

Application of Shear Gas Lift Valves in the Pre-Salt Buzios Field

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Abstract:

Since the beginning of pre-salt oil production, Petrobras has identified over 25 cases of failure in gas lift valves, characterized by unwanted flow from tubing to annulus. Out of these, at least 14 cases have required a rig intervention to replace the damaged valve. These failures typically occurred in the early production stage, before gas lift injection had been initiated in the well.

To minimize both safety risks and intervention costs in this scenario, Petrobras has decided to adopt shear gas lift valves, particularly in some of the Buzios field production modules. In Buzios, it is expected that most wells will operate for at least 5 years without gas lift, which would only be necessary in later stages of production.

A shear gas lift valve remains closed, acting like a dummy valve, until the differential pressure between annulus and tubing reaches its shear out pressure, previously set at manufacturing. From then on, it behaves as a normal orifice valve, allowing lift gas injection. Therefore, determining an adequate range for the shear out pressure, to be set in each valve, is crucial to avoid premature shearing, and also to assure that shearing will indeed occur when needed. Moreover, the shear out pressure has to be set so that, if operational conditions – due to the heating and expansion of confined fluids – get close to causing a collapse of completion equipment, then shearing will occur passively, alleviating the pressure inside the annulus. In this sense, the shear gas lift valve becomes an additional layer of protection against structural failure of the well.

This presentation will give an overview of the procedure used by design teams at Petrobras to determine an adequate range of shear out pressure for the valve in each well, showing how the aforementioned criteria – avoidance of premature shearing, ability to perform shearing and protection against structural failure – affect the results. The same procedure has been applied to the first wells in Buzios to receive shear gas lift valves, which should start production in 2025 and have already been completed between January and February of 2024.