

Longest & Heaviest Geothermal Liner Hanger Installation

Successful installation of the longest and heaviest 13⁵/₈-in. large-bore liner hanger in a European geothermal well

Background

Large-bore liner hangers provide countless benefits in geothermal well design and construction. When compared to conventional surface casing, a liner system provides: reduced material cost, a simplified wellhead design, reduced installation drag that improves the chances of reaching target setting depth, reduced hook weight that allows running a longer casing string (especially on smaller drilling rigs with tensile limitations), and increased annular flow area resulting in a better cement job quality.

Large-bore liner hanger systems are prevalent in geothermal well designs since a large flow area is required to meet production requirements. NOV Completion Tools has a rich history providing geothermal customers with tailor-made liner systems that optimize their operations and set new boundaries in this exciting and growing industry.

H. Anger's Söhne, a major drilling contractor in Germany, was awarded a geothermal project. The plan was to deploy a multi-casing design with various well designs tapering down to different liner sizes. Due to our extensive experience in similar projects in the geothermal market and our comprehensive well construction portfolio, NOV was contracted to supply and install all the liner hanger systems.

The longest section, consisting of the 13⁵/₈-in. system was not only one of the longest geothermal large-bore 13⁵/₈-in. liner installed in continental Europe to date, but also the heaviest, weighing in at 228 metric tons (buoyed weight).

Case study facts

Location: Germany

Customer: H. Anger's Söhne

Products

- PBR
- R-setting sleeve
- GSP hydraulic multi-cone liner hanger
- Duo wiper plug
- MRS setting tool with HFS ball seat
- Tie back stem

Additional services provided

- ASI-X packer
- Cleaning and mill out assembly
- Bucking services
- Torque and drag simulations
- 24/7 operational support



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Solution

In order to run such a long and heavy liner to TD, a robust setting tool is required that can carry the load of the large-bore liner and safely deploy it to TD. We utilized our MRS mechanical setting tool with a proven track record in deploying heavy, large-bore liners for this application.

Consequently, to set and hang such a heavy liner in the host casing, we used our reliable GSP hydraulic multi-cone liner hanger combined with our HFS ball seat to suspend the 13 $\frac{3}{8}$ -in. liner from TD before the cement job. The HFS ball seat was selected to minimize piston forces while accommodating the heavy liner. The cement job was performed with the duo wiper plug system, which allowed for improved cement displacement and reduced contamination between mud and cement.

To optimize the annular flow rate for removing drilling cuttings to the surface during the following drilling sections, we provided the customer with a 13 $\frac{3}{8}$ -in. tieback stem and casing to surface which can be retrieved once drilling has been completed. This allows the customer to regain the larger flow area in the upper part of the well, a crucial requirement for geothermal production.

Results

The liner was successfully run to TD on a combined workstring consisting of heavyweight drill pipe and drill collars. The setting ball was dropped in the HFS ball seat, and the GSP liner hanger was hydraulically activated and set on the first attempt.

The MRS setting tool was released, and the liner was successfully cemented with all shear indications observed. The setting tool was retrieved to the surface, and the operation was safely completed without any downtime.

After cleaning excess cement at the top of the liner with our combination milling tool, the temporary 13 $\frac{3}{8}$ -in. tieback seal stem and casing was successfully tied back to surface.

This operation's success continues to pave the way forward for NOV Completion Tools with our well construction portfolio to deliver customers with reliable large-bore geothermal liner solutions.

