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MineESP™ submersible borehole
and surface pumps

Reliable water management for mining operations



Submersible borehole and surface pumps for mining operations

High efficiency dewatering systems

Mining operations depend on reliable dewatering. You can rely on MineESP™ submersible borehole and surface pumps from Summit ESP®—A Halliburton Service. We have the expertise, technology, and service excellence needed to control groundwater inflows and outperform all other solutions.

Any downtime in the dewatering system quickly leads to water accumulation within the mine and work stoppage. Water is an integral part of mining operations, but it often gets in the way and removing it can be difficult. Extraction operations often move around within the mine to maximize mineral yield, and as a result, dewatering must also be agile. Water volume and pressure fluctuates and dewatering must adjust to meet demand and deliver continuous service.

Wells designed to lower the groundwater level and limit inflow must be both efficient and effective over time.

Our electric submersible pump (ESP) technology is field-proven to withstand thermal cycling, scaling, abrasion, and corrosion in the most challenging environments. Our horizontal pumping systems (HPS) also effectively dewater deep open pits, decline mines, and shaft underground mines.

Mine dewatering strategies often include a mixture of pumping technologies for different locations throughout the mine. In underground decline and shaft mines, HPS typically replace positive displacement pumps, split-case centrifugal pumps, and piston/plunger type pumps.

Unparalleled service

Top performance requires great technology plus an unwavering commitment to customer service. We combine best-in-class product performance and service excellence to deliver a level of service that sets Halliburton apart.

While many pump providers focus on product line management, Halliburton's Artificial Lift team has a different approach. We focus on customers and their needs, first and foremost, and hold ourselves to a higher standard, especially when it comes to customer service in today's mining industry.

