



**DEMILEC** (USA) LLC.  
POLYURETHANE SYSTEMS MANUFACTURER

**Determination of  
DECLARED LAMBDA ( $\lambda$ ) VALUE  
in accordance to the ISO 10456-07**

PRODUCT EVALUATED:  
**SEALECTION 500**

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## Objective

To evaluate thermal conductivity of thermal insulation foam Sealection 500.

## Material Description

Sealection 500 is two part spray-applied, semi-rigid open-cell polyurethane foam insulation with density of 8kg/m<sup>3</sup> (0.5pcf).

## Sample Preparation

Intertek inspector Mr. Gilles Broy witnessed preparation of foam samples used for the specimens 1 - 4 on April 24, 2006. The samples marked with TS, 6826GGB 24 Apr. 06 were received at VTT, Technical Research Center of Finland on May 12, 2006 and cut to the specimens of size about 480mm x 420mm x 35mm.

Samples 5 - 10 were sprayed in the period from January 28 until March 10, 2008. After foam was cooled to an ambient temperature, 6 (six) specimens were cut to dimensions of approximately 305 x 305mm (12 by 12in) and to thickness of approximately 50mm (2in). All specimens were stored under standard laboratory conditions (temperature of 23°C±3°C and relative humidity of 50% prior to their conditioning in oven at 50°C. Specimens are conditioned in oven until their weight change was negligible (samples were free of moisture).

## Test Method

The testing of specimens 1 – 4 was carried out according to the standard EN 12667: "Building materials – Determination of Thermal Resistance by means of Guarded Hot Plate and Heat Flow Meter Methods – Products of high and medium Thermal Resistance". The apparatus used are in accordance with standard ISO 8301: "Determination of Steady-State Thermal Resistance and Related Properties – Heat Flow Meter Apparatus". Test method was one specimen asymmetrical. During the tests specimen was in vertical position and heat flow was horizontal. The edge heat losses were minimized keeping the ambient temperature of the environment surrounding the apparatus at the mean temperature (10±1°C) of the test.

The testing of specimens 5 – 10 was conducted in accordance to the ASTM C 518-04: Steady-state Heat Flux measurements and Thermal Transmission Properties by means of the Heat Flow Meter Apparatus. During the tests specimen was placed in horizontal position between cold and hot plates which surfaces are maintained at known temperatures (0 and 25°C). Because of the temperature difference, heat flows through the sample from the hot side to the cold. The quantity of heat flowing through the sample is measured by a heat flow transducer, which is a device having an output proportional to the heat flow passing through it. This transducer is placed between the sample and the cold plate.

Because some heat flows through the edges of the sample to or from the surroundings, the heat flow measurement is made in the central area of specimen only (232mm<sup>2</sup> (36in<sup>2</sup>) of 929mm<sup>2</sup> (144in<sup>2</sup>)). Therefore, the effect of heat flow across the edges is absorbed entirely by the sample material that surrounds the central heat measuring area.

## Apparatus

The identification of apparatus used for the testing of specimens 1 – 4:

HFM1: 1022388 and HFM2: 9001369

The identification of apparatus used for the testing of specimens 5 – 10:  
 LaserComp FOX 300 with software WinTherm 32  
 Serial Number: 06090841

### Calibration

The calibration of the apparatus used for the testing at the VTT was done using Certified Reference Material IRMM-440 nr.19 (December 4, 2001) as a reference material.

The calibration of the apparatus used for the testing at Demilec was done using the Standard Reference Material 1450c whose thermal conductivity is known and traceable to the national standards.

Both calibrations, at the VTT and Demilec, were done in intervals of two weeks.

### Results of Testing

Testing of specimens 1 - 4 was completed on May 19, 2006. Density of the test specimens was measured according to the standard EN 1602.

Testing of specimens 5 - 10 was completed in the period from February 22 to March 19, 2008. Thermal conductivity was measured at mean temperature of 12.5°C and recalculated to declared lambda value at 10°C following the standard procedure of ISO 10456-07. Density of the test specimens was measured according to the standard ASTM D 1622.

The results of thermal conductivity measurements of semi-rigid polyurethane foam Sealection 500 are presented in the following table.

Table 1: Thermal conductivity values measured on Sealection 500.

Test #	Dimensions of the test Specimen d x a x b (mm)	Density $\rho$ (kg/m <sup>3</sup> )	Mean Temperature T <sub>m</sub> (°C)	Temperature Difference, $\Delta T$ (K)	Heat Flow Rate, q (W/m <sup>2</sup> )	Thermal Conductivity $\lambda_{25^\circ\text{C}}$ (W/(mK))	Thermal Conductivity $\lambda_{10^\circ\text{C}}$ (W/(mK))
(1)	482.0 x 412.0 x 39.0	10.2	9.950	18.49	16.45	-	0.0347
(2)	481.0 x 410.0 x 37.0	10.7	10.000	18.74	16.86	-	0.0333
(3)	480.0 x 418.0 x 32.0	10.8	9.950	18.48	18.95	-	0.0328
(4)	480.0 x 418.0 x 34.0	10.4	10.010	18.74	18.47	-	0.0335
(5)	306.2 x 299.1 x 49.3	7.072	12.505	25.01	19.17	0.0377	0.0373
(6)	306.1 x 304.3 x 49.2	7.040	12.505	25.01	19.62	0.0386	0.0382
(7)	306.5 x 303.8 x 48.6	8.432	12.505	25.01	19.19	0.0373	0.0369
(8)	306.0 x 305.3 x 48.2	8.304	12.505	25.01	18.58	0.0358	0.0354
(9)	306.5 x 301.5 x 49.1	8.256	12.505	25.01	18.66	0.0366	0.0362
(10)	305.8 x 304.8 x 49.2	7.856	12.505	25.01	19.10	0.0375	0.0371
Mean Value			<b>11.494</b>			<b>0.0373<sup>1</sup></b>	<b>0.0355<sup>2</sup></b>

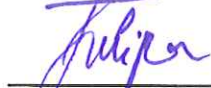
<sup>1</sup> - for six measurements

<sup>2</sup> - for ten measurements

Conclusion

Declared lambda ( $\lambda$ ) value for the set of ten specimens is 0.0355 W/mK.

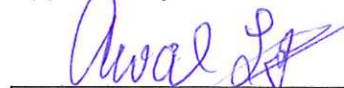
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