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Evaluation Report of

ETA-19/0476 of 14/04/2020

(English language translation, the original version in Czech language)

Technical Assessment Body issuing the European Technical Assessment:

Technical and Test Institute for Construction Prague

Trade name of the construction product: **SILEX SILETERM Energy Saving System**

Product family to which the construction product belongs

Product area code: 4
External Thermal Insulation Composite Systems (ETICS) with rendering insulation product – mineral wool (MW)
"SILEX" D.O.O.

Manufacturer

Bore Šipoša 9b
26000 Pančevo
www.silex.rs

Manufacturing plant(s)

"SILEX" D.O.O.
Bore Šipoša 9b
26000 Pančevo

This Evaluation Report contains

26 pages including 1 Annex which form an integral part of this Report.

1 Introduction

This Report describes the results used to assess the fitness for the intended use of the **SILEX SILETERM Energy Saving System** External Thermal Insulation Composite System launched by "**SILEX**" D.O.O. in accordance with the essential requirements as specified in ETAG 004 used as the EAD, Chapter 5.

This report includes tests carried out in accordance with ETAG 004 used as the EAD concerning the External Thermal Insulation Composite Systems (ETICS) with Rendering.

2 Available documents

- 1) ETAG 004, External Thermal Insulation Composite Systems with Rendering, issued in June 2013, used as the EAD and related test procedures and regulations.
- 2) ETA application form.
- 3) Assembly instructions including drawings.

3 Definition of the product and its intended use

3.1 Product definition

The **SILEX SILETERM Energy Saving System** External Thermal Insulation Composite System (ETICS), hereinafter referred to as the ETICS, consists of factory-produced components and it is supplied by the ETA holder as a coherent system – a kit applied directly on site; the kit is composed of the following components selected by the producer specifically for this kit:

- adhesives specified for the system and mechanical anchors specified for the system;
- thermal insulation material specified for the system;
- base coat containing reinforcement specified for the system;
- reinforcement specified for the system;
- finishing coats specified for the system;

3.2 Intended use

See the relevant ETA, Clause 2.1.

4 Tests on product

4.1 Tests on the system

4.1.1 Reaction to fire - classification (EN 13501-1+A1:2010)

Reaction-to-fire classification of the **SILEX SILETERM Energy Saving System** External Thermal Insulation Composite System was carried out in accordance with EN 13501-1+A1:2010 and in compliance ETAG 004:2013 External Thermal Insulation Composite Systems with Rendering (ETICS), Annex D Reaction to Fire.

The composition of the test sample (representative) was designed on the basis of:

ČSN P CEN/TS 15117:2006 Guidance on Direct and Extended Application and in compliance with ETAG 004:2013 - External Thermal Insulation Composite System with Rendering (ETICS), Annex D Reaction to Fire.

The system composition (representative) for the evidential tests pursuant to EN 13823 (SBI):

- Substrate: particleboard board of thickness 9 mm, untreated by fire retardants
- Adhesive: **SILETERM ST**, average thickness 3-5 mm
- Insulation product: **MW board (TR10)**, thickness 100 mm
density 100 kg/m³, reaction-to-fire class A1
- Base coat: **SILETERM ST + glass fibre mesh MASTERNET CLASSIC 160** – thickness of 6 mm
- Key coat: **KOLOR KONTAKT**
- Finishing coat: **Si&Si 1.5K**
max particle size 1.5 mm

Test was carried out with maximal thickness of finishing coat.

Mounting and fixing:

Reaction-to-fire assessment is based on the tests on the samples of the insulation of thickness of 100 mm (tests pursuant to EN 13823 – SBI and of insulation density (MW) of 100 kg/m³ and further with the finishing coat based on silicone binder.

Following his design and installation instructions, the approval holder installed the ETICS.

The anchors were not used for the sample of the ETICS tested pursuant with ETAG 004, Annex D Reaction to fire and therefore are the results applicable also for mechanically fixed systems.

Test results:

Table No. 1

Testing procedure	Parameter	Average value	Assessment
EN 13823 (SBI)	FIGRA _{0.2 MJ} (W/s)	21.5	≤ 120 (A2)
	THR _{600s} (MJ)	1.3	≤ 7.5 (A2)
	LFS<edge of the test piece	Yes	Yes (A2)
	SMOGRA (m ² /s ²)	0.0	≤ 30 (s1)
	TSP _{600s} (m ²)	32.9	≤ 50 (s1)
	Missing flaming droplets/ particles	Yes	Yes (d0)

In compliance with EN 13501-1+A1:2010 and principles of extended application the **SILEX SILETERM Energy Saving System ETICS** is classified as follows:

Table No. 2

Reaction to fire		Smoke production				Flaming droplets	
A2	-	s	1	,	d	0	

i. e.

