APPLICATION**SHEET**

METALS – AEROSPACE

NICKEL-BASED SUPERALLOY
(INCONEL 600)

SiC is a high-temperature ceramic material with a decomposition temperature above 2300°C. SiC has a very high hardness, a high thermal conductivity and also a high chemical resistivity. In pure single crystal form, SiC is a semiconductor with a band gap of 3.0 eV or higher. These extraordinary properties allow to use SiC for a lot of different applications as bearings, heating elements, high-temperature furnace parts, cutting tools etc. A big amount of SiC is simply used as abrasive material. SiC is produced according to the Acheson method from SiO_2 and carbon. The production requires high amounts of energy and delivers various quality of SiC. Therefore, recycling of used abrasive powder is economical. To check on remaining organic cleaning agents, simply thermogravimetry can be employed.
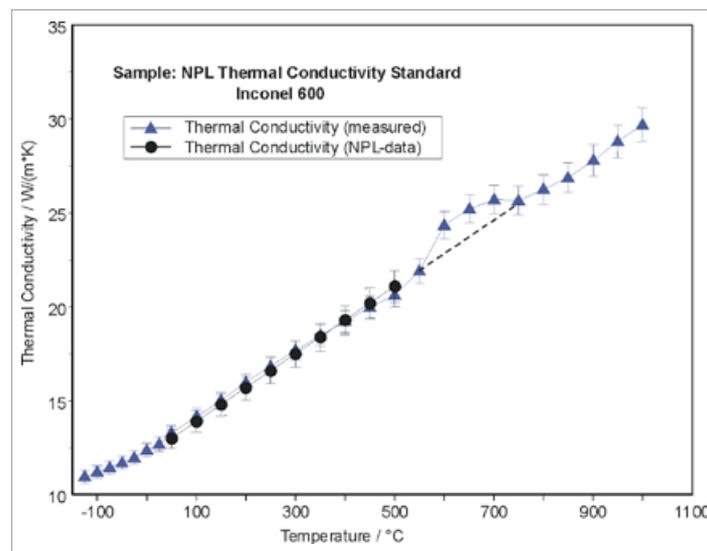
Instrument

LFA 457 *MicroFlash*®

Test Conditions

Temperature range	-125 … 1000°C
Sample holder	12.7 mm
Sample thickness	approx. 3 mm
Sample surface preparation	Sand blasted
C_p from DSC	-

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Results

Presented in the figure are the thermal conductivity values determined from LFA, DIL and DSC tests. Additionally shown are the certified values from NPL (Redgrove, 2003) between 50 and 500°C. Within the uncertainty of the standard material and the accuracy of the tests (error bars), both values agree quite well in the overlapping temperature range. The critical range for the thermal conductivity determination was the temperature range between 550 and 700°C. Here, the calculated thermal conductivity shows on overlapping effect. Due to the fact that the $NiCr_3$ cluster formation occurs in this temperature range, the results represent only the apparent thermal conductivity. Not considering a possible overlapping phase transition enthalpy in the specific heat, the true thermal conductivity might follow a nearly linear increase in this temperature range as indicated as a dashed line in the figure.

Instrument
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