



TECHNICKÝ A ZKUŠEBNÍ ÚSTAV STAVEBNÍ PRAHA, s.p.
Technical and Test Institute for Construction Prague

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Testing Laboratory No 1018.3
accredited by ČIA pursuant to ČSN EN ISO/IEC 17025:2018

TEST REPORT

No 010-047005

on test of thermal conductivity coefficient

Manufacturer: Balticfloc Ltd.
Address: Ata Kronvalda Street 40/22-601, Cēsis, Latvia

Plant: Balticfloc Ltd.
Address: Ata Kronvalda Street 40/22-601, Cēsis, LV 4101, Latvia

Test sample: **BFlex Hemp**

Order No: Z010220247

Number of pages of the test report incl. title page: 5

Pages of annexes: 0

Prepared by:

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test technician - specialist

Approved by:



Ing. Radka Sedmidubská
head of the Testing Department

Copy No: **1**
Number of copies: 3

Praha, on 23.06.2023

stamp of the testing laboratory No 1018.3

Declaration: 1) The test results in this Report relate only to the tested article and they do not substitute any other documents.
2) The test report must be copied as a whole only otherwise a written consent of the testing laboratory is needed.

1. Sample data

Evidence Number: VZ010230154 (A,B,C)
Sample: BFlex Hemp
Declared dimensions: Thicknesses: 40, 80 and 100 mm

Contract: Z010220247
Date of sample delivery: 04.05.2023
Sampling place: warehouse of the manufacturer
Sampling method: not stated
Method of the sample preparation: according to relevant testing standard

Data on sampling conditions, plan and procedure of sampling and name of the person who performed sampling are stated in the Sampling Minutes that are stored in the Testing Department.
The test results are related to the sample as received.

2. Test methods

Identification of the test method		Title of the test method
ČSN EN 12667	Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance	Determination of thermal resistance by means of guarded hot plate and heat flow meter methods

Deviations from normative standards: were not applied

Ostatní související normy:

EAD 040005-00-1201 June 2015	Factory-made thermal and/or acoustic insulation products made of vegetable or animal fibres
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3. Test results

The tests were performed on: 04.05.2023 – 23.06.2023
Place of testing: Laboratories of Testing Department Praha
The tests were performed by: Michal Kadeřávek

Data on person who performed the test, test conditions and equipment used are listed in the Test Minutes. Apparatuses and measuring instruments used for testing have been calibrated and verified pursuant to the valid plan of Testing Department Praha.



3.1 Determination of declared thermal conductivity and the mass-related moisture conversion coefficient to high moisture content

A heat flow meter testing device was used for the test. It consists of a heating unit and a cooling unit with a single sample and a single heat flow meter. Measurement was taken at 10°C mean test temperature. No significant changes in sample weight were observed during the test.

3.2 Measurement results of the thermal conductivity coefficient λ_{dry} , $\lambda_{23/50}$, $\lambda_{23/80}$

Table 1: Summary of λ_{dry} measurement results for BFlex – thickness 40 mm

Sample	Nominal thickness [mm]	Mean temperature [°C]	Coefficient of thermal conductivity λ_{dry} [W/mK]
1	40	9,9	0,0368
2	40	9,9	0,0365
3	40	9,8	0,0369
4	40	9,9	0,0373
5	40	9,9	0,0372

Table 2: Summary of λ_{dry} measurement results for BFlex – thickness 80 mm

Sample	Nominal thickness [mm]	Mean temperature [°C]	Coefficient of thermal conductivity λ_{dry} [W/mK]
1	80	9,8	0,0425
2	80	9,9	0,0429
3	80	9,9	0,0424
4	80	9,9	0,0423
5	80	9,9	0,0431

Table 3: Summary of λ_{dry} measurement results for BFlex – thickness 100 mm

Sample	Nominal thickness [mm]	Mean temperature [°C]	Coefficient of thermal conductivity λ_{dry} [W/mK]
1	100	9,9	0,0423
2	100	10,0	0,0429
3	100	9,8	0,0426
4	100	9,9	0,0418
5	100	9,9	0,0419