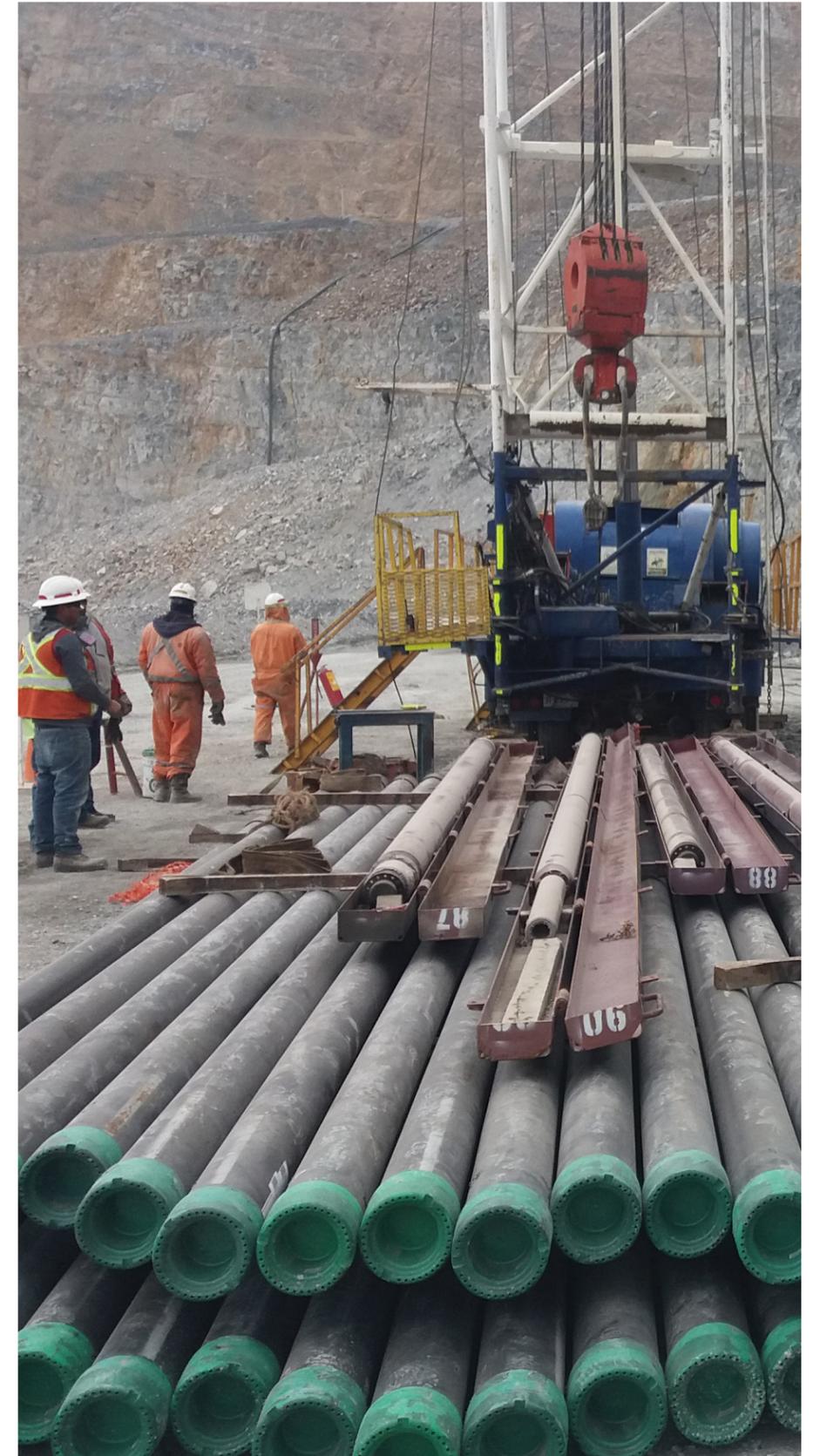
BENEFITS

- Reduced downtime due to inflow
- Low operating and maintenance costs
- Improved mine productivity
- Short lead times on new and replacement equipment
- Variable speed control to adjust to changing conditions
- Remote monitoring for fast response and problem aversion
- Better safety and stability



Well monitoring and optimization

Our well applications engineers have access to a complete 360° view of every well's operational information, downhole equipment, application design, and field service history. This allows the engineers to analyze and understand each well's operational conditions and to identify when there is an issue.



Top tier technology

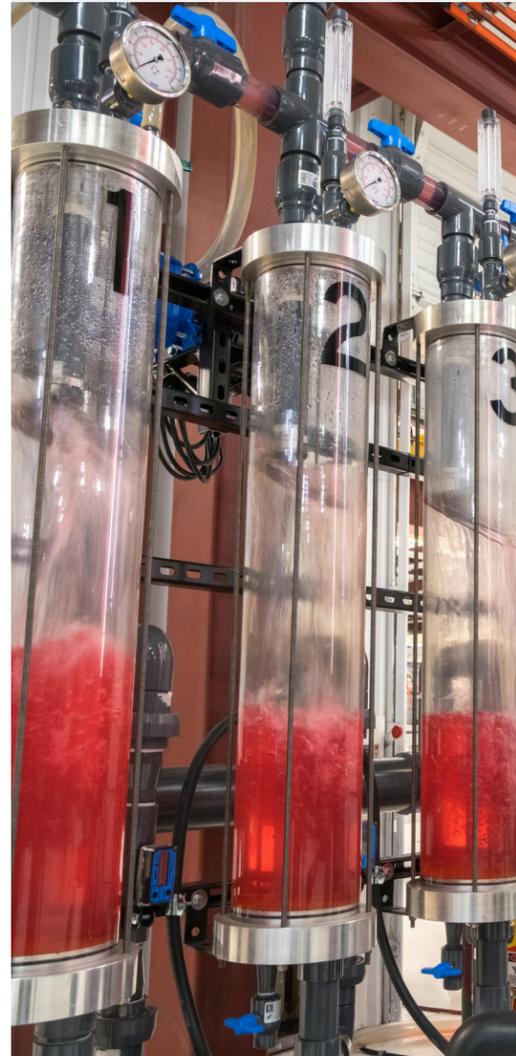
Our MineESP surface and submersible pumping systems directly address the hardest problems in moving geofluids to the surface— thermal cycling and scale resistance.

