



GeoESP® Submersible Borehole and Surface Pump Solutions for Geothermal Energy

Engineer the Future of Energy with Low Carbon Solutions



GeoESP® is flexible, safe, efficient, and innovative

Summit ESP®, a Halliburton Service, offers GeoESP submersible borehole and surface pumps, which directly address the hardest problems in moving geofluids to the surface—thermal cycling and scale resistance.

Experience and expertise

Our global team includes specialists who bring more than 70 years of geothermal experience. We leverage our extensive knowledge to deliver you uniquely custom geothermal solutions.

Manufacturing and R&D

GeoESP is built by specially trained technicians and under engineering supervision, providing impeccable quality assurance and reliability.

With our commitment to geothermal energy, we have an extensive network of global service centers with high-volume, high-power testing facilities in Tulsa, Oklahoma, USA and in Emmen, Netherlands.

Our Research and Development lab at Summit ESP combines experienced scientists and engineers with premier design and testing capabilities to develop efficient and reliable geothermal technology.



Efficiency

We understand your need for minimizing input power costs in geothermal applications. Our GeoESP innovative components include:

- GeoESP Intake with an innovative inlet design protects against solids and scale development and minimizes pressure drops for added power savings
- Intelevate™, our data science-driven digital platform, and GeoController® surface package, create operational efficiency and reduce power consumption by facilitating proactive interventions and planned maintenance

Flexible, modular, and safe pump design

- Standardized dimensions for rapid customization
- Flanged modular interfaces to easily add more centralizers to the system
- Adaptable designs for different well conditions, which minimize backup inventory for use in multiple wells
- High pressure pump housings enhance safety over bolted bowl designs

Innovative, top-tier technology.

- Proven capabilities for production and injection wells
- Heat-resistant materials range of 150 - 250°C (320 – 482°F) BHT
- High-quality materials resist scale, corrosion, and abrasion
- Wide operating range customized to well conditions
- GeoESP Skid increases safety and speed of ESP execution while protecting the GeoESP equipment during storage, transportation, and wellsite preparation

Experience the difference with GeoESP® for your geothermal production needs

EFFICIENCY

Proactive solutions improve efficiency and reduce power consumption.

TOP-TIER TECHNOLOGY

Innovative technology offers quick installation and start-up for more efficient, reliable operations.

Up to:

- 150°C (302°F) BHT
- 2100 hp
- 160 l/s (2,536 gpm) flow rate
- > 2,000 m lifting head

FLEXIBLE, MODULAR, AND SAFE PUMP DESIGN

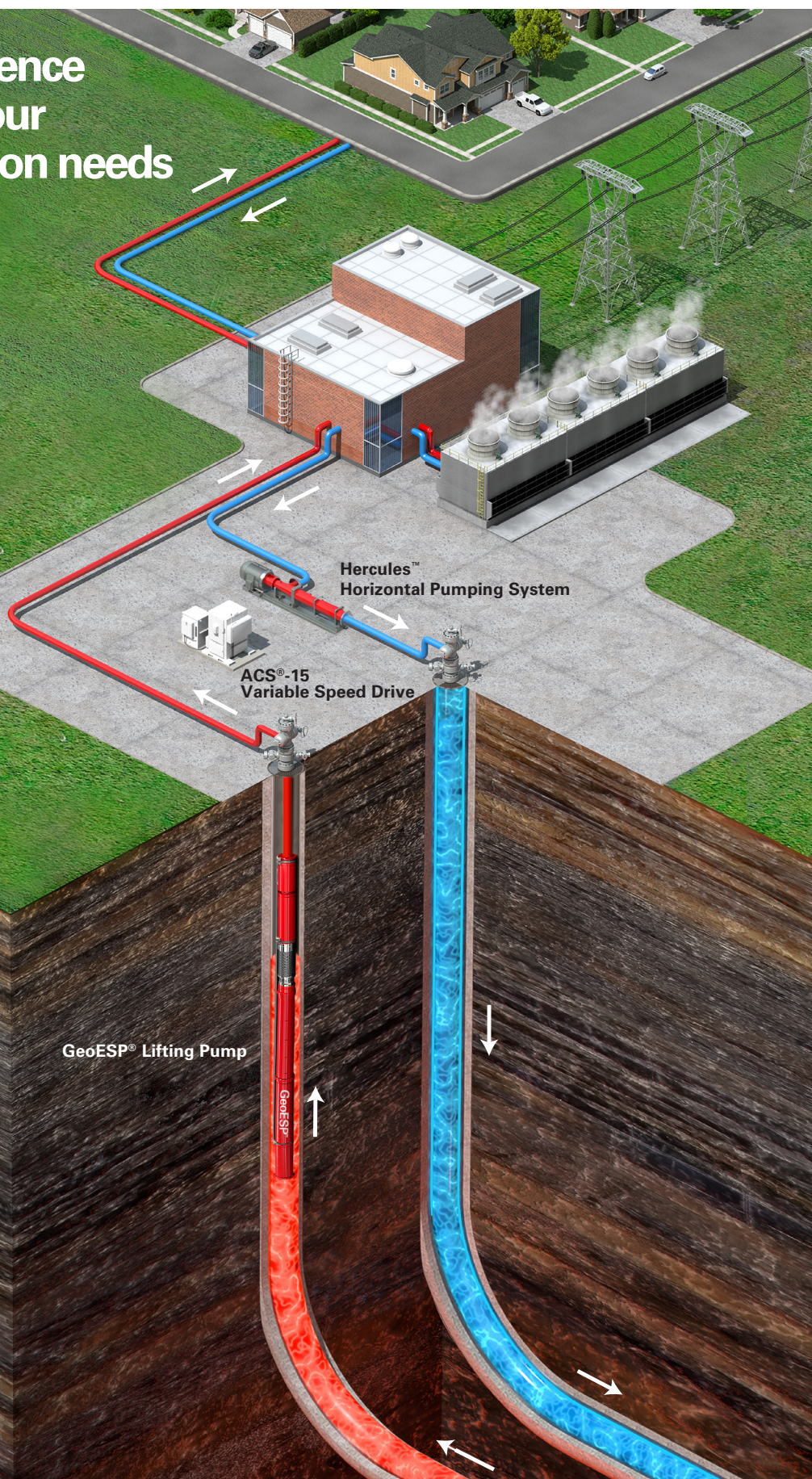
Flexible system for rapid customization at the field location.

