GEOTHERMAL THERMOSIPHON PROBES BASED ON FLEXIBLE CORRUGATED STAINLESS PIPES

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Objective of the work. Research of the effectiveness of using flexible corrugated stainless pipes as geothermal thermosiphon probes for extracting low potential heat of the soil.

Results. Increasing the use of geothermal heat pumps in residential construction increases the potential risk of groundwater pollution in the event of a coolant leak. An alternative to traditional ground heat exchangers is the technology of producing low potential heat of the surface layers of the Earth using geothermal probes based on thermosiphon heat pipes. When using this technology, there is no need to organize the forced circulation of the intermediate coolant, since the heat transfer occurs by evaporation and condensation of the working fluid in the heat pipe.

The effectiveness of thermosiphon probes using from industrially produced flexible corrugated stainless steel pipes with a screw-in knurling of corrugations was investigated in the work. Tests of an experimental sample of a thermosiphon heat pipe showed that because of the condensate flowing along a helical groove, the internal wall was almost completely wetted. This ensures uniform distribution of the working agent along the length of the pipe and efficient heat transfer, which is confirmed by the uniformity of the temperature field along the entire length of the evaporation zone of the heat pipe.

Refrigerants with high saturation pressure and high vapor density must be used as working fluids in thermosiphones of long length. Carbon dioxide (R-744) is one of the most suitable working fluids for thermal properties. Compared to other refrigerants, R-744 has a significantly higher saturation pressure and volume cooling capacity.

Conclusions. The obtaining of the low-grade heat of the surface layers of the Earth with the help of thermosiphon probes based on flexible corrugated stainless pipes makes it possible to increase the seasonal effectiveness of the geothermal heat pump by 15-20 %.

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