wassara

STRAIGHT FORWARD DRILLING

BRINGING GEOTHERMAL ENERGY TO OFFICE WORKERS WITH DEEP CASING DRILLING

Geothermal energy, extracted from forty 170 m (573 ft.) deep boreholes, is being used to heat and cool the newly constructed 11 000 m³ municipal office in the city of Lund in southern Sweden. The formation includes both soft and hard layers of rock.

The complicated drilling project was successfully carried out in 2013, despite the fact that the surrounding downtown buildings were at risk if the formation was pressurised. Thanks to Wassaras water-powered DTH hammer, drilling passed without incident through the different formation layers.

The Kristallen building

The Kristallen municipal office in Lund, Sweden, is an extremely energy efficient building. It is heated and cooled by geothermal energy extracted from 40 boreholes. The heat pump supplies the 11 000 m³ building with all the heating energy required, neither boilers nor district heating are necessary. In total, the system provides the building with about 0.5 MW of heating effect and 1 MW of cooling.

First challenge: Drilling in alternate layers with hard and loose formations

Geological investigations indicated that the formation consisted of both hard and loose layers. The 170 m (573 ft.) deep boreholes would need casings to be installed during the first 80 m (270 ft.) of drilling. Furthermore, drilling with conventional equipment would not be possible.

Second challenge: Urban historically-rich environment

Another challenge was posed by the location of the new office, which is downtown in the city of Lund. A number of surrounding buildings could easily be damaged if the formation was pressurised, including an adjacent railway station and a private housing estate. This meant air-powered drilling was out of the question.

The Wassara way

Wassara DTH hammer drilling is powered by water at up to 180 bar delivery pressure. When the water leaves the drill bit, the pressure drops considerably and reaches the state of hydrostatic pressure. The flush velocity is, however, still adequate to bring any cuttings to the surface and to clean the borehole.

This lowers the risk of pressurising the formation to a minimum. The soft formation is not at risk and cannot interfere with or cause severe damage to the surrounding infrastructure. And thanks to a specially designed water sedimentation arrangement, the drilling water was approved for disposal in the public wastewater system.

Safe and secure drilling

According to Mr. Tomas Kullgren, the project Drilling Supervisor at Skånska Energi, “This drilling project included Ø 168 mm (6.8”) casing, some 80 m (270 ft.) down to rock and then drilling with a Ø 140 mm (5½”) bit the remaining length of the 170 m (573 ft.) stretch. Wassaras water-powered hammer handled the different layers very well. The clay layers, for example, cannot be penetrated with air-powered DTH hammers. All in all the drilling has gone according to plan, in time and on budget.”

Project time for the drilling

April – November 2013

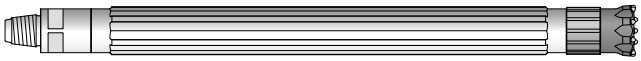
CASE STUDY

BRINGING GEOTHERMAL ENERGY TO OFFICE WORKERS WITH DEEP CASING DRILLING

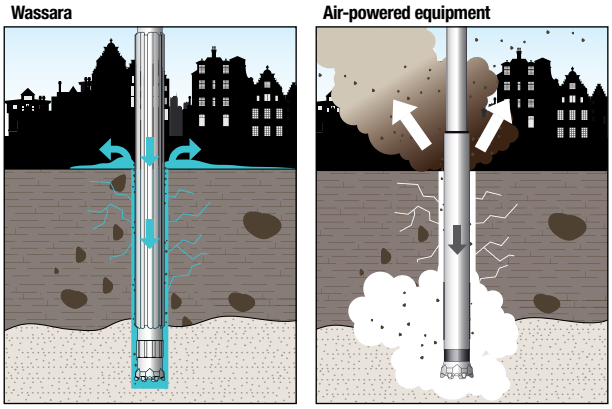
Drilling takes place close to a block of flats

Another casing with drill rod is added to the drill string

Installing the geothermal cables



The W120 hammer



Water-powered drilling minimises the risk of pressurising the formation

Equipment used	
DTH hammer	Wassara W120
Drill bit	Ø 140 mm (5½")
Casing	Ø 168 mm (6⅝")
Drilling fluid	Clean water
Rig	Comacchio GT455
Water pump	WASP 80 diesel
Borehole length	170 m (573 ft.)
Scope of drilling	6 800 m (22 900 ft.) drilling 3 200 m (10 780 ft.) casing
Geologic formation	Clay moraine/till, clay, sand, silt, rock of sandy and silty sediments

November 2015

The Kristallen office building is located next to a railway station