

Heat Transfer Management and Energy Performance of Buildings: Improvement of the European Traceability of the Thermal Conductivity of Insulating Materials

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Heat transfer management in building construction is a grand challenge for saving energy. The energy performance of materials used is therefore one key priority for the building industry, and thermal conductivity is one of the relevant features for insulation materials. Practically, the guarded hot plate (GHP) is a standard method for measuring this property. It has been largely developed, and the metrology has been validated during the last decades within the main NMIs in Europe. The validation is usually performed by using reference materials and through international inter-laboratory comparisons, which enable one to ensure the traceability of thermal conductivity measurements to the "SI". Relying on the experience of some major NMIs in Europe, the project Eura-Thermal aims at strengthening the traceability between National Metrology Institutes (NMIs) and Designated Institutes (DIs) (France, Hungary, Czech Republic, Republic of Serbia) in central and south east of Europe. This new collaborative project has been set up with a main objective to implement new or updated facilities and to improve the European metrological infrastructure in the field of thermo-physical properties [1-2]. Before applying the comparison measurement protocol, knowledge transfer has been conducted between each partner of the consortium and the upgrading of guarded hot plate and similar apparatus types for thermal conductivity measurement has required performance of specific tests in order to assess the apparatus performances in agreement with their respective operating temperature, heat flux, and thermal conductivity range. Considering the operating range of facilities of the laboratories involved in this project, measurements have been performed over a temperature range from 10 °C to 60 °C using two different widely available insulating materials. The inter-laboratory comparison was designed taking into account the diversity of the different GHPs. Specimens of selected materials have been machined in order to conform to dimensions of heater plates and especially, geometries of metering sections [3]. This presentation provides an overview of the Guarded Hot Plate and Heat Flow Meter facilities used and their performances. A description of the different tests performed and the preliminary results obtained within this inter-laboratory comparison will be discussed. This work will also make a link to the activities performed within the frame of the BIPM-CCT-TG ThQ in which the NIST, NPL, PTB, and VNIIM are involved.

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References:

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