

TEST REPORT	
DETERMINATION OF THERMAL CONDUCTIVITY	
FUNCTION TEMPERATURE	
Number of Request	D17-0112
Number of product	2017-000188
Name of product	Tech SA Slab 40 U

Request from	
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Rantigny : 2017, June 2sd

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1 Tests purpose – Measuring Method

The reported tests in this document have for objective the determination of thermal conductivity of flat test specimens as function temperature.

They were conducted in conformity of standards:

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|--|---|
| | <ul style="list-style-type: none"> - ISO 8301 « Thermal insulation. Determination of steady-state thermal resistance and related properties. Heat flow meter apparatus » - Measurements at the temperature of 10°C - NF EN 1946-3 « Thermal performance of building products and components. Specific criteria for the assessment of laboratories measuring heat transfer properties. Part 3 : measurements by heat flow meter method » - « Thermal performance of building materials and products - Determination of thermal resistance by means of heat flow meter methods: <ul style="list-style-type: none"> NF EN 12664 : Dry and moist products of medium and low thermal resistance». NF EN 12667 : Products of high and medium thermal resistance». NF EN 12939 : Thick products of high and medium thermal resistance» |
| | <ul style="list-style-type: none"> - ISO 8302 « Thermal insulation. Determination of steady-state thermal resistance and related properties. Guarded hot plate apparatus » - Measurements with higher at temperatures with 50°C - NF EN 1946-2 « Thermal performance of building products and components. Specific criteria for the assessment of laboratories measuring heat transfer properties. Part 2 : measurements by guarded hot plate method ». - Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate: <ul style="list-style-type: none"> NF EN 12664 : Dry and moist products of medium and low thermal resistance». NF EN 12667 : Products of high and medium thermal resistance». NF EN 12939 : Thick products of high and medium thermal resistance |

2 Product identification

Name of product :	Tech SA Slab 40 U
Origin :	SIIMCO
Country / Plant :	Yanbu
Nature and standard :	MWS
Nominal thickness (mm)	160
Observations	-

