GEOFIT

SMART GEOTHERMAL

Novel geothermal systems, technologies and tools for energy efficient building retrofitting

WP 3 - Laboratory experiments for the thermal behaviour of different collector types in different soil types

Characteristic data on the thermal and hydraulic performance of new collector configurations are required. This data is generated from laboratory tests and field studies on an original scale.

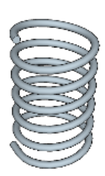
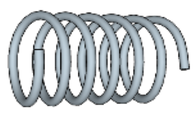
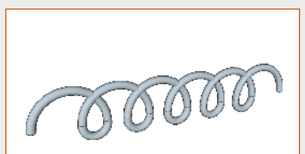
Laboratory procedure

- In boxes (approx. 1 m³) different, reduced, modified flat collector types are buried, filled with 3 different soil types.
- Use of temperature (PT100 and glass fiber) and humidity sensors to evaluate thermodynamic properties
- The containers are placed in a climatic chamber under constant climatic conditions.
- Use of the results to check data from the developed models and applicability in common simulation tools
- Phase change scenarios (freezing) and water permeability experiments in the monitored environment of the climate chamber
- The field experiments are carried out by Groenholland with the Thermal Response Test (TRT).

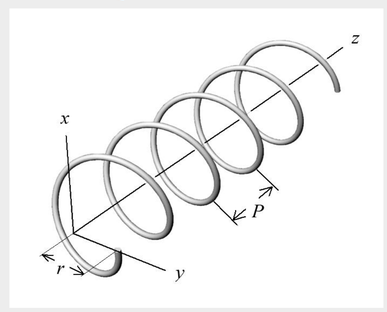
Experimental characterization of collectors (combination of all parameters = 432 variations)

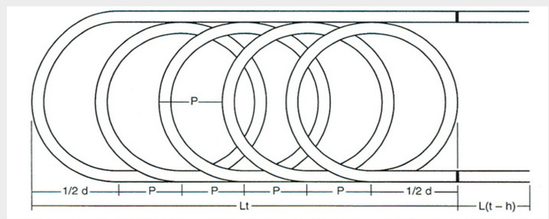
Three different soil types	Three different soil temperatures	Four different Heat flow rates ($\dot{Q}$)	
gravelly-sandy	< 0 °C	Heat extraction	Heat injection
Saturated-sandy	10 °C	$\dot{Q}_1$, $\dot{Q}_2$	$\dot{Q}_3$, $\dot{Q}_4$
loamy-clayey	15 °C		

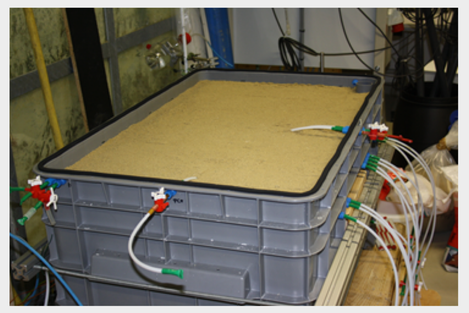
4 different collector types

	vertical
horizontal	
	horizonal flat standing
horizontal flat lying	

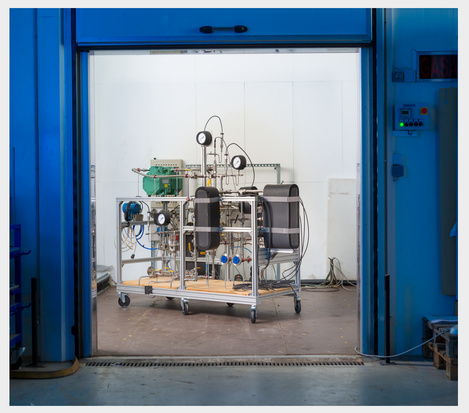
3 different loop pitches
(distance between single loops or extent of overlapping)







Box filled with soil and collector model



Climate chamber at AIT

Partner

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