

Geothermal Production Well – Case Study

Installation of 1278 Meter STAR 9-5/8 in.
Glassfiber Reinforced Epoxy (GRE) Casing

Fiber Glass Systems | 

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Type of well: **Geothermal production Well**

Location: **Kleszczow, Poland**

Wellname: **Kleszczow GT-2**

Borehole depth: **1285 Meter**

Bottomhole temperature: **60 degrees Celsius**

Borehole diameter: **364,4 mm**



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Drilling and installation company: **Jaslo, Grupa PGNiG, Poland**

Manufacturer GRE Casings: **NOV Fiberglass Systems, San Antonio, Texas, USA**

Supplier, inspection and training installation crew: **German Water and Energy Group, Peine, Germany**

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Storage:

- Set the casings on a flat concrete surface
- Leave the separator boards between the casing layers
- Thread protection must remain in place



Load inspection:

- Check quantities, casing type, pipe body threads, report deviations
- Check for missing thread protectors and thread damage
- Look for impact damage

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Product:

- 9-5/8 in. Anhydride Casing
- ID: 8.25 in. (209,5 mm)
- Drift: 8.09 in. (205,5 mm)

Max. allowable operating ratings at 150 degrees F (65,6 degrees C):

- Inside pressure: 1500 PSI (103 bars)
- Collapse pressure: 1400 PSI (96,5 bars)
- Tensile: 125.000 lbs (56,7 Tons)



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Selection of resin system and well completion considerations:

- Medium, temperatures, changes in temperature
- Well depth, bore-hole and cementing procedure
- Mud-density and cement-density
- External (annulus) and internal differential pressures below rating
- Avoid shock collapse pressure when setting cement plug
- Worst case simulation with the stress-strain computer program StarWell

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9-5/8 in. OD 8RD Casing Threads conform to API 5B, Table 7, 14th edition, L4 is minimum)

Thread length 5.13 in. (130,3 mm) make up torque

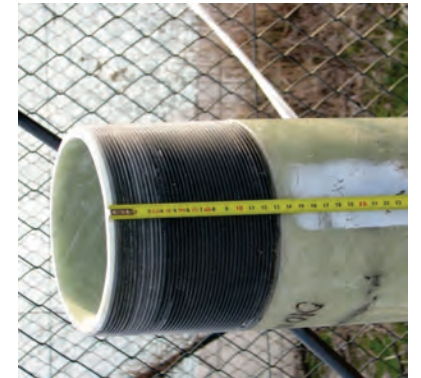
Optimum 630 ft.lbs (857 Nm)

Minimum 500 ft.lbs (680 Nm)

Maximum 880 ft.lbs (1200 Nm)

OD 8RD API Threads:

- Joining system threaded and coupled
- Patented advanced composite thread
- Precision molded with epoxy, graphite & ceramic
- Tighter tolerances than steel
- Improved make and bread performance
- Minimizes thread and wrench damage
- Compatible with steel API 5B threads



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9-5/8 in. Casing:

- Upset OD: 9.70 in. +/- 1.12 in. (246,4 mm +/- 3mm)
- Collar OD: 11.60 in. -0.10 in. (294,6 mm -2,5 mm)

Elevator selection. Running the casing with three elevators, elevators used for supporting the casing and for to pick up and lower the next joint.



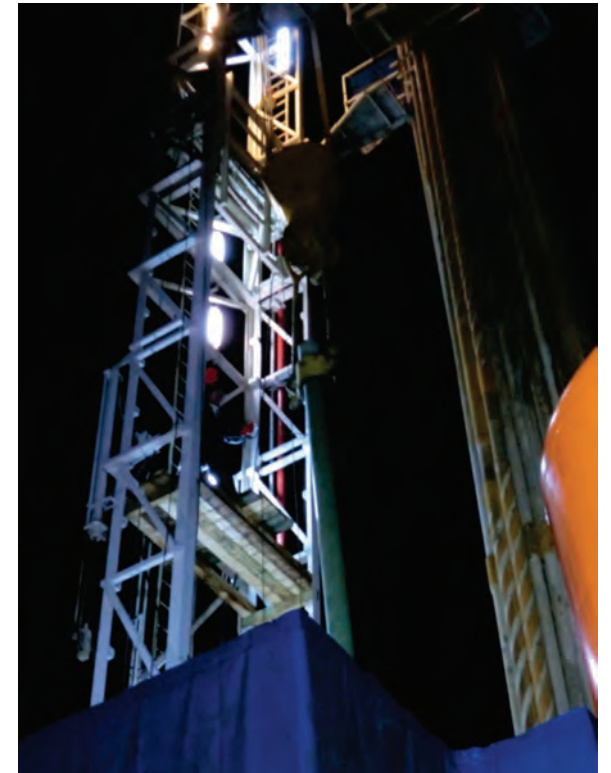
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Float equipment: Two sets of aluminium float collars are installed, one prefabricated on a nipple and mounted to the first casing. The second float collar between the first connection from the first and the second casing.

