TEST REPORT

Applicant:	**FIBRAN S.A.** 56010 THESSALONIKI Greece
Content:	Insulation component test of mineral wool used in ETICS according ETAG 004 (2013)
Material Identification:	Thermal insulation products for buildings - Factory made mineral wool (MW) products **FIBRANgeo** **"BP-ETICSplus"** Rock mineral wool board with conventional binder
Sampling:	The samples were sent by the applicant to FIW München. Goods receipt no.: WE17-3332, date: 12.07.2017
Production unit:	**FIBRAN S.A.** **Terpni, Serres, Greece** Line 2
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Procedure:

The testing laboratory FIW München (notified body No. 0751) was asked by

FIBRAN S.A., Greece

to carry out the Insulation component test of mineral wool used in ETICS ETAG 004 (2013). The samples were produced according to the manufacturer at the manufacturing plant

FIBRAN S.A., Terpni, Serres, Greece, Line 2

and sent to FIW München.

The sample boards were produced with conventional binder, a thickness range between 50 mm and 200 mm and a density range between 92 kg/m³ and 104 kg/m³.

BP-ETICSplus, nominal thickness 50 mm, lot number 271613150D
BP-ETICSplus, nominal thickness 60 mm, lot number 271603150D
BP-ETICSplus, nominal thickness 200 mm, lot number 271622152D

The tests are only referring to the insulation component test of mineral wool (5.2) used in the ETICS including the identification test according to Annex C for insulation components, but without any system tests, guidelines or requirements of any national Technical Assessment Body (TAB) or customer.

The following tests were conducted according the request of the applicant on the smallest and greatest thickness:

- Determination of density according to ETAG 004 Annex C.2.1
- Determination of dimensional characteristics and appearance according to ETAG 004 Annex C.2.2
  - Determination of length and width according to ETAG 004 Annex C.2.2.1
  - Determination of thickness according to ETAG 004 Annex C.2.2.2
  - Determination of squareness according to ETAG 004 Annex C.2.2.3
  - Determination of flatness according to ETAG 004 Annex C.2.2.4
- Compression test according to ETAG 004 Annex C.2.3
- Dimensional stability test according ETAG 004 Annex C.2.4
- Hygiene, health and the environment test according to ETAG 004 Chapter 5.2.3
  - Water absorption according to ETAG 004 Chapter 5.2.3.1
- Safety in use according to ETAG 004 Chapter 5.2.4
  - Tensile test perpendicular to faces according to ETAG 004 Chapter 5.2.4.1
    - In dry conditions according to ETAG 004 Chapter 5.2.4.1.1
    - In wet conditions according to ETAG 004 Chapter 5.2.4.1.2 after 7 days storage
    - In wet conditions according to ETAG 004 Chapter 5.2.4.1.2 after 28 days storage
- Safety in use according to ETAG 004 Chapter 5.1.4 (informative test on the ETICS)
  - Wind load resistance of mechanically fixed ETICS
    - Pull-Through in dry and wet conditions according to ETAG 004 Chapter 5.2.4.3.1

Additional the following test was conducted on 60 mm thickness as prescribed to ETAG 004:

- Shear strength and shear modulus of elasticity test according to ETAG 004 Chapter 5.2.4.2

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Results:

The test results are made up in the following tables.

Table 1: Determination of density according to ETAG 004 Annex C.2.1

For the determination of the dimensional characteristics, appearance and density always the complete board is measured. The amount of tested boards is in each case written in brackets.

