

Michał KACZMARCZYK<sup>1</sup>, Magda KACZMARCZYK<sup>1</sup>, Magdalena KLICH<sup>2</sup>  
and Konrad THÜRMER<sup>3</sup>

<sup>1</sup>AGH University of Science and Technology, 30-059 Krakow, Poland

<sup>2</sup>IWSÖ Institut für Wasserwirtschaft, Siedlungswasserbau und Ökologie, Coudray, Germany

<sup>3</sup>BTU CS Brandenburg University of Technology Cottbus – Senftenberg, Siemens-Halske-Ring 8, 03046 Cottbus, Germany

## **Interpretation of rock mass thermal conductivity at the design stage of heat pump installation and its impact on system efficiency (COP)**

### **Abstract**

The recognition of geological and thermal conditions of the rock mass in the case of designing a borehole heat exchanger as the ground source for heat pump installations is a key issue affecting the efficiency of the heating/cooling system operation. This is especially important for large-sized buildings with a high demand for thermal power, which affects into the size of the ground source installation. The aim of the article is to indicate the difference in the obtained results concerning thermal calculations at the design stage of the brine/water heat pump installation with the borehole heat exchanger, in relation to the theoretical values of the rock mass thermal conductivity and the real values obtained during the thermal response test (TRT). For this purpose, calculations of thermal performance per 1 length meter of the current rock mass were made, with particular emphasis on the change in the value of the thermal conductivity coefficient in the tested drilling profiles. Correspondingly, heat pump coefficient of performance (COP) were calculated, which allowed to analyze the influence of the oversizing/undersizing phenomenon of the ground source on the technical parameters of the heat pump's operation and the economic effect of the investment.

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<sup>1</sup> Corresponding author: mkz@agh.edu.pl