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Prior to beginning installation of the casing the alignment of the rig require adjustment. Pulling the casing over the hole is not a good practice and leads to thread wear or damage due to excessive torque during make-up of the casing. During installation a derrick man should stabilize and align the connection.

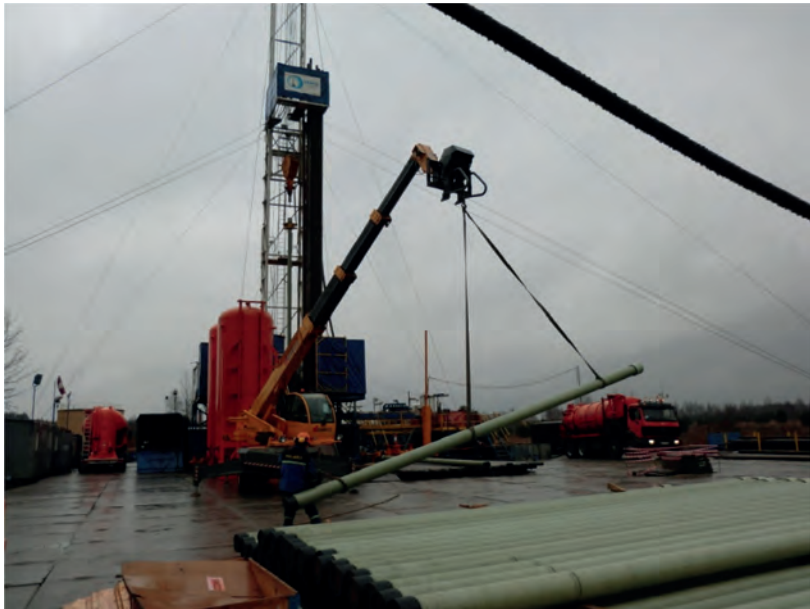


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Wrench selection: The 9-5/8 in. Casing is made up by a power tong. The “Lamb”-power tong is equipped with automatic computer controlled load measuring equipment on the tie back line to control the maximum torque.

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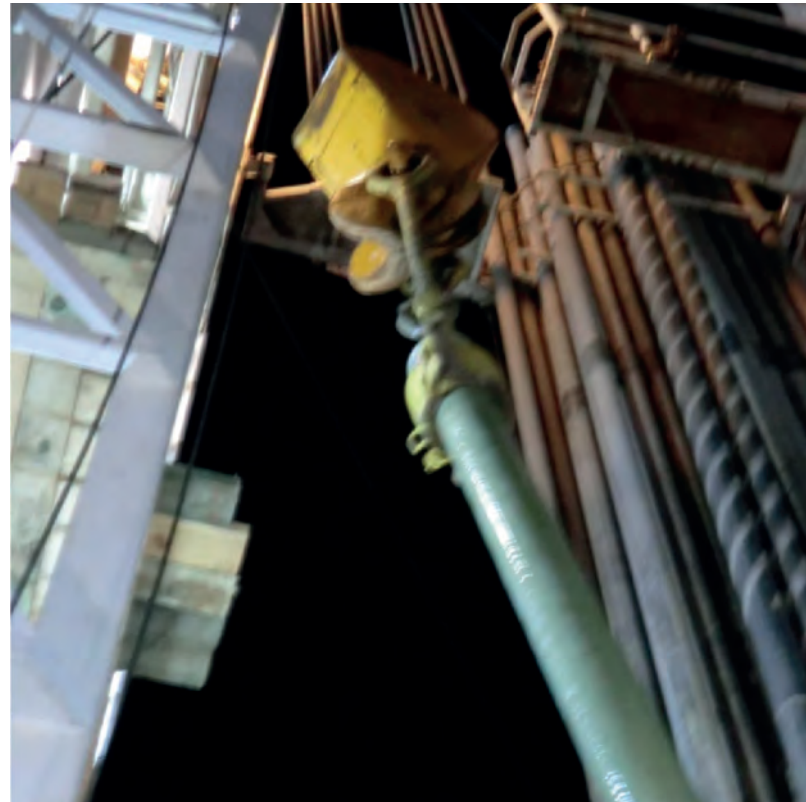