EXPERIENCE AND EXPERTISE

More than 70 years of experience in geothermal development.

MANUFACTURING AND R&D

Dedicated facilities with the ability to respond quickly and development of advanced geothermal technology.



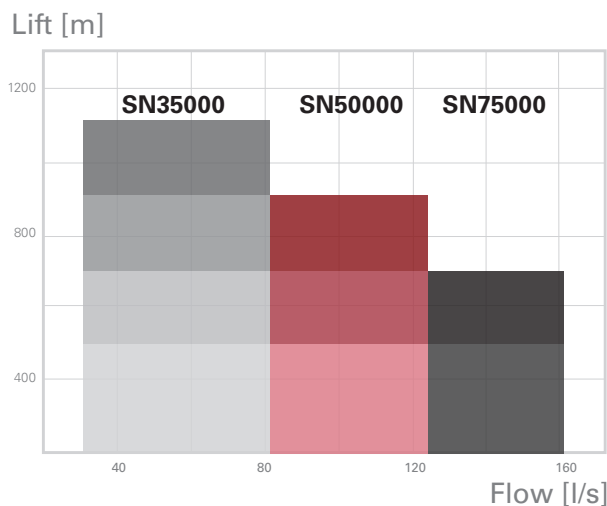
GeoESP® Top-tier Technology

GEOESP TIGER SHARK® PUMP



- Three pumps offered: SN35000, SN50000, SN75000
- Ring Lock XT™ Ni-Resist lock rings have the same thermal expansion coefficient as the pump diffusers
- Erosion Buster® diffuser design redirects fluid path inward and into the primary flow path, decreasing wear on critical areas
- DuraHard® 3 slick, non-stick coating minimizes the formation of scale and pump plugging
- Modular sections with 9-1/2-in. OD housing for all pumps easily adapt in the field for different lift requirement
- High-pressure pump housings enhance safety over bolted bowl designs
- Bolt on discharge
- Bolt on standard Intake or GeoESP

PUMP CAPABILITIES



GEOESP INTAKE



- Easily interchangeable, modular design with flanged connection
- Maximal pump protection against solids and junk
- 5x larger inflow area
- Minimal internal pressure drop to obtain power savings and minimize scale deposition
- Minimal external pressure drop to prevent casing erosion and minimize scale deposition on mechanical seals and the protector venting ports
- DuraHard® 3 slick, non-stick coating minimizes the formation of scale and pump plugging