Reception date of product or test specimens: 09/02/17

3 Results of tests

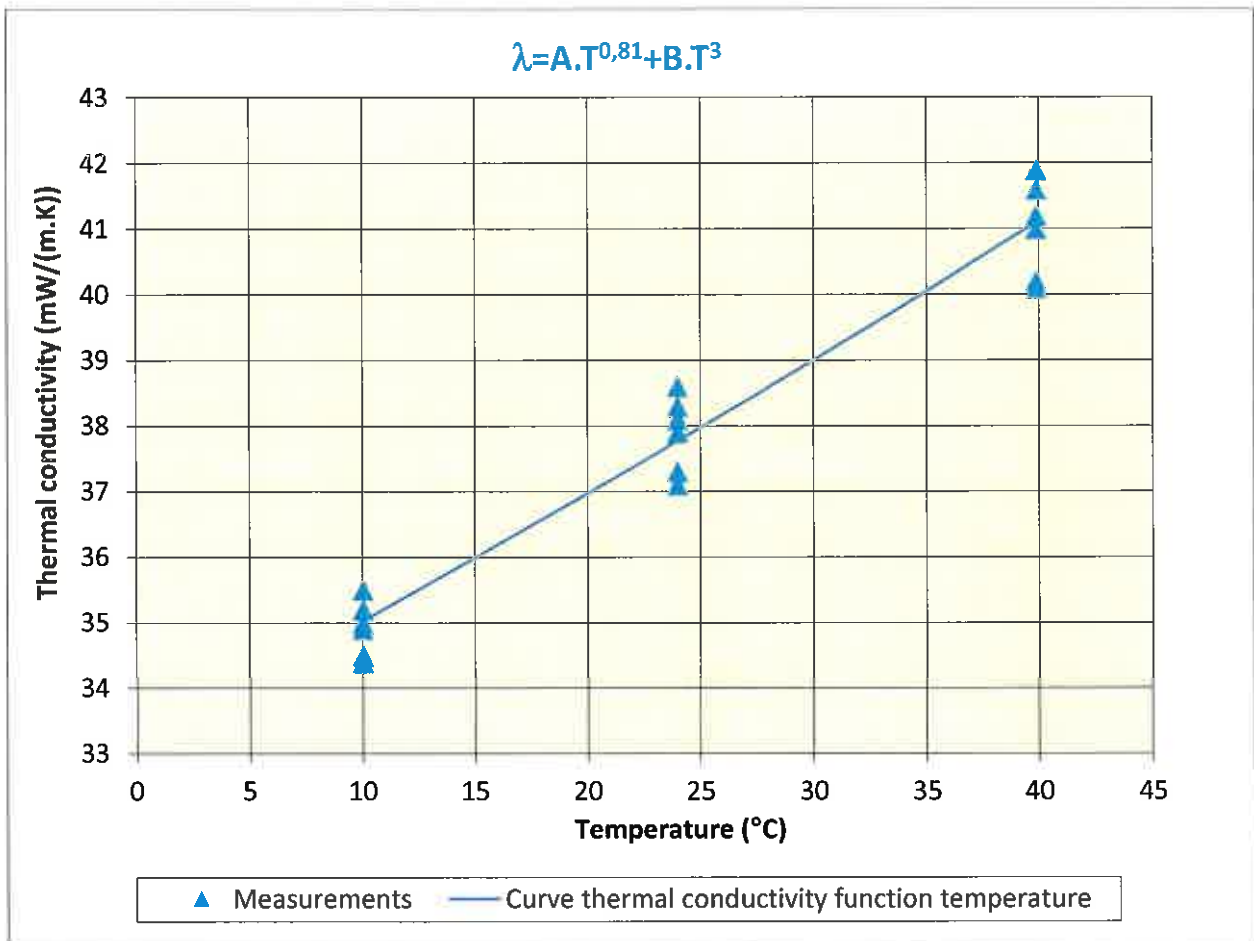
Ident. of test specimen ⁽¹⁾	Density (kg/m ³)	Mean Temp (°C) ⁽²⁾	Thermal conductivity (10 ⁻³ W/(m.K))	ΔT mean (°C)	Density of flow (W/m ²)
17-0188/1	41,3	10,0	34,9	18,3	4,1
17-0188/2	40,0	10,0	35,0	18,3	4,0
17-0188/3	46,6	10,0	34,5	18,3	4,1
17-0188/4	38,3	10,0	35,5	18,3	4,2
17-0188/5	46,1	10,0	34,4	18,3	4,0
17-0188/6	40,6	10,0	35,2	18,2	4,1
17-0188/1	41,3	24,0	37,9	20,2	4,9
17-0188/2	40,0	24,0	38,1	20,2	4,9
17-0188/3	46,6	24,0	37,3	20,2	4,9
17-0188/4	38,3	24,0	38,6	20,2	5,0
17-0188/5	46,1	24,0	37,1	20,2	4,7
17-0188/6	40,6	24,0	38,3	20,2	5,0
17-0188/1	41,3	39,9	41,0	20,3	5,3
17-0188/2	40,0	39,9	41,2	20,3	5,3
17-0188/3	46,6	39,9	40,2	20,3	5,3
17-0188/4	38,3	39,9	41,9	20,3	5,5
17-0188/5	46,1	39,9	40,1	20,3	5,2
17-0188/6	40,6	39,9	41,6	20,3	5,4

- (1) Identification given by accredited thermal laboratory
 (2) Mean temperature inside test specimen

Operator: Fauchart Romain

Date of tests apparatus Rmatic : from 10/02/17 to 31/03/17

The measured thermal conductivities are only valid with the thickness and at the difference of temperature used during this test. Results are only certified with test specimen used during this test.



