

New Reference Installation for the Measurement of the Thermal Conductivities of Thermal Insulating Materials

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A reference installation for the measurement of the thermal conductivities of thermal insulating materials up to 0.02 W/(m•K) was created in VNIIM. It has the most accurate steady-state method of measurement for the thermal conductivity of two flat samples with a guarded hot plate apparatus. Maximum sample limits are 330x330x30 mm. The total standard uncertainty is less than 1 %. It is the first multiple-valued measure (MVM) for reproduction of thermal conductivity for a continuous scale of thermal conductivity over the range 0.02-0.2 W/(m•K). Thus, the thermal conductivity can be reproduced for any point in the specified range.

MVM principle: when a control signal is generating an additional flat heating unit of MVM, it leads to a reduction of the thermal conductivity between the working sides of MVM. MVM calibration is carried out on a reference installation in VNIIM over the temperature range from 280 up to 350 K. The SRM made from fiber glass or foam substances has a heterogeneous non-uniform structure with gas inclusions. It leads to additional heat transferring and breaks the performance of the Fourier equation. When MVM is applied, the Fourier equation is strictly carried out. Multiple-valued measures are protected by a Russian Federation patent.