FloSure Autonomous ICD

Advanced Inflow Control Technology

FloSure Autonomous Inflow Control Device (AICD) placed across the reservoir reduces gas-oil ratio and delays early water breakthrough to increase oil production.

The FloSure Autonomous Inflow Control Device (AICD) is an effective solution for increasing oil production over the life of the field. The award-winning FloSure AICD has been deployed successfully in light and heavy oil wells to overcome water or gas breakthrough and ensure uniform production longevity. The device preferentially chokes unwanted produced fluids whilst promoting production of oil from the entire length of the well.

The valves are deployed with the sand face completion either as an integral part of TAQA's FloRight premium and direct wrap screens, or within an independent sub. A DHP liner hanger along with SealRight open hole packers or SwellRight swellable packers isolate compartments within the horizontal section of the well to enable the differential inflow control of fluids.

The design includes a levitating disc that responds to fluid viscosity and density. FloSure uses Bernoulli's theory of "Sum of static pressure, dynamic pressure and friction loss along a streamline is constant". Low viscosity gas reduces friction pressure and causes very high velocity, thereby "sucking" the levitation disc against the seat, restricting gas flow. Whereas high viscosity oil increases friction pressure pushing the disc away from the seat and increasing oil flow.

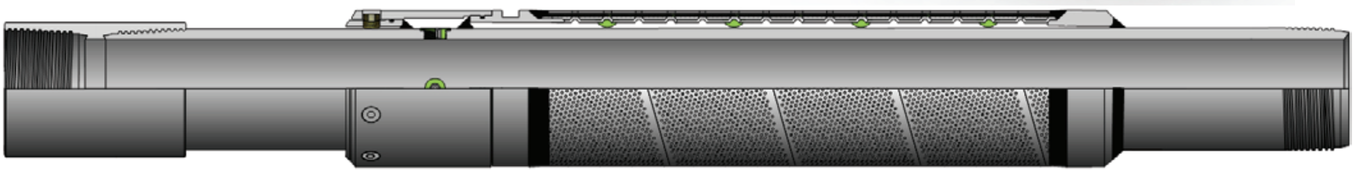
TAQA's proprietary software is used for creation of performance curves for any downhole fluid properties. Regression co-efficients for use in reservoir simulators such as Eclipse or steady-state programs like NETool are part of the program output.

Features

- Variable choke which controls both gas and water in wells
- Gas/water control outperforms passive ICDs
- Levitation disc allows for ream or wash-down and spotting of breaker fluids

Benefits

- Valve will respond to the velocity of the fluiD coming into the well
- Readily configurable for a range of production conditions
- Incorporated into a screen joint without OD protrusion

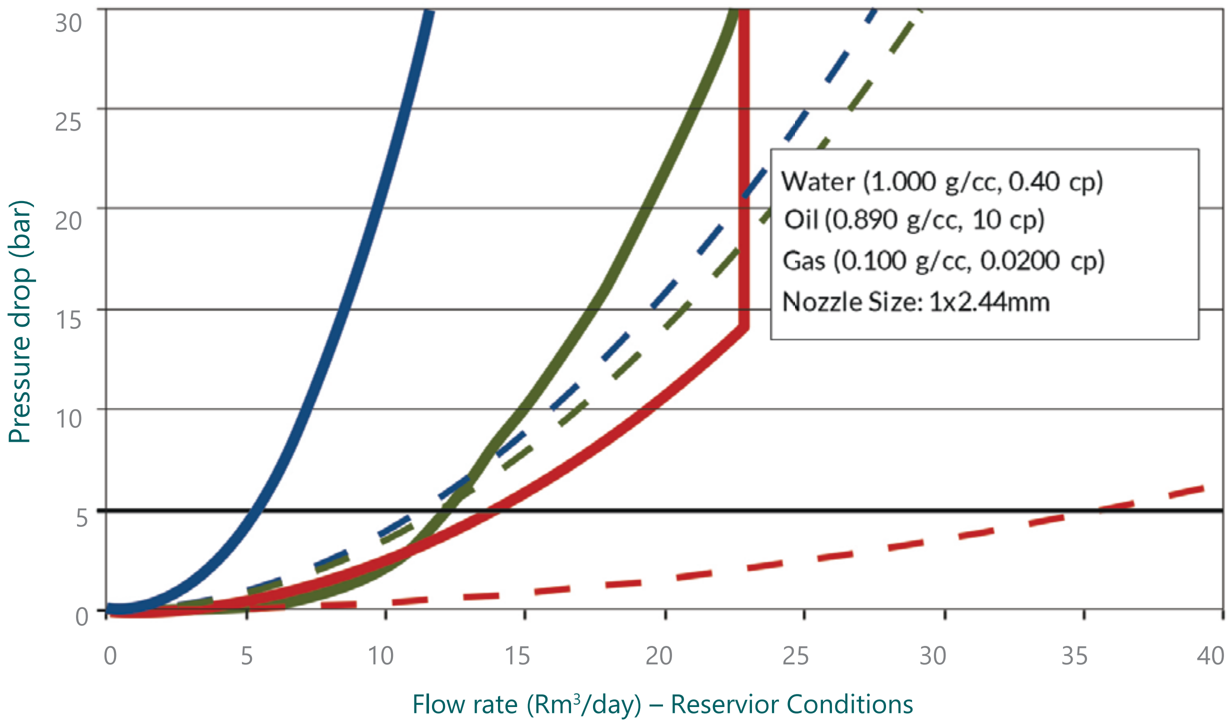


FloSure AICDs can be integrated with TAQA's premium screen range.

Improving Flow Control

Generate Initial Fluid Flow Performance Curves and Compare with Passive ICD Design

FloSure AICD Performance V Passive ICD



At 5 bar drawdown water and gas flow are significantly reduced compared to a passive ICD

Key

AICD
— Water — Oil — Gas

PASSIVE ICD
- - Water - - Oil - - Gas

Generate AICD Performance Co-efficients

Perform linear regression using linear regression method as well as rigorous multi-variable non-linear regression for NETool and Eclipse simulators as per below equation:

$$\delta P = f(\rho, \mu) * a_{AICD} * q^{x}$$

$$f(\rho, \mu) = \frac{\rho_{mix}^{2}}{\rho_{cal}} * \frac{\mu_{cal}}{\mu_{mix}}^{y}$$

$$\rho_{mix} = \alpha_{oil}\rho_{oil} + \alpha_{water}\rho_{water} + \alpha_{gas}\rho_{gas}$$

$$\mu_{mix} = \alpha_{oil}\mu_{oil} + \alpha_{water}\mu_{water} + \alpha_{gas}\mu_{gas}$$

Key

ρ= Density
µ= Viscosity
q= Flow Rate
α= AICD co-efficients

AICD equation set for Eclipse/NETool (from SPE 159634)