A crane, a spotter man and slings are used to pick up the casings. Keep thread protectors on until ready to make-up connection. Every casing is tailed to the rig floor. Casing is ready to be picked up by the elevator.

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The elevator is attached to the casing.



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Connection preparation. Clean box and pin thread. Lubricate both pin and box applying a light even coat with a typical dope brush. Make sure root of thread is coated, use only Startec thread compound.

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Connection make-up 9-5/8 in. casing. Gently lower pin into the box until engagement is felt. Rotate initially with a no. 5 strap wrench. Once the connection is started, remove the pick up line, latch elevator. Derrick man should hold the joint alignment. Make up hand tight.

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After hand tight, a qualified power-tong is used for full engagement. Both torque and thread standoff are monitored. Torque is checked with a hand wrench every 10th joint. For the first joint a back-up wrench is used on the coupling to be able to reach the powertight position.

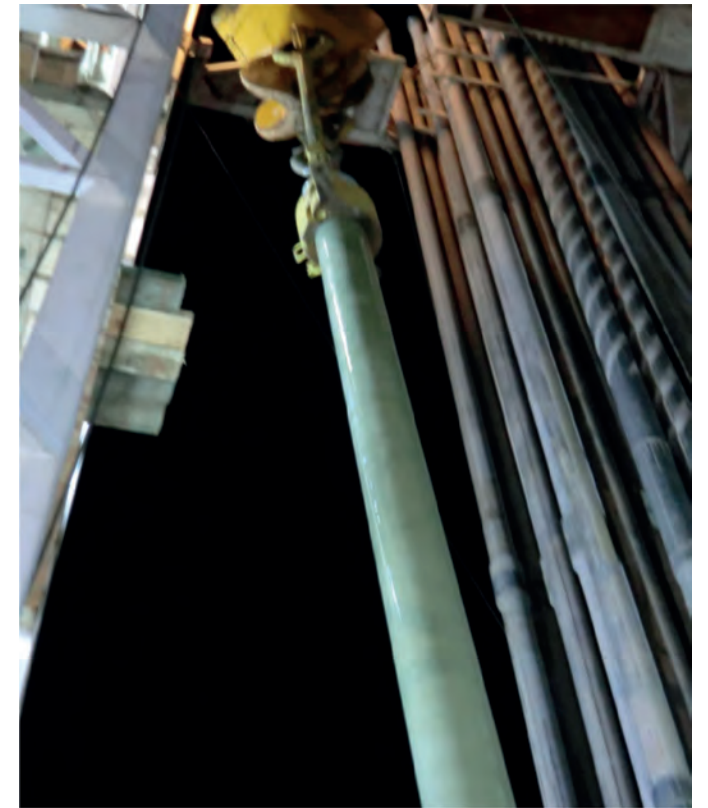
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The connection is designed for a position make-up of 2-3 threads exposed outside the female box.

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Fiberglass casing is up to 50% buoyant. After the coupling has landed onto the elevators every installed joint has to be filled up with mud. Considerations for lowering the casing: proceed slowly, avoid obstructions. Exercise caution when running couplings through blow out preventors.



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The complete installation is monitored. Average installation speed is 8 joints per hour, Approx. 75 Meter per hour. The total installation of the 1278,22 Meter took 20 hours.

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Cement plug are used to cement the annulus. Seat gently, do not exceed maximum internal pressure of the casing. 50 bars and 55 m³ cement were necessary to cement the annulus. The fiberglass casing required “chaining down” due to differential densities (mud 1,2 and cement 1,6-1,8 kg/dm³).