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REDA Hotline550 High-Temperature ESP System

APPLICATIONS

- Wells with high bottomhole temperatures
  - Steamflooding and thermal recovery applications
  - Geothermal applications
  - Poorly cooled motors in viscous applications
- Wells with abrasive fluids
- Gassy wells
- Wells with risk of steam breakthrough
- Wells with corrosive fluids, including H_2S, CO_2, and chemical treatments
- Horizontal wells

ADVANTAGES

- Extended ESP run life
- Expanded ESP operating range
- Increased production in thermal recovery applications

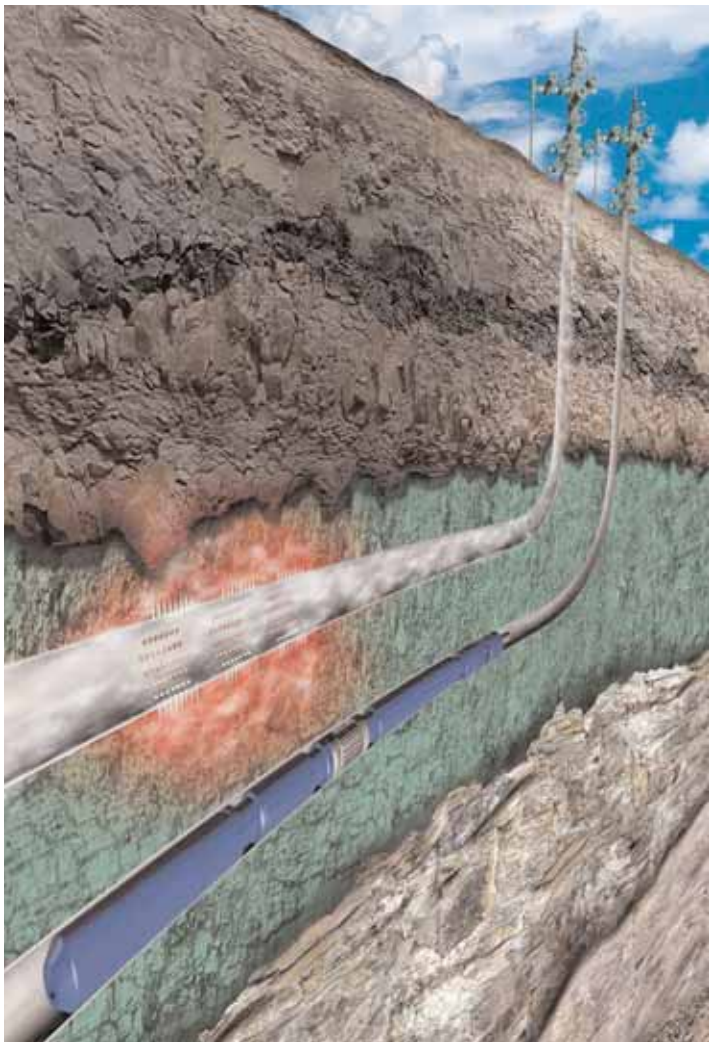
FEATURES

- Integrated system that withstands severe heating and cooling cycles.
- Motor insulation system rated up to 288 degC [550 degF]
- Nonelastomeric seal at pothead
- Metal bellows to eliminate need for elastomeric bags.
- High-temperature, abrasion-resistant compression pump.
- High-temperature power cable and motorlead extension designs
- High-temperature gas-handling tools

The REDA* Hotline550* high-temperature ESP system is a complete lift system consisting of ESP downhole equipment, power cables, and a surface variable speed drive (VSD). The system can produce reliably from wells with bottomhole temperatures of up to 218 degC [425 degF]. It is designed to operate in high-temperature, gassy, highly abrasive, and corrosive environments common to thermal recovery heavy oil applications, such as steam-assisted gravity drainage (SAGD) and other steamflooding applications. It accommodates material expansion and contraction and thermal fatigue resulting from temperature cycles and extremes.

EQUIPMENT DESIGN

Each component of the Hotline550 system has been designed to extend system run life in high-temperature applications. The Hotline pump tolerates abrasive fluids at high temperatures by using compression construction combined with abrasion-resistant materials and bearing systems. The motor pothead has a nonelastomeric, metal-to-metal seal that acts as a barrier to prevent fluids from entering the motor. The redesigned motor uses special high-temperature materials rated to 288 degC [550 degF]. An innovative power cable design helps ensure electrical system reliability from the power supply to the motor. The Schlumberger Advanced Motor Protector uses a metal bellows, which eliminates the risks encountered with elastomers operating in high temperatures. This protector has a dual bearing system, dual elevated shaft seals, and special sand diverter system to improve performance in abrasive applications. The SpeedStar SWD sine wave drive VSD—an integral part of the system—minimizes harmonic heating in the motor and helps extend pump run life.



Hotline ESP system in SAGD application.

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GAS HANDLING AND STEAM BREAKTHROUGH

Schlumberger has extensive experience in equipment selection and pump sizing for steamflood applications. As a result, operators are able to select appropriate gas separators and gas handlers to maximize well drawdown. For example, the Advanced Gas Handler or Poseidon™† multiphase gas handler will enable the pump to effectively manage large amounts of free gas. Bottom-feeder gas separators are also available to limit fluid entry to the low side of the casing in horizontal wells, allowing steam to bypass the pump on the high side of the casing. When a gas separator and a gas handler are used together, the ESP system can produce a downhole gas volume fraction of up to 95%.

DISTRIBUTED TEMPERATURE MEASUREMENTS

The Hotline550 system can use the Sensa* fiber-optic distributed temperature sensing (DTS) system to monitor temperature profiles along the wellbore. Monitoring the temperature across a horizontal section helps improve steamflooding efficiency and identify steam breakthrough. Monitoring the temperature across the ESP string helps identify pump performance degradation and gas
locking and provides key information for optimizing well production.

Specifications	
Max. bottomhole temperature, degC [degF]	218 [425]
Pump series A–L, mm [in]	86 [3.38]–184 [7.25]
Flow rate range at 50 Hz, m^3/d	13–45,000
Flow rate range at 60 Hz, bbl/d	100–54,000
Motor OD, mm [in]	142.7 [5.62]
Max. power at 60 Hz, hp	321 (single section motor)
Max. power at 50 Hz, hp	267 (single section motor)
Protector OD, mm [in]	130.3 [5.13]
Protector chamber selection	Bag, labyrinth, metal bellows
Gas handler	Poseidon gas handler, Advanced Gas Handler
Gas separator	Vortex gas separator, bottom feeder gas separator
Metal composition	Carbon steel, Ni-Resist™, Redalloy*, INCONEL®, special alloy, special coating
Deviation	0–90°

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