GeoESP® Top-tier Technology

CORSAIR™ MOTOR



AVENGER® MLE



DEFENDER™ SEAL



- Designed for increased reliability in high-temperature, highly corrosive wells

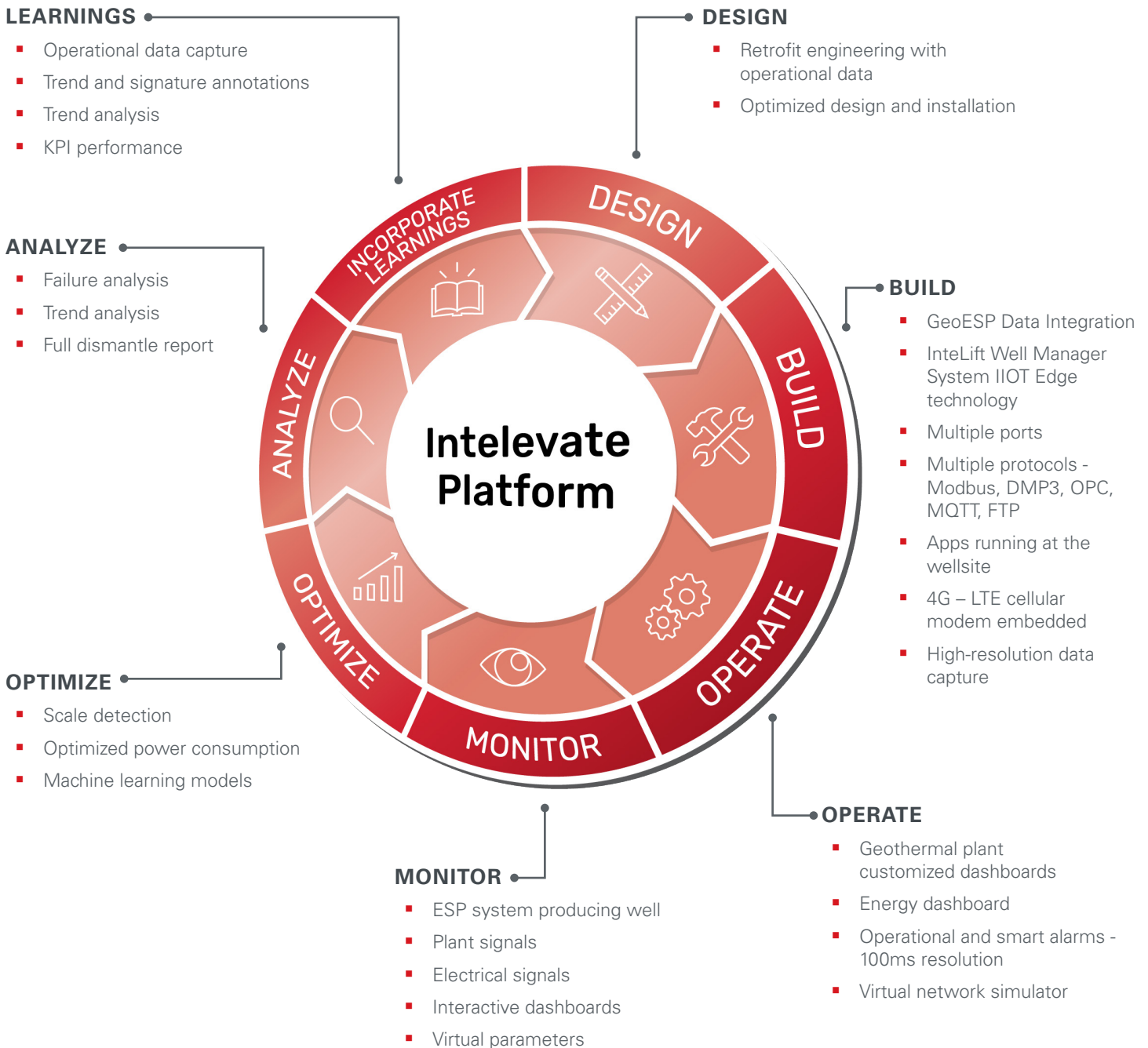
- High-temperature tape-in pothead for maximum reliability and performance
- Compliant mount, tungsten carbide radial supports in the head and base to help reduce vibration
- Bigfoot™ Bearing – wide profile, larger size increases heat transfer, reducing internal motor temperature and distributing side loads
- Mechanical bearing retainers incorporated into Big Foot™ bearings allow movement of rotor stack within stator during thermal cycling
- Non-recessed rotors reduce bearing temperature, leading to significant increase in reliability and efficiency
- High-temperature insulation systems allow successful operation in high-temperature wells

- Super sand seal designed to operate in extreme environments
- Super sand head significantly reduces scale deposition
- Tungsten carbide radial bearings provide longevity
- Extended expansion capacity to cope with thermal cycling
- Extreme load thrust bearing helps prevent overload during system upset



