

# Thermal Conductivity Testing

Acrylic paint for Vivechrom

## REPORT

vivechrom tc testing v0504  
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# Introduction

One material type (two sample pairs) of white acrylic paint material from Vivechrom company were tested for thermal conductivity, using the THA-SYS system.

## 1 Measurement principle

The measurement was performed in compliance with the ASTM 1114-98 standard, relative to traceable Pyrex 7740 material. For more information on the measurement principle, the THA01 manual can be consulted.

NOTE: times mentioned are total experiment times: heating times are one third of these total times.

## 2 Quality Assurance and Traceability

The measurement quality is assured by:

- 1 The fact that the measurement with THA-SYS is absolute.
- 2 The total measurement chain is checked by a measurement of Hukseflux Pyrex samples (Huksref 10 and Huksref 11) that again are traceable to a reference sample obtained from NPL. Traceability of calibration is to the "guarded hot plate" of National Physical Laboratory (NPL) of the UK. Applicable standards are ISO 8302 (EN 12664:2001) and ASTM C177.

Thermal conductivity standards identification: PR44/E03070427A and PR44/E03070427B, calibration data 24 October 2003, NPL certificate PR44/E03070427.

### Samples provided by customer

Dimensions (mm)	100 x 70 X 1 approximately, 6 pieces
Colour	White
Grade	Acrylic paint, Vivecryn Thermoelastic





## THA-SYS

Heater surface (m <sup>2</sup> )	0.003967
Serial Number	THA01-04-01
Contact resistance (m <sup>2</sup> K/W)	0,00029
Sensor parameters	C_1 = 0.00998 10 <sup>-4</sup> V/K <sup>2</sup> C_2 = 0.463 10 <sup>-3</sup> V/K C_3 = 0.962 -
Program Version	THA0429
Filling Fluid	Glycerol
Measurement equipment	CR10XE4545

## Reference samples

Marking	Hukseref 10 and Huksref 11
Material	Pyrex 7740
Thickness (mm)	5.00
Thermal conductivity @ 0 degrees C: (W/mK)	1.058
Temperature dependence: (W/mK)/K	0.00144
Thermal conductivity @ 20 degrees C: (W/mK)	1.087





### 3 Measurements

Operator:

Tests were performed by Kees van den Bos on April 04 2005.

#### Contact resistance

Typical value (m <sup>2</sup> K/W)	0.00034
Value Measured (m <sup>2</sup> K/W)	0.00029
Deviation	0.00005
Allowable deviation	+/- 0.00006

#### Reference samples

Temperature (C)	20
Expected result (W/mK) (literature values)	1.087
Obtained result (W/mK)	1.087 (1800 s)
Deviation:	+0.0%
Allowable deviation	+/- 2%

Sample thickness was measured. Samples 3 and 4 were rejected because the variation in thickness was more than average (around +/- 10%)

#### Customer Samples

Sample id	Sample thickness (mm)
1	0.85 +/- 3%
2	0.90 +/- 5%
5	1.01 +/- 3%
6	0.99 +/- 3%





The measurement results were generated by the THA01 program. The measurements results are summarised in a table below.

Measurement results

sample description	Sam-ple id	Duration (3H)	Thermal Conductivity	Accuracy (estimated)
		s	W/mK	%
Vivecryn Thermoelastic	1 & 2	600	0.238	+/- 7 %
Vivecryn Thermoelastic	5 & 6	600	0.252	+/- 7 %
Vivecryn Thermoelastic	1+5 and 2 +6	1500	0.248	+/- 4 %

Table 3.1 *Samples with description, experiment duration thermal conductivity values with estimated uncertainty*  
*The accuracy in the measurement with 4 samples is higher than that with 2 samples only because the influence of inaccuracy in the thickness is less, and because the overall signal level is higher.*

The overall conclusion is that the thermal conductivity can be specified as 0.25 +/- 4%. This is in good agreement with the expected values for plastics with a high degree of filling material.