Test		Products "BP-ETICSplus"	
Nominal thickness according to labelling	[mm]	50	200
Measured mean density according to ETAG 004 Annex C.2.1 In conjunction with EN 1602:2013 (14 / 8 single values)	[kg/m³]	97.1	94.6

Table 2: Determination of dimensional characteristics and appearance according to ETAG 004 Annex C.2.2

Test		Products "BP-ETICSplus"	
Nominal thickness according to labelling	[mm]	50	200
Measured mean value according to ETAG 004 Annex C.2.2.2 In conjunction with EN 823:2013 (14 / 8 single values)	[mm]	53	201
Nominal length according to labelling	[mm]	1000	1000
Measured mean value according to ETAG 004 Annex C.2.2.1 In conjunction with EN 822:2013 (14 / 8 single values)	[mm]	999	1000
Nominal width according to labelling	[mm]	600	600
Measured mean value according to ETAG 004 Annex C.2.2.1 In conjunction with EN 822:2013 (14 / 8 single values)	[mm]	598	601
Measured squareness according to ETAG 004 Annex C.2.2.3 In conjunction with EN 824:2013 (14 / 8 single values)	[mm/m]	1 / 0	0 / 0
Measured flatness according to ETAG 004 Annex C.2.2.4 In conjunction with EN 825:2013 (14 / 8 single values)	[mm/m]	0	0

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Table 4: Compression test according to ETAG 004 Annex C.2.4

The size of the tested samples is 200 mm x 200 mm x product thickness.

Test		Products		
		"BP-ETICSplus"		
Nominal thickness according to labelling	[mm]	50	200
Compressive strength or compressive stress at 10 % compression			
Measured mean value regarding compressive stress at 10 % compression according to ETAG 004 Annex C.2.3 In conjunction with EN 826:2013 (mean of 5 single values)	[kPa]	37	39
Single values	[kPa]	41 / 39 / 30 / 37 / 38	37 / 43 / 36 / 38 / 40
Declared level by labelling	[kPa]	20	20

Table 5: Determination of dimensional stability test according ETAG 004 Annex C.2.4

The size of the tested samples is 200 mm x 200 mm x product thickness.

Test		Products		
		"BP-ETICSplus"		
Nominal thickness according to labelling	[mm]	50	200
Dimensional stability (48 h, 70 °C, 90 % R.H.)			
Measured mean value regarding dimensional stability according to ETAG 004 Annex C.2.4 In conjunction with EN 1604:2013 (mean of 3 single values)			
length $\Delta_{\varepsilon l}$	[%]	±0.0	+0.1
width $\Delta_{\varepsilon b}$	[%]	+0.1	+0.1
thickness $\Delta_{\varepsilon d}$	[%]	+0.4	+0.2

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Table 6: Safety in use according to ETAG 004 Chapter 5.2.4 - Tensile test perpendicular to faces

The size of the tested samples is 200 mm x 200 mm x product thickness and is identical in dry and wet conditions. The wet condition testing is performed as a two test series exposed to heat-moisture actions at (70 ± 2) °C and (95 ± 5) % R.H. in a climatic chamber followed by a drying period at (23 ± 2)°C and (50 ± 5) % RH until constant mass is achieved.

Test		Products	
		"BP-ETICSplus"	
Nominal thickness according to labelling	[mm]	50	200
Tensile test perpendicular to faces according to ETAG 004 Chapter 5.2.4.1			
In dry conditions according to ETAG 004 Chapter 5.2.4.1.1 (delivered condition)			
Measured mean value σ_{mt} In conjunction with EN 1607:2013 (mean of 5 single values)	[kPa]	20.7	21.6
Single values	[kPa]	21.9 / 21.3 / 19.6 / 22.4 / 18.5	20.3 / 23.9 / 19.9 / 23.9 / 20.1
Declared level by labelling	[kPa]	7.5	
In wet conditions according to ETAG 004 Chapter 5.2.4.1.2 after 7 days storage and drying period (aged condition)			
Measured mean value σ_{mt} In conjunction with EN 1607:2013 (mean of 8 single values)	[kPa]	7.4	8.2
Single values	[kPa]	7.7 / 7.4 / 8.2 / 7.0 / 9.2 / 6.8 / 6.4 / 6.6	7.4 / 8.6 / 7.5 / 9.9 / 9.4 / 8.0 / 6.4 / 8.5
Ratio between aged (7 days) and delivered conditions	[%]	36	38
In wet conditions according to ETAG 004 Chapter 5.2.4.1.2 after 28 days storage and drying period (aged condition)			
Measured mean value σ_{mt} In conjunction with EN 1607:2013 (mean of 8 single values)	[kPa]	7.5	11.1
Single values	[kPa]	8.3 / 6.2 / 7.6 / 7.3 / 8.4 / 7.5 / 8.8 / 6.1	11.1 / 10.7 / 9.8 / 11.4 / 10.9 / 11.5 / 11.8 / 11.8
Ratio between aged (28 days) and delivered conditions	[%]	36	51

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Table 7: Hygiene, health and the environment test according to ETAG 004 Chapter 5.2.3 - Short term water absorption test

The size of the tested samples is 200 mm x 200 mm x product thickness.

