

UDK 621.36

USE OF PELTIC ELEMENTS FOR MEASURING HEAT EXCHANGERS FROM EXTERNAL WALLING

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For the development of measures to improve the energy efficiency of buildings, accurate and reliable information is needed on: the main thermal characteristics of the enclosing structures (ES); data on their moisture-temperature state; levels of heat loss; volumes of external air infiltration, etc. Traditionally, thermocouples, resistance thermometers and heat exchangers were used for this purpose. To improve the reliability of measurements in the design of long-term thermal monitoring systems, the stability of the indicators, high sensitivity and accuracy (reproducibility) of measurements is very important. These characteristics and requirements are met by sensors that are based on semiconductors. They allow to accurately measure the values in the measurement range that is inherent in the heat transfer through the ES, especially for the urgent tasks of creating high-performance buildings and passive buildings with high heat transfer resistance and, accordingly, low and super-low levels of heat loss.

In this work, the verification of the operation of sensors of thermal measurements based on semiconductor sensors in the real conditions of exploitation of research objects was carried out. The analysis of existing semiconductor sensors for measuring the thermal flow according to the criteria of their sensitivity, measurement range, measurement error, availability and cost. According to the basic technical characteristics, the main type of sensors that can be used to measure the heat flow is determined. Also, the comparison of pair wise signals for the external and internal surfaces of the wall structure using different types of sensors: thermocouple-type battery and thermoelectric modules were performed. It is established that the values of the signals from the Peltier sensors are somewhat lower than for the thermocouple sensors, which can be corrected when calibrating the Peltier sensors. Each pair of signals has an equidistant nature of the differences.

The obtained results can be used for the production of an experimental sample of a block of thermal measurements using semiconductor sensors.