We use heat-resistant materials to protect pumps, motors, and other components from high temperature and thermal shock. Locking mechanisms within the pumps further protect bearings from excessive heat. Our DuraHard® coatings protect equipment from calcium carbonate scaling, as well as abrasives and corrosives, and our molecular bond coating provides hardness comparable to carbide materials with added ductility. In addition, our spiral grooves and specialized materials make our bearings and bushings particularly resistant to scale.

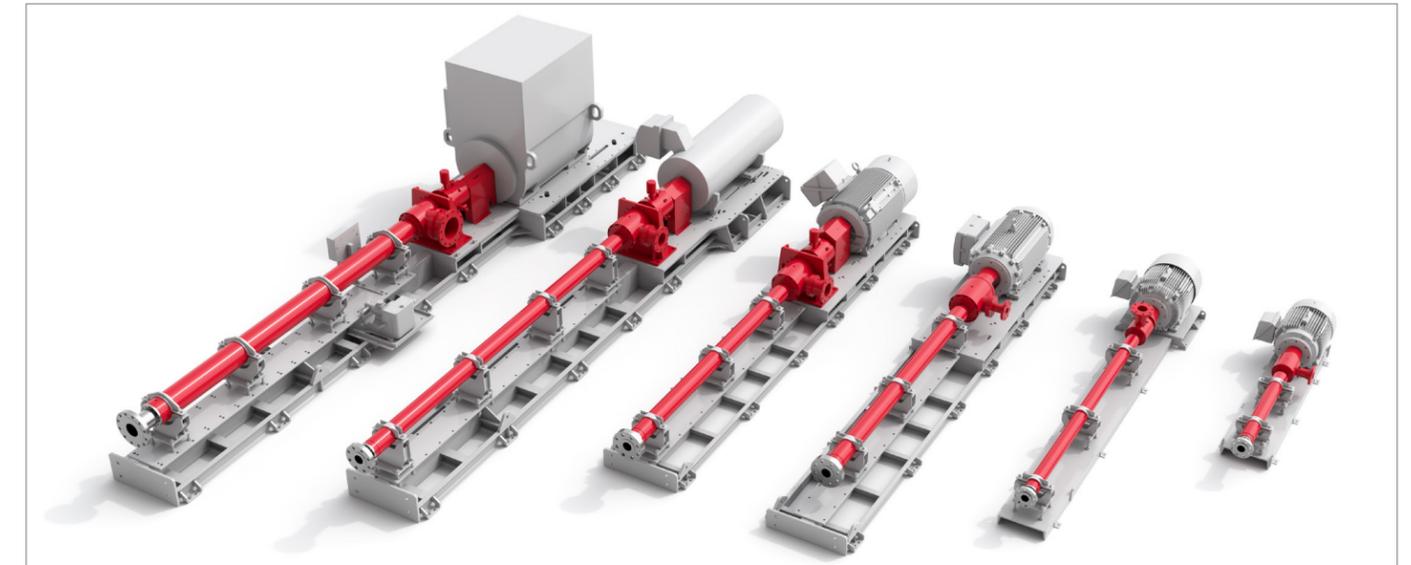
FEATURES	ESP	HPS
Pulse-free flow protects downstream and upstream pipes, valves, and instrumentation	•	•
Simple rotating assembly has few moving parts, requiring minimal routine maintenance		•
Minimal downtime due to simple replaceable components (mechanical seal, pump barrel, thrust chamber)		•
Easily reconfigured for changing flow and pressure requirements		•
Vertical and horizontal configurations	•	
Scale, corrosion, and abrasion resistant	•	•
Thermal shock resistant	•	•
Extreme high-load seal section	•	
Bagless scale resistant seal option	•	
Single low-pressure mechanical seal	•	
Heat resistant up to 302°F (150°C)	•	
Heat resistant up to 500°F (260°C)		•
Discharge pressure up to 5,000 psi (345 BAR)	•	
Discharge pressure 300 up to 7,100 psi (20 to 490 BAR)		•
Compression pump 875 series and larger	•	
Compression pump 675 series and larger		•
Up to 2,100 hp (1,566 kW)	•	
20 to 2,500 hp (15 to 1,865 kW)		•
Flow range 800 to 70,000 BPD (23 to 2,000 USgpm, 5 to 465 m³/hr)	•	•

RESEARCH AND DEVELOPMENT

The Summit ESP Research and Technology Center brings together product engineers, R&D engineers, manufacturing, reliability, and quality teams focused on innovation and reliability. Our state-of-the-art facility is fundamental to continuous performance improvement in harsh environments. Test loops and wells allow system integration testing prior to field development and validate operation in extreme conditions.



