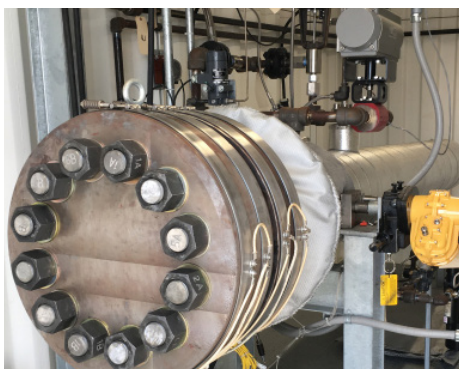
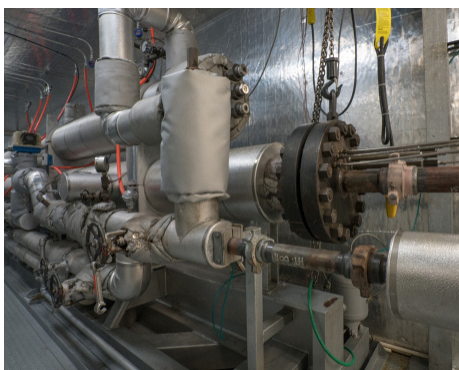




FireStorm® SAGD Electric Submersible Pumping Systems

**DEPENDABLE TECHNOLOGY FOR
HIGH-TEMPERATURE APPLICATIONS**



Introducing the FireStorm[®] Extreme High-Temperature SAGD Pumping System

MAXIMIZE OIL RECOVERY IN SAGD WELLS

Summit ESP[®] – A Halliburton Service delivers the latest electric submersible pump (ESP) technology for improved steam-to-oil ratio (SOR) and reliability in steam-assisted gravity drainage (SAGD) wells. Every component is designed and tested for conditions routinely encountered in SAGD applications – extreme operating temperatures, large temperature swings, wide production flow ranges, corrosion, abrasion, and dissolved free gas. The system is designed to tolerate bottomhole temperatures up to 250°C (482°F) and temperature cycles up to 140°C (284°F). The new generation of equipment provides additional tools for challenging SAGD reservoir production, allowing maximum contact between the steam and bitumen in the reservoir. Our gas avoidance technology helps increase production rates throughout all phases of SAGD well production.

Delivering Results with Velocity

Our reputation for reliable, cost-effective solutions stems from our investment in research, development, and testing. We design and test our specially engineered SAGD systems for high performance under extreme thermal conditions. All SAGD components undergo extensive high-temperature horizontal well tests and two-phase gas loop tests at our Research and Technology Center and have successfully passed rigorous third party testing conducted by C-FER Technologies. This rigorous process helps ensure our systems will perform as needed to maximize oil production in SAGD wells.

Left top » Our Research and Technology Center has the tools to validate theory, pushing the limits of understanding to drive ESP performance to the next level.

Left middle » The 260°C (500°F) high-temperature flow loop system tests the ESP performance and reliability at high temperatures, simulating downhole conditions.

Left bottom » The MLE and cable test pressure vessel is rated for 207 bar (8000 psi) at 343°C (650°F) and is capable of simulating gas decompression events at live well operating temperature utilizing CO₂ and N₂.

Right » The high-pressure two-phase gas loop simulates and tests ESP components in liquid and gas flow conditions.



FEATURES		BENEFITS	
Motor			
» Rated up to 250°C (482°F) bottomhole temperature		» Performs at high SAGD temperature	
» Polyimide and PEEK insulated magnet wire		» Offers waterproof design that is reliable at high temperatures and resistant to damage in shipping	
» Encapsulant free slot design		» Allows more efficient heat transfer to the wellbore	
Equalization System			
» Corrosion-resistant metal bellow		» Maximized expansion oil volumes allows for 140°C (284°F) temperature cycles	
» Filtration system		» Protects the metal bellow from sand and particulates buildup	
» Single nested bellow, below the motor		» Equalizes more volume per unit length and reduces risk associated with more complex design	
» Dual bellow system		» Maximizes the expansion capacity below and above the motor	
Thrust Chamber			
» High-temperature impact resistance thrust bearings		» Handles temperature up to 350°C (662°F) and resists shock loads due to gas pockets	
» Metal bellow mechanical seals		» Expels oil with no ingress	
» Nickel alloy shaft		» Protects from erosion and corrosion	
» Tungsten carbide runner		» Shields against immediate erosion and degradation if contact between runner and bearings occurs	
» Optimized thrust chamber bearing placement		» Enhances thrust bearing heat dissipation and reduces oil flashing	
» Easy fill metal bellow orientation		» Eliminates need for vacuum filling, reducing service time	
Pump and Gas-Handling Stages			
» Erosion Buster® diffuser erosion reduction technology		» Improves wear resistance through redirecting sand particle flow to less-critical areas within pump stages	
» Extended range compression (XRC) pump configuration		» Increases operating range (pressure and flow rate) by transferring downthrust to seal thrust chamber for pump and gas-handling stages	
» Mechanical thermal locking bearing system		» Maintains proper bearing support at high temperature, providing torque resistance to keep bushing position static when press fit is insufficient	
» Proprietary-blend tungsten carbide bearings		» Provides radial support with high resistance to abrasives (six times more resistant than industry-standard tungsten carbide)	
» Diffuser coupling mechanism		» Eliminates diffuser stack spin as temperature fluctuates by coupling entire stack together	
» Gas-handling stage		» Reduces two-phase solutions to one homogeneous solution, handling more than 60 percent free gas	
» Self-orienting intake		» Reduces gas intake in first pump stage by orienting toward the naturally higher density of fluid at casing bottom	
Variable-Speed Drive			
» Varies speed to match set parameters and well conditions		» Optimizes production and reduces downtime	
» Active front end		» Cancels harmonics, making power more efficient	
» Unity power factor		» Efficiently uses electricity from the grid and avoids penalties associated with lower power factor	
» Rugged outdoor-rated design		» Provides assurance for harsh-environment operations in all climates	

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.

H014018

10/23 © 2023 Halliburton. All Rights Reserved.