

## Performance Checks and Validation of High Temperature Guarded Hot Plates

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The guarded hot plate method (GHP) is the reference technique for measuring thermal conductivity of insulation materials and medium conductive materials. The requirements for the design and for checking performance of guarded hot plate apparatus used around room temperature are well documented in standards such as ISO 8302, ASTM C177, EN 12664 and EN 12667. Complying with the requirements of those standards allow to perform thermal conductivity measurements with relative uncertainty better than 5% and to get reproducibility better than 1%. For guarded hot plates used above 100°C, it is almost impossible to fully comply with standards specifying low temperature guarded hot plates because of technical constraints. A group of five National Metrology Institutes (NPL, CMI, LNE, MKEH, PTB) in EU are collaborating in a three-year project for improvement of measurements of thermal conductivity of insulation materials and thermal protection materials up to 800°C. Those institutes have developed or are developing GHPs for temperatures from 100 to 800°C. Those instruments will be commissioned as national references if they reach the objective of relative uncertainty better than 5%. For validating high temperature GHPs and assessing uncertainties, particular techniques and procedures must be used. Validations aims to show mainly that the heat flow is unidirectional in the metering area and that parameters used for the calculation of thermal conductivity are known with the appropriate uncertainties. Global validations are also performed to show that results remains coherent for different conditions of measurement. The techniques of validation, specific to the configuration of each apparatus are described in detail and examples of numerical results are given.

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