

# Large-bore Geothermal Liner

**Producing clean and reliable geothermal heat for sustainable cultivation in Netherlands**

## Background

Hoogweg Paprikakwekerijen has over 160 hectares of greenhouse operations for bell peppers grown in modern greenhouses and is expanding by another 50 hectares without the use of natural gas connections – relying largely on geothermal energy as well as other sustainable energies such as biomass.

For this campaign, Hoogweg planned a series of five additional wells, including two production wells and three injection wells to generate clean, sustainable, and reliable geothermal heat that is not impacted by external factors with an extended life of +/- 30 years.

For the producer wells, a series of 13.375-in. x 18.625-in. liner hanger packer systems and 9.625-in. x 13.375-in. liner hanger packer systems were necessary to complete the well by covering up the chalk formation and producing the geothermal energy from the Slochteren sandstone formation. These large-bore liner hanger systems are commonly utilized in geothermal well designs in order to provide a larger internal flow area required to improve the overall output of the geothermal system.

## Solution

We were selected in large part due to our strong track record of reliable performance as the leading turnkey well construction provider for geothermal wells in Europe. The 13.375-in. x 18.625-in. liner hanger system was designed and manufactured in Vechta, Germany within 14 weeks from placement of order to equipment at rig site. The VXP liner top packer and GSP liner hanger were selected in order to ensure reliable isolation of the formation combined with a pocketed slip and debris-tolerant hanger system. Our float shoe and float collar were utilized alongside the liner hanger system and were able to wash the systems to bottom.

The large-bore liner hanger systems provide many benefits in geothermal well design and construction when compared to conventional surface casing including:

- Reduced material cost due to not needing to install casing to surface
- Simplified design and reduced load on wellhead due to tapered string
- Improved chances of reaching TD due to ability to rotate liner casing
- Reduced hook weight, allowing for deeper casing strings (especially on smaller drilling rigs)
- Improved cement bond through rotation and increased flow area

## Case study facts

**Location:** Luttelgeest, Netherlands

**Customer:** Hoogweg Paprikakwekerijen

**Well type:** Two geothermal producer wells

## Products

- Two sets of 13.375-in. x 18.625-in. cemented VXP and GSP liner hanger packer systems
- Casing accessories
- i-Con™ XL monitoring tool

## General Well Information

- Host Casing: 18.625-in. 109 ppf
- Liner size/weight: 13.375-in. 72 ppf
- Top of Liner: ~1,100 to 1,200 m
- Liner shoe: ~1,750 to 1,850 m
- Production Fluid Temperature: 80 °C



## Case Study

We also provided centralizers and planned the standoff placement based on simulations to optimize the placement of centralizers and ensure that the entire 13.375-in. liner system — as well as the entire well — was centralized properly for optimal cementation and wellbore isolation. Additionally, our proprietary i-Con™ XL monitoring tool was run for each 13.375-in. liner installation allowing us to provide detailed internal/external pressure, tensile, compression, torque, and temperature data. This data from the first installation validated the torque and drag models and ensured sufficient weight down to fully set the packer in both installations, allowing the operator to be confident in the installation and wellbore isolation.

### Results

- Successfully able to wash down to reach critical target depths necessary for geothermal application with no pre-set of equipment.
- Two separate liner hanger systems with float equipment and casing accessories run in geothermal producer wells with no HSE incidents.
- i-Con XL Monitoring Tool ran in conjunction with 13.375-in. x 18.625-in. Liner Hanger systems, providing downhole data to validate torque and drag models and ensure sufficient weight down to set packer and isolate wellbore.

