ADVANCED COMPLETION TECHNOLOGIES FOR THERMAL HEAVY OIL

IMPROVING EFFICIENCY IN STEAM-ASSISTED GRAVITY DRAINAGE WELLS
Halliburton is a leader in thermal heavy oil, with a long track record of innovative technologies that have proven their worth in challenging assets. As operators develop deeper and more varied assets, Halliburton technologies will be the key to improving reservoir understanding and efficient recovery.

**Technology Solutions for Every Phase of Your Project**

Halliburton technology can add value at every phase of your heavy oil project: identification and planning, drilling and evaluation, and finally completion and production. No matter what challenges you face, we can help you minimize costs and improve the economics of heavy oil wells.

**Completion Solutions to Help Improve Efficiency**

- EquiFlow® OptiSteam™ Flow Control Device
- EquiFlow® Autonomous Inflow Control Device
- EquiFlow® Inflow Control Device
- PetroGuard® Screens
Flow Control Device: Selective Steam Injection

To achieve a successful thermal project, operators need a sound steam management system in place. Without steam management, SAGD completions deliver steam preferentially at the toe and heel, resulting in a barbell-shaped steam chamber that causes higher steam-oil ratios and un-swept zones.

EquiFlow® OptiSteam™ Flow Control Device

The EquiFlow OptiSteam device injects steam at targeted locations and with customized rates. This optimizes steam energy distribution for maximum efficiency and performance. Unique features of the EquiFlow OptiSteam device help ensure successful installation, even through high deviations. While in SAGD injection mode, the possible damaging effects of steam impingement are mitigated through our diffuser technology.

Sand Control Screens:
Increase Performance and Decrease Well Failures

Unwanted sand production can be damaging to a well’s performance and may result in high remedial costs. This is especially true in thermal heavy oil operations where commonly used slotted liners are at risk to plugging, increased drawdown and damaging fluid velocities.

PetroGuard® Screens

Halliburton’s family of PetroGuard screens include a broad range of sand control solutions including direct-wrap screens with superior mechanical properties and premium mesh technology that offers increased open area to reduce fluid velocities.
Inflow Control Devices: Improve Overall Recovery and Efficiency

Inflow control devices have proven their value in controlling unwanted fluid production in a variety of wells, including conventional fields and thermal heavy oil operations. Without flow control, certain zones are preferentially produced, leading to the influx of unwanted fluids. With inflow control technology, the zones are uniformly swept to prevent water coning in conventional applications. For SAGD operations, the primary concern is the prevention of steam breakthrough into the wellbore and providing a uniform subcool.

EquiFlow® Autonomous Inflow Control Device
Halliburton’s EquiFlow autonomous inflow control device (AICD) automatically reacts to dynamic changes in the viscosity of production fluids. In thermal heavy oil applications, this technology can reduce steam flow by as much as 40% compared to conventional nozzle inflow control technology. The EquiFlow AICD has no moving parts and offers operators an extremely reliable way to extend the life of the well and help ensure maximum recovery.

EquiFlow Inflow Control Device
In some cases, operators may understand the conditions of the reservoir so well that a more economical inflow control device (ICD) can be used. The operator pre-sets the device based on the expected flow rate of the well. Even though this system does not automatically adjust itself based on fluid viscosity, with proper planning, the EquiFlow ICD can reliably provide balance of fluids into the well.
Additional Halliburton Technologies for SAGD

In addition to these completion solutions, Halliburton offers cutting-edge technologies to support every phase of a heavy oil project.

**Sperry Drilling** offers proprietary magnetic ranging technology that provides the precise wellbore placement needed for SAGD wells.

**FiberWatch** service includes point and distributive temperature sensors that give operators real-time insights into the movement of steam in the reservoir.

To learn more about how Halliburton’s heavy oil capabilities can improve your next project, contact your local Halliburton representative or email us at completions@halliburton.com.
Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.