Hercules™ horizontal pumping systems



Flow range: 800 to 70,000 BPD (23 to 2,000 USgpm, 5 to 465 m³/hr)

Discharge pressure: From 300 up to 7,100 psi (20 to 490 BAR)

Horsepower: From 20 to 2,500 hp (15 to 2,000 kW)

Temperature: Up to 500°F (260°C) for extreme applications

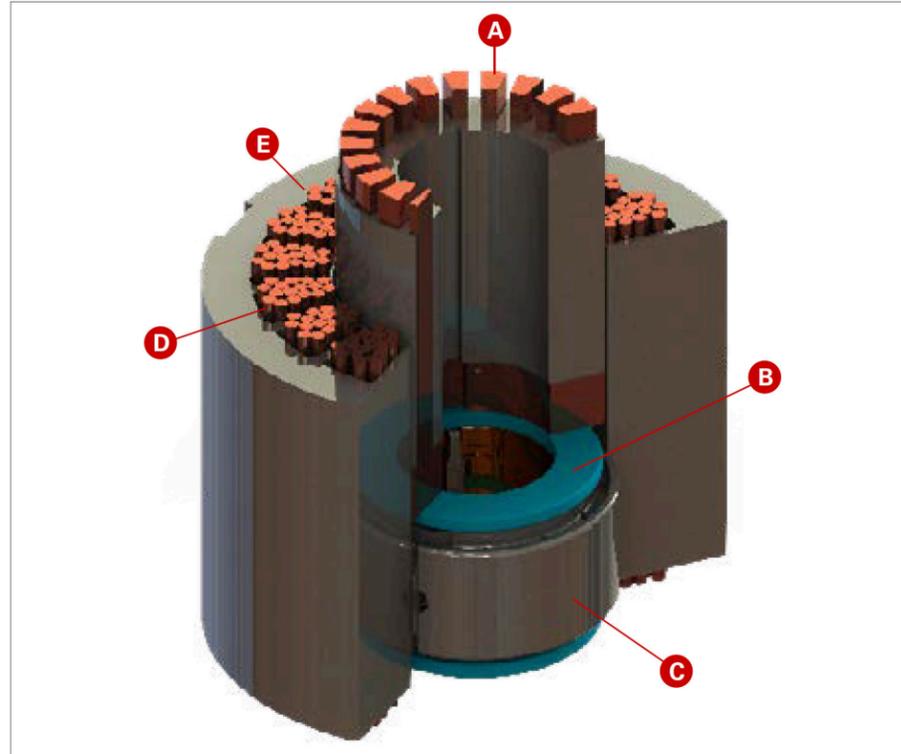


Electric submersible pump technology

Corsair™ motor

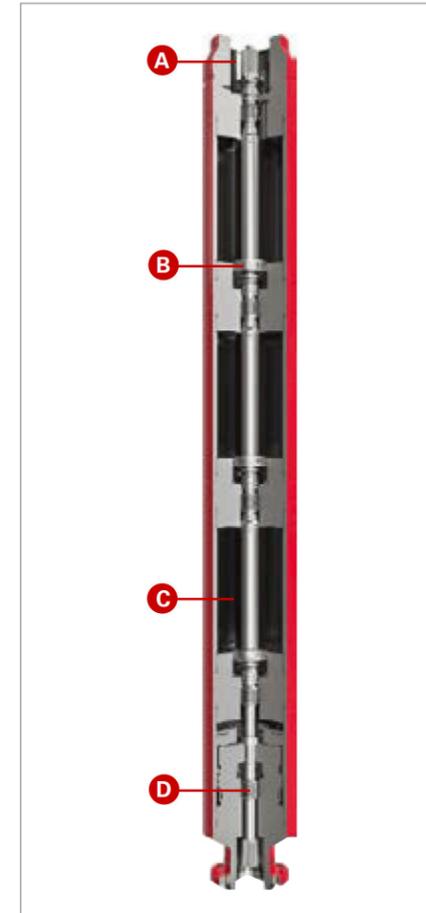


- A. High-temperature tape-in pothead for maximum reliability and performance
- B. Compliant mount, tungsten carbide radial supports in the head and base to help reduce vibration
- C. Mechanical bearing retainers incorporated into Big Foot™ bearings allow movement of rotor stack within stator during thermal cycling
- D. Non-recessed rotors reduce bearing temperature, leading to significant increase in reliability and efficiency
- E. High-temperature insulation system allows successful operation in high-temperature wells



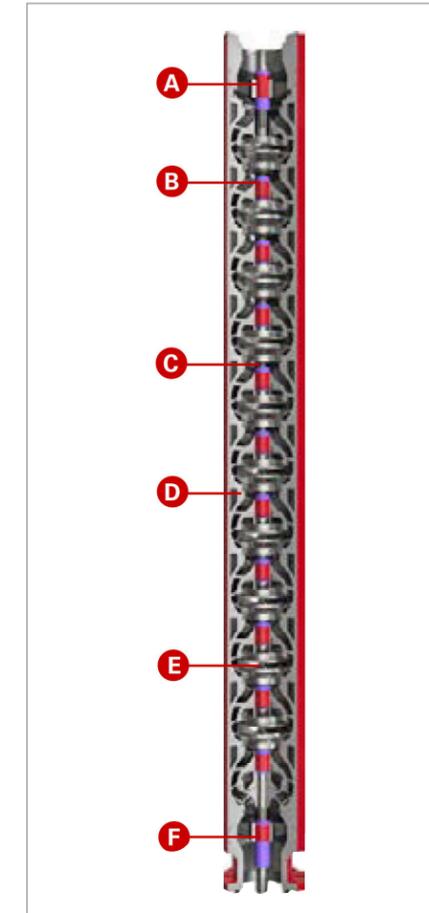
- A. **Shaped rotor bars:** New design utilizes shaped rotor bars, resulting in less current waste and a more efficient motor
- B. **Flat-top rotors:** incorporate thermal insulated washers and eliminate the need for inserting motor bearings into recessed areas – thus reducing friction and heat while improving reliability and performance
- C. **Self-aligning, wide-profile, Big Foot™ bearings:** Larger wide-profile bearing increases heat transfer, reducing internal motor temperatures. Large wide-profile motor bearing also distributes side loads over larger areas, thus reducing fretting damage in the stator laminations