A2 – s1, d0

The classification is valid for the final use under the following conditions:

- Substrate:
 - Euroclass A1, A2-s1, d0 and wood based substrates
 - No cells
 - Density minimal 487.5 kg/m³
- Ways of fixing:
 - Fixed with adhesive of maximum heat of combustion of ≤ 0.10 MJ/kg and thickness of ≤ 10 mm.
 - Mechanical fixing with anchors
 - Combination of adhesives and mechanical fixing
- Insulation material:
 - Euroclass A1
 - Limit of thickness 100 mm
 - Density of ≤ 100 kg/m³
- Reinforcement:
 - Glass fibre mesh of maximal heat of combustion ≤ 4.40 MJ/kg and area/weight ratio ≤ 160 g/m²
- Rendering system:
 - base coat with max. heat of combustion ≤ 0.10 MJ/kg of thickness ≤ 5 mm
 - finishing coat with max. heat of combustion ≤ 1.84 MJ/kg and thickness ≤ 1.5 mm (max. particle size 1.5 mm), with adequate key coat.

4.1.2 Water absorption (ETAG 004, Cl. 5.1.3.1)

Composition of the tested system:

- Insulation material: **MW board (TR10)**, thickness of 100 mm
- Base coat: **SILETERM ST**, thickness of 5 mm
- Glass fibre mesh: **MASTERNET CLASSIC 160**
- Key coat **KOLOR KONTAKT**
- Finishing coats defined directly in the table

Water absorption (test results):

Table No. 3

	Water absorption after 1 hour [kg/m ²] (average value)	Water absorption after 24 hours [kg/m ²] (average value)
SILETERM ST without finishing coat and key coat	0.02	0.34
Si&Si 1.5K grain structure, max. particle size 1.5 mm	0.01	0.18

Water absorption of the base coat as well as of all finishing coats is lower than 1 kg/ m² after 1 hour and 0.5 kg/ m² after 24 hours.

4.1.3 Hygrothermal behaviour (ETAG 004, Cl. 5.1.3.2.1)

System was tested on the four test walls subjected to hygrothermal cycles.

Composition of the system:

- Substrate: test wall pursuant to ETAG 004
- Adhesive: **SILETERM ST**, average thickness 5-10 mm
- Insulation product: **MW board (TR10)**, thickness 100 mm
- Base coat: **SILETERM ST**, thickness 4 mm
- Reinforcement: **MASTERNET CLASSIC 160**
- Key coat: **KOLOR KONTAKT**
- Finishing coat: **Si&Si 1.5K**
grain structure, max particle size 1.5 mm

Fixing the tested system:

The system was applied on the test wall. The lower part of the test pieces (up to 750 mm) was without a finishing coat - rendering, i.e. the base coat formed the external surface. The ETICS was applied including renderings to other parts of the test piece and every type of the rendering was applied in vertical divisions to the surface of the base coat.

None of the following defects occurred on the assessed external renderings or the base coat during and after the tests:

- 1) Blistering or peeling of any part of the rendering system
- 2) Failure or cracking associated with joints between the insulation product boards or profiles fitted with the system
- 3) Detachment of the external rendering
- 4) Cracking allowing water penetration into the insulation layer

On the assessed layers of rendering coat and base coat no defects were observed during and after the tests.

4.1.4 Freeze/thaw resistance (ETAG 004, Cl. 5.1.3.2.2)

Water absorption after 24 hours was lower than 0.5 kg/m² and therefore test was not performed.

4.1.5 Impact resistance (ETAG 004, Cl. 5.1.3.3)

Composition of the tested system:

- Insulation product: **MW board (TR10)**, thickness 100 mm
- Base coat: **SILETERM ST**, thickness 4 mm
- Reinforcement: **MASTERNET CLASSIC 160**
- Key coat: **KOLOR KONTAKT**
- Finishing coat: defined directly in the table

The tests were carried out on samples on test wall and on samples after hygrothermal cycles according to ETAG 004 Cl. 5.1.3.2.1.

Categories of use were determined accordingly to tested components:

Table No. 4

	Category of use
Si&Si 1.5K grain structure, max. particle size 1.5 mm	III

4.1.6 Water vapour permeability (ETAG 004, Cl. 5.1.3.4)

Composition of the tested system:

- Base coat: **SILETERM ST**, thickness 5 mm
- Reinforcement: **MASTERNET CLASSIC 160**
- Key coat: **KOLOR KONTAKT**
- Finishing coat: defined directly in the table

Water vapour permeability (test results):

Table No. 5

	Equivalent air thickness s_d (m – average value)
Si&Si 1.5K grain structure, max. particle size 1.5 mm	0.31

Stated values do not exceed limit of 1.0 m.

4.1.7 Release of dangerous substances (ETAG 004, Cl. 5.1.3.5)

Kit not assessed according to EOTA TR 034.