Test		Products "BP-ETICSplus"		
Nominal thickness according to labelling		[mm]	50	200
Short term water absorption				
	Measured mean value W_p regarding water absorption according to ETAG 004 Chapter 5.2.3.1 In conjunction with EN 1609:2013 (mean of 4 single values - 2 from each side)	[kg/m²]	0.05	0.08
	Requirement according ETAG 004 Chapter 6.2.3.1 (mean value)	[kg/m²]	≤ 1.0	≤ 1.0

Table 8: Safety in use according to ETAG 004 Chapter 5.2.4 – Shear strength and shear modulus of elasticity test

The test is performed according to the application in width direction of the boards. Sample size is 200 mm x 100 mm. The test method is the double sample procedure.

Test		Products "BP-ETICSplus"	
Nominal thickness according to labelling		[mm]	60
Shear strength			
	Measured mean value $f_{\tau m}$ according to ETAG 004 Chapter 5.2.4.2 In conjunction with EN 12090:2013 (mean of 5 single values)	[N/mm²]	0.025
	Single values f_τ	[N/mm²]	0.025 / 0.023 / 0.026 / 0.025 / 0.026 /
	Requirement according ETAG 004 Chapter 6.2.4.2 (minimum value)	[N/mm²]	≥ 0.02
Shear modulus			
	Measured mean value G_m according to ETAG 004 Chapter 5.2.4.2 In conjunction with EN 12090:2013 (mean of 5 single values)	[mPa]	1.06

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Table 9: Test on the ETICS - Safety in use - Pull-through tests of fixings according ETAG 004 Chapter 5.1.4

As raptures occur in the edge during prior pull-through tests on mineral wool products the sample dimensions were increased to 500 mm x 500 mm (as recommended according to ETAG 004 Chapter 5.1.4.3.1). As the tensile strength of the insulation product in wet conditions tested according 5.2.4.1.2 (see Table 6) is less than 80% of that determined in dry conditions, the Pull-through test is carried out in wet conditions as described in 5.2.4.1.2/ "28 days exposure".

Test		Products		
		"BP-ETICSplus"		
Nominal thickness according to labelling		[mm]	50	200
Pull-through tests of fixings according ETAG 004 Chapter 5.1.4.3.1				
Diameter of the used anchor plate		[mm]	60	
Used anchor			Reference steel anchor	
	Measured mean value maximum load in dry conditions according to ETAG 004 Chapter 5.1.4.3.1 (mean of 5 or 4 single values)	[N]	336	808
	Single values: maximum load / at displacement	[N] / [mm]	364 / 25 300 / 27 326 / 17 341 / 21 351 / 18	880 / 140 798 / 121 728 / 75 825 / 140 - / - *)
	Measured mean value maximum load in wet conditions 28 days according to ETAG 004 Chapter 5.1.4.3.1 in conjunction with 5.2.4.1.2 (mean of 5 single values)	[N]	213	467
	Single values: maximum load / at displacement	[N] / [mm]	251 / 21 209 / 24 185 / 17 214 / 20 204 / 21	529 / 128 377 / 114 501 / 124 448 / 128 478 / 139

*) Specimen was defect

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Remarks:

The test results are only valid for the tested specimens under the tested conditions.

Conclusion:

The tested product met the requirements regarding to the selected insulation component tests of mineral wool used in ETICS according ETAG 004 (2013) Chapter 5.2 and Annex C.2 in conjunction with Chapter 6.2.

Gräfelfing, 05.06.2018

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