Table 4: Values for product BFlex:

Mean value $\lambda_{10,dry,mean}$ [W/mK]	0,0406
Standard deviation $s\lambda$	0,002636
Coefficient k	1,87
Coefficient of thermal conductivity $\lambda_{10,dry,90/90}$ [W/mK]	0,0456



Table 5: Summary of $\lambda_{23,50}$ and $\lambda_{23,80}$ measurement results of BFlex

Sample	Values after conditioning					
	23°C, 50% R.H.			23°C, 80% R.H.		
	Mean temperature [°C]	Coefficient of thermal conductivity $\lambda_{23,50}$ [W/mK]	Mass related moisture $u_{23,50}$ [kg/kg]	Mean temperature [°C]	Coefficient of thermal conductivity $\lambda_{23,80}$ [W/mK]	Mass related moisture $u_{23,80}$ [kg/kg]
1 (40 mm)	9,9	0,0388	0,055	9,9	0,0429	0,111
2 (40 mm)	10,0	0,0383	0,057	9,9	0,0439	0,117
3 (40 mm)	9,8	0,0373	0,056	9,8	0,0425	0,116
1 (80 mm)	9,8	0,0479	0,045	9,8	0,0587	0,097
2 (80 mm)	9,9	0,0479	0,042	10,1	0,0544	0,092
3 (80 mm)	9,8	0,0475	0,042	9,9	0,0564	0,095
1 (100 mm)	9,9	0,0480	0,037	10,0	0,0565	0,090
2 (100 mm)	9,8	0,0484	0,018	9,8	0,0552	0,070
3 (100 mm)	9,8	0,0467	0,030	9,8	0,0563	0,087
Mean value		0,0445	0,056	---	0,0519	0,097
uncertainty	---	± 3%	± 1,1*10 ⁻⁴	---	± 3%	± 1,1*10 ⁻⁴

3.3 Calculation of the declared value of the thermal conductivity coefficient

Determination of $\lambda_{10,dry,90/90}$

$$\lambda_{10,dry,90/90} = \lambda_{10,dry,mean} + k * s_{\lambda}$$

$$s_{\lambda} = \sqrt{\frac{\sum_{i=1}^n (\lambda_i - \lambda_{10,dry,mean})^2}{n - 1}}$$

$$n = 15$$

$$k = 1,87$$

Determination of coefficients $f_{u,1}$ a $f_{u,2}$

$$f_{u,1} = \frac{\ln \frac{\lambda_{10,(23,50)}}{\lambda_{10,dry}}}{u_{23,50} - u_{dry}}$$

$$f_{u,2} = \frac{\ln \frac{\lambda_{10,(23,80)}}{\lambda_{10,(23,50)}}}{u_{23,80} - u_{23,50}}$$



Determination of declared value of thermal conductivity coefficient λ_D

Category 1 (from $\lambda_{10,dry,90/90}$)

$$\lambda_{D,(23,50)} = \lambda_{10,dry,90/90} * e^{f_{u,1}(u_{23,50}-u_{dry})}$$

Category 2 (from $\lambda_{10,dry,limit}$)

$$\lambda_{D,(23,50)} = \lambda_{10,dry,limit} * e^{f_{u,1}(u_{23,50}-u_{dry})}$$

Tested thicknesses of BFlex [mm]	$f_{u,1}$ [-]	$f_{u,2}$ [-]	Category 1		Category 2	
			$\lambda_{10,dry,90/90}$ [W/(mK)]	$\lambda_{D,(23,50)}$ [W/(mK)]	$\lambda_{10,dry,limit}$ [W/(mK)]	$\lambda_{D,(23,50)}$ [W/(mK)]
40, 80, 100	2,178	2,777	0,0455	0,0500	0,0411	0,0451

Note.: $\lambda_{10,dry,limit}$ is highest measured value λ_{dry} of each thickness

4. Annexes:

END OF THE TEST REPORT

