

Emissivity Measurements on Reflective Insulation Materials

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The development and use of new thermal insulation products in many industrial sectors, ranging from building insulations to power generation or satellite applications, requires the accurate knowledge of the radiative properties of the investigated material, i.e. its emissivity. A major objective of the new Project "Improvement of emissivity measurements on reflective insulation materials" (EMIRIM) within the framework of the European Metrology Programme for Innovation and Research (EMPIR) is to improve and validate reference techniques for the measurement of the total hemispherical emissivity of low emissivity foils with an uncertainty below 0.03. The calibration and measurement procedures developed within this project shall lead to a significant benefit for industrial manufacturers of reflective foils as well as for the end-users of the industrial instruments used to characterize them.

One of the objectives of the Physikalisch-Technische Bundesanstalt (PTB), as a partner within the EMIRIM project, is the emissivity measurements of highly reflecting insulation foils (emissivity below 0.1) with an absolute uncertainty of better than 0.02. Here, we present a new sample holder, based on the principle of vacuum mounting of the sample, which allows performing angular resolved emissivity measurements on reflective foils with the above target uncertainty. Furthermore, different types of reference samples were developed within the EMIRIM project with the goal to improve the calibration of industrial emissivity measurements of foils. The emissivity and reflectivity of these reference samples were characterized and are presented here as well.

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