APPLICATION**NOTE**

Insulating Materials – HFM

An Important Component of KEYMARK Certification for Insulation Materials: Automatic Evaluation of Lambda 90/90 When Determining Thermal Conductivity by Means of HFM 706 *Lambda*

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Introduction

The insulation market offers a variety of materials for a wide range of applications having to do with buildings. One of the most important selection criteria for insulation materials is thermal conductivity. The extent to which legal minimum standards for thermal insulation must be met is determined at an early stage in the planning process.

KEYMARK and Thermal Conductivity

KEYMARK is a European quality mark for standardized products, awarded, among others, for thermal insulation materials. It stands for tested and monitored quality in accordance with European standards for insulation materials in the construction industry.

The thermal conductivity, λ, of an insulation material is a key criterion for KEYMARK certification. The specified λ value must be determined as a Lambda 90/90 value. This ensures that not only the average, but at least 90% of the production meets or exceeds this value with 90% certainty. KEYMARK thus ensures that the thermal performance is reliable in the real world – not just in the laboratory.

Lambda 90/90 Value

To calculate the Lambda 90/90 value, at least ten measurements of an insulation class are required; see formula 1.

$$\lambda_{90/90} = \lambda_{mean,n} + k \cdot s$$

$\lambda_{90/90}$ = Lambda90/90
n = Number of measurements (min. 10)
$\lambda_{mean,n}$ = Average value of n measurements
k = Saftey factor, typically 2.07
s = Standard deviation of n measurements

SmartMode Software

The *SmartMode* software of the HFM 706 *Lambda* instrument series offers the possibility of directly outputting this important quality measurement value, thus adding value to the operation of the instrument and the evaluation of the measurement results.

Measurement Results

The example shows measurements on ten different XPS (extruded polystyrene) samples of equal quality at a mean sample temperature (T_{mean}) of 10°C (ΔT=20K). Thanks to the Idle Mode, which keeps the plates at a defined temperature after a measurement, the measurement time for each test is a maximum of 30 minutes.

NGB · Application Note 378 · EN · 0525 · Technical specifications are subject to change.

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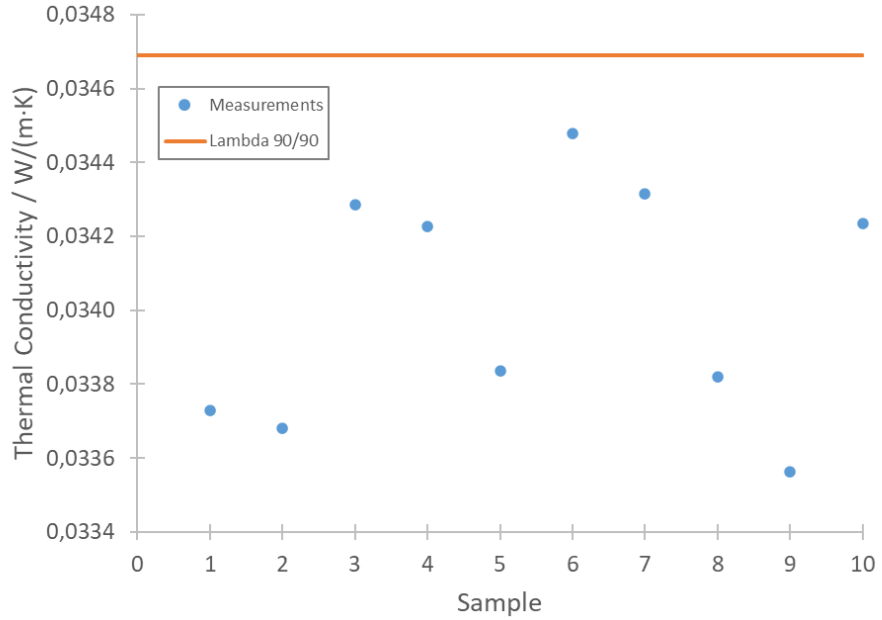
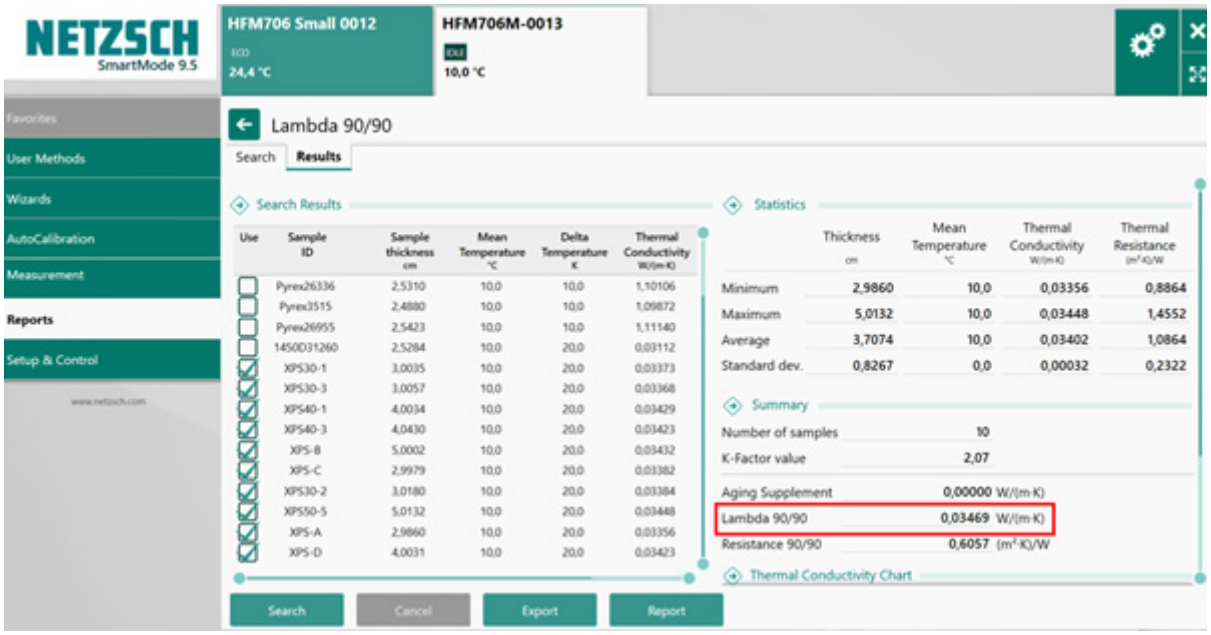


1 Thermal conductivity of ten XPS samples at T_{mean} = 10 °C (ΔT=20K) incl. Lambda 90/90 value



2 Evaluation of the Lambda 90/90 value via the *SmartMode* software

The Lambda 90/90 value shown in figure 1 is then automatically evaluated by the *SmartMode* software; see figure 2.

Conclusion

With the help of the *SmartMode* software of the HFM 706 *Lambda* instrument series, the Lambda 90/90 value can quickly and easily be calculated. Export to common data formats eliminates the need for additional documentation and saves on further work.

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