HALLIBURTON

GAS SEPARATOR

Slugger™ HT 538 gas separator

Novel and innovative gas slug manager for high-temperature applications

FEATURES AND BENEFITS

Gas slug mitigation

- High-performance design handles high gas volume fractions (GVF) across a wide operating range
- High-volume rotating intake reduces gas ingestion
- Expanded internal liquid reservoirs deliver continuous stream of liquid to the pump
- Extended length reduces gas recirculation
- Downstream directed gas exit ports reduce gas recirculation

High temperature

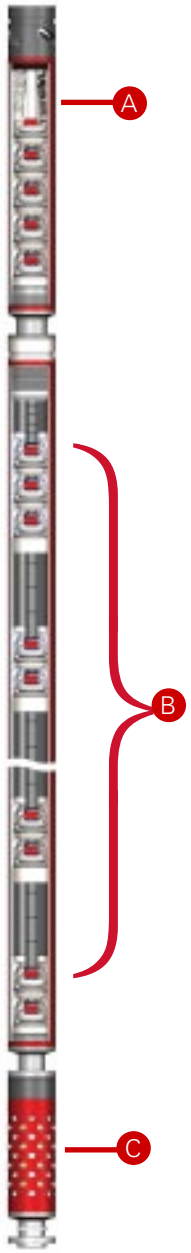
- Built as a compression separator to extend run life
- Each non-rotating part is pinned for thermal expansion protection
- Exclusive T-Lock AR bearings enhance erosion protection
- Special three-piece metal cam lock technology protects against erosion and thermal expansion
- Modified shafting provides expansion protection
- Enhanced internal flow design provides erosion protection

Overview

In wellbores where the electric submersible pump (ESP) is set in the vertical section, traditional mechanical gas separators use centrifugal force to separate the fluids by density and deliver liquid to the pump intake. An extended slug of gas, however, leaves little to no fluid for the separator to process, making them ineffective.

The issue is exacerbated in horizontal sections where lower density gas flows on top of the heavier liquid in a stratified flow regime producing large slugs of gas. Where the unconventional method of using steam-assisted gravity drainage (SAGD; Sag-D) is used to extract heavy crude oil, gas slugging is an ongoing problem as pumps are typically landed in near-horizontal positions.

Other gas separation methods, such as bottom feeder intake systems, have had limited success due to low velocity production. Pump performance and run life are also negatively impacted in SAGD by the high temperatures used to reduce the viscosity of produced fluids.



A. Stationary helix seperation chamber » Creates a vortex without a spinning paddle wheel, enabling separation efficiency that increases with flow rate.

B. Slugger internal reservoirs » Stores excess liquid for a gas slug event.

C. Rotating intake » High-volume rotating intake reduces fluid velocity, encouraging natural fluid phase separation and reduced gas ingestion.

SUMMIT ESP

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SAGD applications

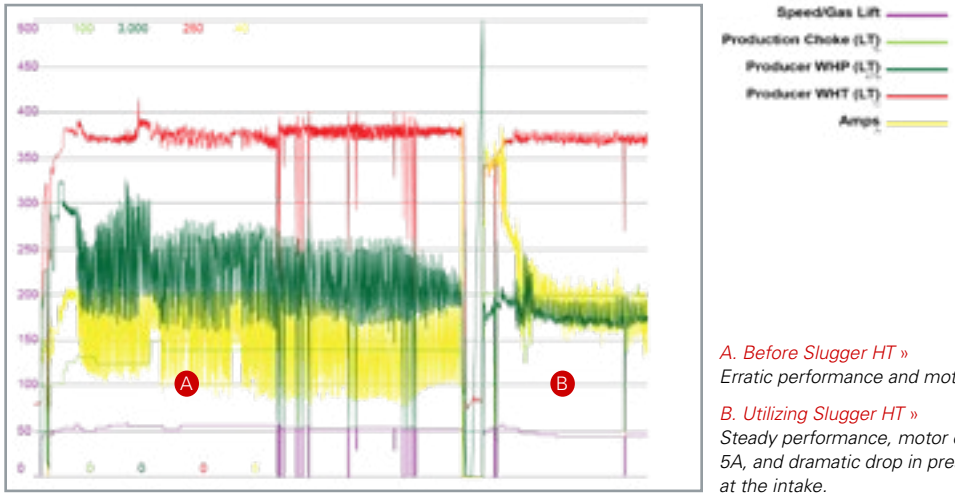
To address SAGD issues, Summit ESP® - A Halliburton Service designed a new type of gas separation system, Slugger™ HT. Slugger HT combines three exclusive technologies into one system to tackle the gas slugging and stratified flow events typical in SAGD applications. Starting at the intake, the system uses a high-volume rotating component which reduces the fluid velocity to encourage natural phase separation. The liquid phase moves through an expanded series of reservoirs which provide a continuous stream of liquid to a high-performance, high-velocity, gas separator. Optimized gas exit ports propel gas downstream away from the exit, reducing the recirculation of gas and the reformation of gas slugs while the extended length of the system allows liquid in the annulus to recirculate when a gas slug hits. Finally, every component is enhanced for high temperature applications.

Slugger HT difference

Before Slugger HT was installed, low-flow shutdowns and constant amp fluctuations reduced production and created an environment where the well could not be fully optimized. After Slugger HT was installed, wellhead pressure stabilized, leading to smoother ESP operation and more consistent fluid production. Water production was also higher, allowing for improved optimization of the well.

Production data

Operational data



A. Before Slugger HT »
Erratic performance and motor current swings of 13A.

B. Utilizing Slugger HT »
Steady performance, motor current swings reduced to 5A, and dramatic drop in pressure swings at the intake.

DATA SHEET

R&D testing capabilities

Our innovative transparent testing system provides a visual understanding of different flow regimes.

Findings were combined with high-speed photography, computational fluid dynamics (CFD) validation, and state-of-the-art instrumentation to develop every component of the Slugger™ HT gas separator. Gas slugging flow regime can be seen in the image at right.

Slugger™ HT specifications

Outer-diameter size	5.38 in.
538 Series - Single Flow Range (BPD)	up to 20,000
538 Series - Integral Tandem Flow Range (BPD)	up to 24,000
Percent of Gas Handling	98%
Abrasion Resistant (AR) Bearings	25 total

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

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