Characterization of an Emissometer used for Industrial Emissivity Measurements on Reflective Insulation Materials

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Reflective thermal insulation materials or reflective heat screens are used not only for building applications, but also in aircraft, land vehicles, boats, space craft, satellites, power plants, and cryogenic applications for thermal insulation and fire protection because of their light weight, small footprint, low particle contamination, and yet high efficiency. An accurate knowledge of the emissivity of these materials is a key parameter for their successful use as well as the development and improvement of new insulation products. Usually, infrared integrating spheres based spectrometers or hemispherical near-normal reflectometers with a hemispherical radiator are used for emissivity measurement in industrial applications and for the quality control of these materials. However, a lack of appropriate calibration procedures as well as of a validated uncertainty budget of end-user instruments lead currently to relatively large discrepancies in emissivity measurements of highly reflective foils. This problem is addressed in the project “Improvement of emissivity measurements on reflective insulation materials” (EMIRIM), funded by the European Metrology Programme for Innovation and Research EMPIR. One of the tasks of the Physikalisch-Technische Bundesanstalt (PTB), as a partner in this project, is to characterize and validate emissivity measurement techniques and instruments for the foils used in reflective insulation products. The TIR100-2 reflectometer supplied by INGLAS was chosen within this project as one of the most commonly used commercial devices. Its technical features, e.g. the size of its measurement spot, will be characterized at PTB using a new measurement setup. Here, the concept is to observe a well-known reference sample trough a set of highly reflective precision apertures, which will be brought in sequence in front of the reflectometer. The setup and the characterization of the TIR100-2 reflectometer will be shown in detail and discussed. Acknowledgements: This work was funded through the European Metrology Programme for Innovation and Research (EMPIR) Project 16NRM06 ‘EMIRIM’. The EMPIR initiative is co-funded by the European Union’s Horizon 2020 research and innovation programme and the EMPIR Participating States.