

## Project report geothermal systems

### **Geothermal world-scale plant with central solution for brine distribution: Research and development centre Fronius in Thalheim near Wels (Austria)**

Fronius GmbH develops, produces and sells battery chargers, welding technology and inverters for photovoltaic systems all over the world. End of 2008, the total rebuilt of the branch in Thalheim, Austria, started. The new construction with at least 22,500m<sup>2</sup> floor-spaces will host approx. 400 scientists and developers.



**Picture 1: Planned research and development centre of company Fronius in Thalheim**

In Thalheim, Fronius transfers an integrally intended, high efficiency climate control and energy concept with different energies, especially an own solar technology. So, a high efficiency building without CO<sub>2</sub> emissions will be realized. This standard is unique and exemplary for an energy-intensive research facility. The energy extraction is based on a big geothermal plant and the heat recovery out of the development processes.

Together with three deep wells and one of the biggest geothermal fields in the EU this forms a solid part of a modern heat and regulation management. The geothermal field consists of 204 geothermal probes.

As a seasonal energy storage the excess heat of summer will be stored in the underground which leads to a more economic heating energy in winter due to the higher ground temperature. Energy extraction free of CO<sub>2</sub>-emission à la Fronius.

The geothermal probes of FRANK GmbH are designed as duplex probes. The raw material of the geothermal probe pipes is a high-quality PE 100-RC (resistant to crack). The solid wall pipes made of PE 100-RC grant an optimal safety against point loads, crack initiation, slow crack extension and outer damages. All probes are manufactured on modern welding machines and are completely packed on pallets for the transportation to construction site. An individual certificate for each geothermal probe confirms the quality of the probes.



**Picture 2: Geothermal duplex probes PE 100-RC OD 40**

The two flows and returns of the probes with OD 40 mm are connected with a Y-piece to the horizontal pipes OD 50 mm. Altogether the drilling company Baugrund Süd, Bad Wurzach, drilled about 40,000 meter for this project. For a better thermal connection with the surrounding area and for the sealing, all boreholes are filled with mortar ThermoCem PLUS from Heidelberg Cement after insertion of the probes. So the embedding of the probes has a twice as high heat conductivity as a normal, not improved, hydraulically-setting mortar, which guarantees a constant and effective heat transport between probes and soil.

The high demands which are made on the complete installation correspond to the manhole and geothermal probes. All junction lines are axially adjusted in the probe field and central conducted to the manhole. With this central solution a complex distribution on a high amount of field manholes and an extra directing manhole could be avoided.



**Picture 3: Transport of distribution manhole to construction site**

The manhole was factory-provided and completely pre-assembled with all essential stop and regulating valves so the manhole only had to be located into the pit after delivery. In this case planning and construction of an expensive concrete manhole on site was not necessary and the installation could be reduced to a minimum. The manhole in horizontal configuration was made of FRANK PE 100 spiral pipe with an inner diameter of 2,40 m and 12 m length. Furthermore, the manhole is accessible by trucks, SLW 60, to use this area as a parking place.

Long-time experience of FRANK Group in building manholes for landfills, distribution manholes and profiled sewer systems ensures that the high static specification corresponds to a construction completely made of PE.



**Picture 4: Location of manhole into the building pit**

Of course details for the aeration and lighting were considered during design and manufacturing. Also an entrance with a ladder and a tread inside the manhole guarantees a readily access to all stop and regulating valves. To grant an exact regulation of the hydraulic adjustment of the different junction lines, every probe circuit is equipped with a line control valve type "Oventrop Hydrocontrol". A measuring computer generates an exact adjustment of the valves per differential pressure measurement, so all geothermal probes are balanced.



**Picture 5: Factory-provided pre-assembly with all essential stop and regulating valves**



**Picture 6: on-site connection of the probes to the manhole**

### **Scope of supply**

- 204 duplex geothermal probes PE 100-RC 40 x 3,7mm, SDR11
- Horizontal manhole 2,40 m x 12m with completely prefabricated distributor technology

### **Services of FRANK**

- Suggestions for the design of distributors, manholes and connections
- Development of the manhole, static and construction

### **Construction period**

End of 2008 until 2011

## Partners

Employer: Fronius International GmbH, Thalheim Austria

Planner: ARUP, Berlin  
IS Industrial Services GmbH, Salzburg

Drilling and  
Installation: Bau Grund Süd Gesellschaft für Geothermie mbH, Bad Wurzach

Supplier: Frank GmbH, Geothermal probes and distribution manhole  
Oventrop GmbH, regulating valves  
Heidelberg Cement GmbH, mortar for geothermal probes

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