Deliverable D3.6

Evaluation of the performance due to the use of nanofluids

WP3

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Dissemination Level

PU	Public	
CO	Confidential, only for members of the consortium (including the Commission Services)	**X**
CI	Classified, as referred to in Commission Decision 2001/844/EC	

Publishable summary

The Deliverable D3.6 is a confidential document delivered in the context of WP3, Task 3.6: Heat transfer improvement by the use of nanofluids, with regard to the analysis of the employment of nanofluids to possibly enhance the efficiency of the geothermal systems.

Nanofluids are colloidal suspensions of nanoparticles (as oxides, metals or carbon) in common fluids (as water, oil, ethylene glycol or refrigerants). In the literature, there are several studies on the use of these fluids either as thermal vectors, even in geothermal applications, or as compressor lubricants in HVACR applications. As thermal vectors, they promise to improve the heat transfer and thus the energy efficiency of the system by enhancing the thermal conductivity and the heat transfer coefficient of the base fluids. As lubricants, they could enhance the tribological properties, in particular the lubricity, determining higher reliability and duration of the machine and lower energy consumption. After a preliminary search in the open market, some fluids (both heat transfer fluids and lubricants) have been selected for aims of the project. The selection was focused on commercial nanofluids in order to get easily available fluids and at accessible costs.

Several tests have been performed on these fluids to study their most significant properties (stability, thermal conductivity, viscosity, heat transfer coefficient, tribological behaviour), with the aim to evaluate possible enhancements with respect to the base fluids.

This document summarizes all tests performed on the chosen nanofluids and the obtained results. Unfortunately, none of the studied fluids, both as heat transfer fluid or as lubricant, proved to ensure better performance than the base fluids. Thus, they are not suggested for the application in the geothermal system (heat pump + closed loop) developed in the project.