- D. **Standard double-wrapped polyimide insulated windings:** This feature provides added protection that improves reliability
- E. **Precision hand-wound stators:** These stators allow more room in the slot for additional copper wire, thus increasing efficiencies and performance. Hand-winding also reduces the potential for damaging wire during construction, further increasing reliability and performance

Defender® seal



- A. Super sand head eliminates scale deposition
- B. Tungsten carbide radial bearings provide longevity
- C. Extended expansion capacity to cope with thermal cycling
- D. Extreme load thrust bearing helps prevent overload during system upset

Tiger Shark® pump



- A. Enhanced tungsten carbide material throughout pump
- B. Grooved bushings help prevent scale deposition
- C. Stage coatings help prevent CaCO₃ scale and NORM scale sticking
- D. Erosion Buster® design in every diffuser prevents abrasive recirculation within the pump
- E. Special retaining ring provides secondary press-fit bushing retention to prevent bushing from spinning due to scale deposition or thermal cycling
- F. Double-sleeve system provides more support to critical shaft end



DuraHard® 3 – slick, non-stick coating



DuraHard® 7 – nickel coating



DuraHard® 15 – molecular bond coating

Our pumps stages include DuraHard® coatings to help prevent CaCO₃ scale and NORM scale sticking to ensure the longest life span possible.



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

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