

# Joint Research Centre

## Certified reference materials for testing of thermal properties

### IRMM-440, Thermal conductivity of a resin bonded glass fibre board

IRMM-440 consists of a resin-bonded glass fibre board of nominal density between 64 and 78 kg/m<sup>3</sup>. Boards can be cut to the following dimensions:

- (300 x 300 x 35) mm<sup>3</sup>
- (500 x 500 x 35) mm<sup>3</sup>
- (600 x 600 x 35) mm<sup>3</sup>
- (1000 x 1000 x 35) mm<sup>3</sup>

The certified thermal conductivity between - 10 ° C and + 50 ° C is given by

$$\lambda \text{ [W/(m.K)]} = 2.93949 \cdot 10^{-2} + \frac{T}{^{\circ}\text{C}} \cdot 1.060 \cdot 10^{-4} + \frac{T^2}{(^{\circ}\text{C})^2} \cdot 2.047 \cdot 10^{-7}$$

The uncertainty of the certified thermal conductivity is 0.000 28 W/(m.K) at the 95 % confidence level over the range from - 10 ° C to + 50 ° C.

An indicative value for the thermal conductivity between -170° C and -10° C is given by

$$\lambda \text{ [W/(m.K)]} = 2.95 \cdot 10^{-2} + \frac{T}{^{\circ}\text{C}} \cdot 1.08 \cdot 10^{-4} + \frac{T^2}{(^{\circ}\text{C})^2} \cdot 2 \cdot 10^{-8}$$

The indicative uncertainty of thermal conductivity is 5% at the 95 % confidence level over the range from - 170 ° C to - 10 ° C].

( $\lambda$  in W/(m.K) and T in ° C)



#### Confidence in measurements

All certificates and detailed production information can be found at <https://crm.irmm.jrc.ec.europa.eu>

## BCR-724, Thermal conductivity and diffusivity of glass ceramic (Pyroceram)

BCR-724 samples are cylinders of Pyroceram 9606. Samples are available as cylinders of different dimensions:

- BCR-724A: diameter = 13.0 mm, height > 18 mm
- BCR-724B: diameter = 13.9 mm, height > 21 mm
- BCR-724C: diameter = 25.9 mm, height > 22 mm
- BCR-724D: diameter = 26.9 mm, height > 22 mm

The certified thermal diffusivity  $\alpha$  and thermal conductivity  $\lambda$  are given by

$$\alpha = 4.406 - 1.351 \cdot 10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} T^4$$

$$\lambda = 2.332 + 515.1/T$$

with  $\alpha$  in  $\text{m}^2/\text{s} \cdot 10^{-6}$ ,  $\lambda$  in  $\text{W}/(\text{m}\cdot\text{K})$  and  $T$  in  $\text{K}$ .

The equations are valid for temperatures between 298 K and 1025 K. Relative expanded uncertainties are 6.1 % for  $\alpha$  and 6.5 % for  $\lambda$ , corresponding to confidence levels of 95 %.



### How to order reference materials

#### From JRC in Geel

Tel: +32 14 571 705 • Fax: +32 14 590 406  
<https://ec.europa.eu/jrc/en/reference-materials>  
E-mail: [jrc-irrm-rm-distribution@ec.europa.eu](mailto:jrc-irrm-rm-distribution@ec.europa.eu)

#### From authorised distributors

**LGC Standards GmbH (DE)**  
<http://www.lgcstandards.com/>  
E-mail: [de@lgcstandards.com](mailto:de@lgcstandards.com)

**Sigma-Aldrich Chemie GmbH (CH)**  
<http://www.sigmaaldrich.com/irrm>  
E-mail: [flukatec@sial.com](mailto:flukatec@sial.com)

**Sigma-Aldrich RTC Inc. (USA)**  
<http://www.RT-Corp.com>  
E-mail: [RTCSalesgroup@sial.com](mailto:RTCSalesgroup@sial.com)

**ARMI (USA)**  
<http://www.armi.com>  
E-mail: [Info@ARMI.com](mailto:Info@ARMI.com)

**Industrial Analytical (RSA)**  
<http://www.industrialanalytical.co.za>  
E-mail: [info@industrialanalytical.co.za](mailto:info@industrialanalytical.co.za)