Test specimens are selected:

By the Accredited Thermal Laboratory according to a selection of test specimens	Randomly in the product
	The closest product mean gramweight
	The closest product nominal density
By the customer	

Remark: This selection is not sampling as defined in NF EN ISO/CEI 17025 because the products most representatives are selected by the factory

4 Uncertainty

The maximal measurement uncertainty at two standard deviations is $\pm 2,3\%$

5 Equation of variation of thermal conductivity function temperature

From these measurements, it was determined coefficients A et B of polynomial law below de of variation of thermal conductivity function temperature:

Polynomial Law	$\lambda = A.T^{0,81}+B.T^3$
A =	2,416E-01
B =	5,122E-07
Range of temperature valable	de 10°C à 40°C

λ in $10^{-3}W/(m.K)$

T in K

6 Table of calculated thermal conductivities

From this equation of variation of thermal conductivity function temperature, it was calculated thermal conductivities at following temperatures:

Temperature (°C)	Thermal conductivity ($10^{-3} W/(m.K)$)
10	35,0
20	37,0
24	37,8
25	38,0
30	39,0
35	40,0
40	41,1

7 Conditioning and characteristics of test specimens

7.1 Conditioning of test specimens

They were conditioned before test in a room with air controlled at $(23 \pm 5) ^\circ\text{C}$ and at $(50 \pm 20)\%$ relative humidity during at minimum 24 hours

7.2 Determination thickness of test specimens

Thickness determined under load of	50Pa
Epaisseur imposée	

The thickness of measure in apparatus is maintained by using ceramic spacers. Consequently it can necessary to grind the test specimens in order to obtain the thickness of spacer.

Grinded test specimens	<input type="checkbox"/>	yes
	<input checked="" type="checkbox"/>	no

The thickness of measure in apparatus is limited to 75mm. For a product higher thickness, the test specimen is splited to half-thickness.

Splited test specimens	<input type="checkbox"/>	yes
	<input checked="" type="checkbox"/>	no

7.3 Characteristic of test specimens in dry condition

Identification of test specimen	Sizes (mm)	Weight (g)	Thickness (mm)
17-0188/1	607x601	2351,1	156
17-0188/2	593x603	2261,2	158
17-0188/3	600x594	2540,0	153
17-0188/4	601x595	2134,8	156
17-0188/5	602x601	2635,3	158
17-0188/6	598x596	2239,6	155

8 Apparatus

The tests were made on:

R-Matic 1 – Report :	17007V, 17008V, 17009V
R-Matic 2 – Report:	16005V
FIW1 – Report :	16006V
FIW2 – Report :	PV16-0057
FIW3 – Report :	PV16-0058
FIW4 – Report :	16004V

The FIW is an apparatus with hot guarded plates with 2 test specimen.

Total sizes: 500 mm x 500 mm
Size of measuring area: 250 mm x 250 mm
Measuring thickness between : 30 mm < d < 75 mm

The R-Matic is fluxmetric apparatus with one test specimen at a time. The plates are horizontal and the hot plate is located at the bottom.

Total sizes: 610 mm x 610 mm
Size of measuring area: 305 mm x 305 mm
Measuring thickness between : 30 mm < d < 170 mm
Number of fluxmeters : 2

Lateral insulation: regulation of ambient air at the mean temperature of the test

Reference test specimen for calibration fluxmetric apparatus :

Reference test specimen	TGR05 ou 06	Date of certification	29/04/2009
Type	Laine minérale	Certification Body	Laboratoire national de métrologie et d'essais
Thermal resistance	1.66 m2.K/W		
Thickness	50 mm		
Date of expiry of the calibration	29/04/2019	Ref N° of the test..	J110203-DE/1

Annex 1– Others measurements**Test not covered by laboratory accreditation****Loss of ignition**

Reference procedure: Branch Specification 30503A

LOI (%)	3,0
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Fasonaire

Reference procedure: Branch Specification GH 05649

Fasonaire (mmH ₂ O)	210
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