

Autonomous ICD

Dynamically controls and delays gas and water influx

APPLICATIONS

- Oil wells with early gas and water breakthrough
- Openhole horizontal wells
- Wells where passive ICDs are not effective
- Heterogeneous reservoirs
- Fields with high cost of handling water and gas

BENEFITS

- Balances inflow from the outset, providing more efficient well cleanup, heel to toe
- Delays gas and water influx
- Reduces gas and water influx on breakthrough
- Ensures a balanced flow profile and maximizes recovery
- Saves rig time through simplicity and ease of installation
- Optimizes well performance using the latest log data
- Provides simple production management of multiple zones in openhole completions
- Lowers field development costs
- Reduces workovers through long-term hardware reliability and resistance to erosion and plugging

FEATURES

- No moving parts for greater erosion resistance
- Easy-to-install, modular design; adjustable at the wellsite
- Available with all screen media
- Up to 6 autonomous ICDs (AICDs) per joint with 4½-in basepipe
- Up to 8 AICDs per joint with 5½-in and 6⅝-in basepipe
- Optimal AICD completion design modeled using ICD Advisor* inflow control device planning software and ECLIPSE* industry-reference reservoir simulator

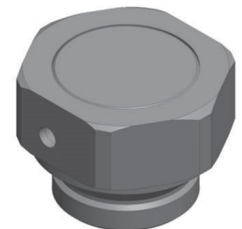
Schlumberger AICDs restrict gas and water inflow in oil reservoirs. They are mounted on unperforated basepipe equipped with a screen. Produced fluid flows through the screen, between the screen medium and basepipe, and into the AICD and production tubing.

The AICD entry nozzles and internal design create a rotational flow. Oil exits the device with a swirling motion and a pressure drop very similar to that produced by a passive ICD. Gas and water rotate at a higher velocity because of their lower viscosities, creating low pressure in the core region that causes flow breakdown. As a result, the flow rates of gas and water are reduced; the effect increases with the proportion of gas and water in the flow stream.

Schlumberger AICDs can be used for reservoirs producing

- ultralight oil (0.3–1.5 cP)
- light oil (1.5–8 cP)
- medium oil (8–50 cP)
- heavy oil (50–1,500 cP).

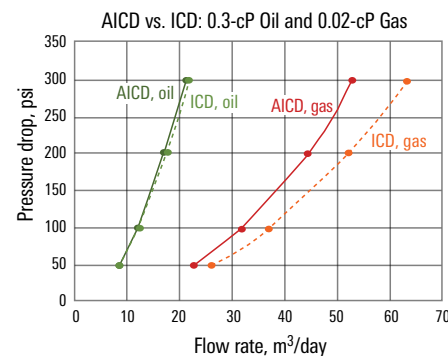
Water control in ultralight oil reservoirs requires a minimum oil viscosity of 1 cP.



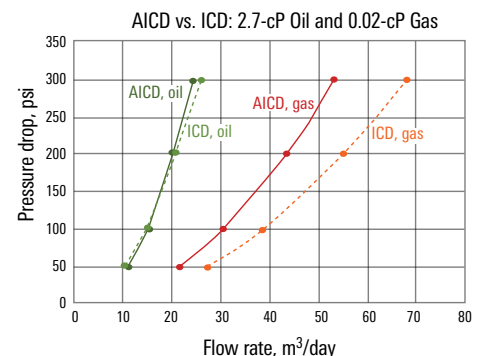
Schlumberger autonomous ICD (AICD).

AICD performance validation

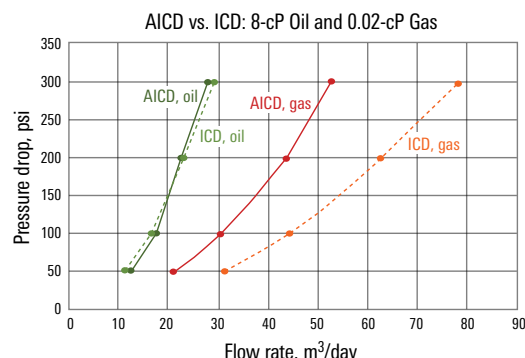
Schlumberger AICD performance was optimized for water and gas control in ultralight to heavy oil reservoirs by using rigorous computational fluid dynamics (CFD) modeling. Flow performance has been validated by single-phase and multiphase flow tests for 0.3-, 1.5-, 2.7-, and 8-cP oil; 0.75-cP water; and 0.02-cP gas under representative reservoir conditions.



Ultralight oil and gas flow performance.



Light oil and gas flow performance.



Medium oil and gas flow performance.

Autonomous ICD

Uniform inflow

AICDs promote uniform production across the reservoir. In high-permeability or high-pressure zones, the AICD exerts higher backpressure than in less productive zones because of the higher fluid velocity. Consequently, low-productivity zones produce more than in normal screen completions, minimizing the risk of bypassing reserves and increasing hydrocarbon recovery.

Production management

Installing one or more AICDs on each joint incorporating a sand screen delays gas and water breakthrough, and the AICDs self-regulate to restrict gas and water flow when breakthrough occurs.

Schlumberger AICD completion designs are supported by flow modeling using the ECLIPSE reservoir simulator and ICD Advisor software. The number of AICDs deployed can be adjusted at the wellsite using the latest LWD data.

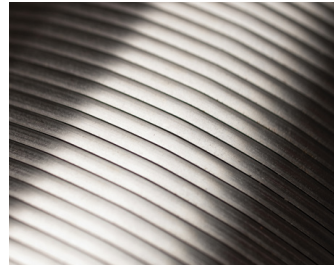
The Schlumberger AICD screen is a robust and reliable downhole inflow control system that functions without any external intervention, control, or downhole telemetry. It provides an integrated production management solution for controlling sand and hydrocarbon production downhole.

Enhanced resistance to erosion

Flow through Schlumberger AICDs remains below sonic velocity at differential pressures up to 600 psi. Subsonic velocities, absence of moving parts, and tungsten carbide construction result in a robust device that resists erosional damage. Erosion resistance has been proved via accelerated aging tests that simulate 10 years of sand production.

Filter media options

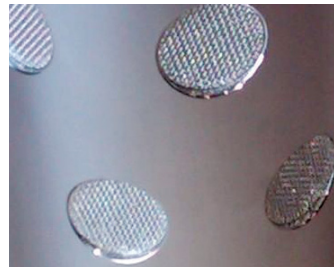
Screens are available with a range of options for filter media.



Wire-wrapped filter media provides a precise slot opening, very robust construction, and the lowest plugging tendency.



Premium mesh filter media has a large open flow area (OFA) and is available in multiple mesh sizes, including for smaller particles.



FacsRite disc filter media combines premium mesh filter media flexibility with casing strength and the highest ID/OD ratio.



MeshRite stainless steel wool filter media offers a large OFA and is ideal for unknown or variable particle sizes.

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