

TEST REPORT SLIMVAC

Client : **MICROTHERM NV**
9100 SINT- NIKLAAS
BELGIUM

Contents : Tests on vacuum insulation panels (VIP)

“Slim Vac “

Description : Vacuum insulated panels, containing an insulation core made from opacified Pyrogenic Silica (density 170 kg/m³), covered with a polyester fleece and wrapped with a high barrier foil made out of three metalized polyester layers and LLDPE (for example from the company Hanita coatings), e.g. for use in refrigerators.

Measurements of the test samples : 800 mm x 800 mm.

Nominal thickness : 20 mm.

Origin of samples: The samples have been sent to FIW München by the client.

Goods received on 8.01.2009.

Report nr : L1-09-057

Date of Issue : 22nd October 2009

Nr of Pages : 4

TESTS CARRIED OUT :

The FIW institute in Munich was instructed by Microtherm NV in Sint-Niklaas/Belgium, to carry out the following tests on the Vacuum Insulated panels with the name of “SlimVac” ; those panels contained an insulation core of opacified Pyrogenic Silica (density 170 kg/m^3), covered with a polyester fleece and wrapped with a high barrier foil made out of three metalized polyester layers and LLDPE.

For the testing, samples had been sent by the client with the overall dimensions of $20 \times 800 \times 800 \text{ mm}^3$

- Thermal conductivity testing on a guarded hot plate according to EN 12677 to define the starting position “initial value”.
- Climate change test (+80/-15)°C with 8 cycles during 24 hours according to DIN 52344
- 30 days temperature storage at 80°C.
- Thermal conductivity testing as EN 12667 after 30 days of temperature storage (additional measurement according the requests of the client).
- 60 days of temperature storage at 80°C.
- Thermal conductivity testing as EN 12667 after 90 days of temperature storage.
- A further 90 days temperature storage at 80°C.
- Thermal conductivity testing as EN 12667 after a total of 180 days temperature storage in “aged” condition.

RESULTS :

The results are given in the tables underneath :

Results of Thermal Conductivity testing on guarded hot plate equipment according to BS EN 12667:2001.

Nominal thickness	mm	20
Thermal conductivity λ @10°C <u>starting value</u>	W/(m-K)	0,0042
Climate change test (+80/-15) °C with 8 cycles during 24 hrs acc DIN 52344, after this 30 days storage at 80°C		
Thermal conductivity λ @10°C <u>after 30 days</u> temperature storage (additional measurement following the request of the client)	W/(m-K)	0,0045
Continuing 60 days of storage at 80°C		
Thermal conductivity λ @10°C <u>after 90 days</u> temperature storage	W/(m-K)	0,0046
Further 90 days of storage at 80°C		
Thermal conductivity λ @10°C <u>after 180 days</u> temperature storage “changed	W/(m-K)	0,0048

ESTIMATION OF THERMAL CONDUCTIVITY AFTER 15 YEARS :

From the research activities of FIW München and ZAE in Würzburg the acceleration of rapid ageing of thermal conductivity at 80°C against a storage temperature of 23°C has been established. Moreover, following research work of EMPA in Dübendorf/Switzerland, it is known that the pressure increase in vacuum panels is about 1 mbar per year.

Based upon the cited experience, the thermal conductivity of the tested vacuum panels, at 15 years of age, and use at room temperature, is estimated at

0,0053 W (m-K)

This estimated value does not contain any guaranteed edge effects, estimations of the thermal heat bridge effect of the lateral foil side walls or any allowance for production variations or tolerances.

REMARK :

The measured thermal conductivity values are valid for the center of the examined panels without the influence of heat bridges of the foil wrapping. These are not measured values of thermal heat conductivity e.g. in the sense of DIN V 4108-4.

When using these Slimvac panels or making heat protection calculations, national regulations, proof of serviceability like building permissions and so on are to be complied with.

Gräfelfing, den 22. Oktober 2009

Sachgebietsleiter

Handwritten signature of W. Albrecht in blue ink.

Dipl.-Ing. (FH) W. Albrecht



Bearbeiter

Handwritten signature of Renate Hirmer in blue ink.

Dipl. Ing. (FH) Renate Hirmer