gas to match this pressure therefore causing a “bubble” inside of the system with no flow able to pass. Once this happens, the high discharge pressure will force the PAR Valve to actuate, dumping fluid back to the annulus which simultaneously primes the pump with fluid while dropping the discharge pressure and allowing the gas bubble to come to surface. This enables operators to effectively pump through a gas lock situation without the risk of underload shut down and potentially burning up their motor.



This concept was put to the test in a challenging Mississippi Chat well. This operator was experiencing excessive underload shut downs and premature ESP failures caused by producing gas up to 3Mcf/D while running with a fluid level 2,000ft above the pump. After the installation of the PAR Valve, the operator was able to increase the flow to pull the fluid level below bubble point pressure to 800ft above the pump. This resulted in an oil production increase of 33% and extended the run life of the ESP system substantially.

For more information on the Pressure Actuated Relief Valve by Production Tool Solution, please contact your local PTS representative or visit www.ptsprotects.com