A Digital Approach to Geothermal Wells

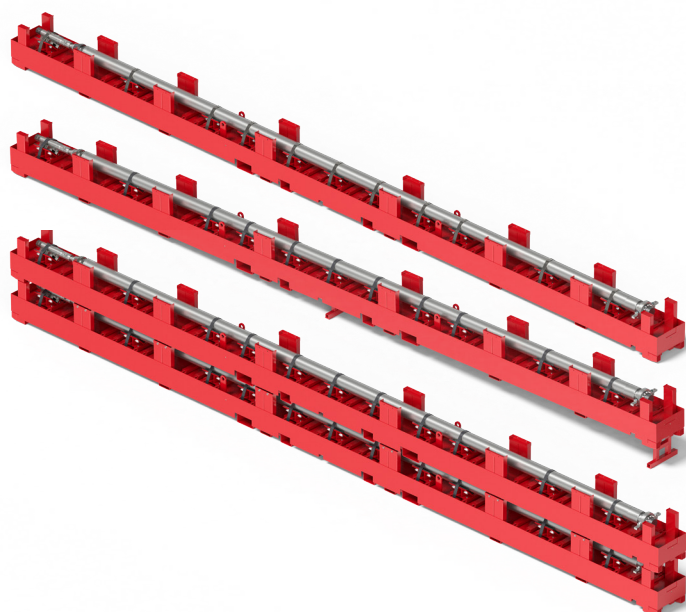
The Intelevate™ digital platform offers a data-science driven solution using machine learning with advanced features to help improve well operations, minimize shutdowns, and increase production. Real-time diagnostics, asset performance summary, operator dashboard, shutdown protection, and a full audit trail give detailed insights over time via rich visualization of “smart” field data.





GEOESP® BOX TEST CONTAINER

The GeoESP Box Test Container is a simple, plug-and-play surface solution that provides complete system integration from in-flow performance testing to ongoing operations as a final long-term solution.

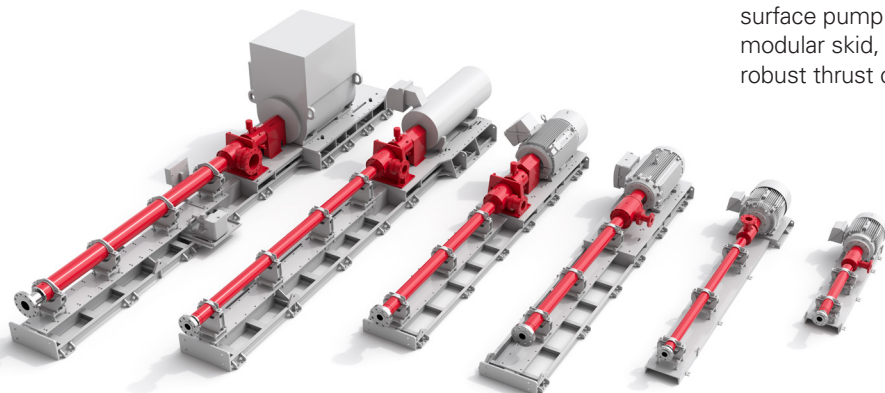


GEOESP SKID

- **Protects ESP equipment:** during storage, transportation, and wellsite preparation to extend ESP runlife
- **Improves transportation:** Skid designed to avoid bending and impact while providing safer built-in design features
- **Facilitates well site operations:**
 - Reduce lifting and handling
 - Increase safety
 - One-person no crane precheck
 - One-person rig up preparation without forklift or crane additional assistance
 - ESP ready for assembly
- **Simplifies long term storage:**
 - Stackable during storage
 - Enable oil flushing
 - Manage environmental impact (control leaks)

HERCULES™ HORIZONTAL PUMPING SYSTEM

Hercules horizontal pumping system is a multistage centrifugal surface pump designed for re-injection, mounted securely on a modular skid, powered by a two-pole motor, and protected by a robust thrust chamber.



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

Discharge Pressure » From 20 to 490 BAR (300 up to 7,100 psi)

Horsepower » From 15 to 2000 kW (20 to 2,500 hp)

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

Why Halliburton?

Halliburton collaborates and engineers solutions across the geothermal lifecycle in order to reduce the cost per megawatt for our customers.



More than 70 years of experience in geothermal development



Strategic collaboration with leading geothermal operators worldwide



Industry-leading people, products, services, and technology adept in geothermal field development planning and execution



Successful execution of geothermal operations globally by utilizing our in-country experience to streamline the field development process



Integrated, full-cycle solutions for greater efficiencies and to help mitigate risk during geothermal resource exploration, planning, and execution

Halliburton engineers solutions to help maximize asset value for our customers. All products and service solutions are available as integrated offerings or as bespoke services, based on customer requirements.

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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