4.1.8 Bond strength (ETAG 004, Cl. 5.1.4.1)

4.1.8.1 Bond strength between base coat and thermal insulation product (ETAG 004, Cl. 5.1.4.1.1)

Composition of the tested system:

- Insulation material **MW board (TR10)**, thickness of 100 mm
- Base coat **SILETERM ST**, average thickness 5 mm
- Glass fibre mesh **MASTERNET CLASSIC 160**

Bond strength between the base coat and insulation product (test results):

Table No. 6

	Bond strength (MPa)						Required value	Rupture typology
	Particular values					Average value		
In dry condition	0.009	0.010	0.008	0.010	0.009	0.009	≥ 0.08 or failure in insulation product	C
After hygro-thermal cycles on the wall	0.006	0.005	0.006	0.008	0.012	0.007		

C – cohesive failure in insulation product.

4.1.8.2 Bond strength between the adhesive and substrate (ETAG 004, Cl. 5.1.4.1.2)

Composition of the tested system:

- Substrate concrete boards of composition and minimal thickness in accordance with ETAG 004, Cl. 5.1.4.1.2
- Adhesive **SILETERM ST**, average thickness 5 mm

Bond strength between the adhesive and the substrate (test results):

Table No. 7

	Bond strength (MPa)						Average value	Required value	Rupture typology
	Particular values								
No complementary conditioning	1.266	1.498	1.257	1.304	1.292	1.323	≥ 0.25	B	
2 days in water, 2 hours of drying	0.414	0.520	0.413	0.381	0.502	0.446	≥ 0.08	B	
2 days' immersion in water, 7 days of drying	1.604	1.127	1.386	1.409	1.555	1.416	≥ 0.25	B	

B – cohesive break in adhesive.

4.1.8.3 Bond strength between the adhesive and insulation product (ETAG 004, Cl. 5.1.4.1.3)

Composition of the tested system:

- Insulation material **MW board (TR10)**, thickness of 100 mm
- Adhesive **SILETERM ST**, average thickness 5 mm

Bond strength between the adhesive and insulation product (test results):

Table No. 8

	Bond strength (MPa)						Required value	Rupture typology
	Particular values					Average value		
No complementary conditioning	0.007	0.006	0.007	0.005	0.007	0.006	≥ 0.03 and failure in insulation product	C
2 days in water, 2 hours of drying	0.004	0.004	0.005	0.004	0.004	0.004	≥ 0.03 or failure in insulation product	C
2 days' immersion in water, 7 days of drying	0.006	0.005	0.007	0.006	0.004	0.006	≥ 0.03 and failure in insulation product	C

C – cohesive failure in insulation product.

4.1.9 Wind load resistance (ETAG 004, Cl. 5.1.4.3)

4.1.9.1 Pull-through resistance of anchors through thermal insulation products (ETAG 004, Cl. 5.1.4.3.1)

Discrepancies in particular, mean and lowest test results values are caused by rounding the values down in order to abide the safest approach idea.

Test results of pull-through resistance on anchors with insulation products MW boards in accordance with ETAG 004, cl. 5.1.4.3.1:

- Surface assembly

Tested components of the system:

- Thermal insulation material **MW board (TR10)** – thickness 60 mm
TR measured in dry condition: 13.4 kPa
TR measured in wet condition: 6.1 kPa
- Anchors **BRAVOLL PTH-KZ 60/8 ***

Table No. 9

Maximal loads (kN) in pull-through resistance of anchors – surface assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.429	0.415	0.403	0.412	0.426	0.41	0.40
	After thermal/humid load	0.269	0.204	0.239	0.275	0.223	0.24	0.20
At the panel joints ETAG 004, fig. 7 - scheme 2a	After thermal/humid load	0.194	0.248	0.198	0.205	0.221	0.21	0.19

* this anchor had plate stiffness of 0.30 kN/mm during the time of the testing (2010)

Tested components of the system:

- Thermal insulation material **MW board (TR10)** – thickness 100 mm
TR measured in dry condition: 15.2 kPa
- Anchors **BRAVOLL PTH-60/8 + BRAVOLL IT PTH 100**

Table No. 10

Maximal loads (kN) in pull-through resistance of anchors – surface assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.870	0.827	0.689	0.766	0.757	0.78	0.68
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.691	0.652	0.594	0.783	0.502	0.64	0.50

Tested components of the system:

- Thermal insulation material **MW board (TR10)** – thickness 100 mm
TR measured in dry condition: 15.2 kPa
- Anchors **BRAVOLL PTH-60/8 + BRAVOLL IT PTH 140**

Table No. 11

Maximal loads (kN) in pull-through resistance of anchors – surface assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.938	0.905	0.917	0.972	0.955	0.93	0.90
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.711	0.733	0.701	0.636	0.713	0.69	0.63

Tested components of the system:

- Thermal insulation material **MW board (TR10)** – thickness 80 mm
TR measured in dry condition: 17.0 kPa
- Anchors **Koelner TFIX - 8 S + Koelner KWL 090**

Table No. 12

Maximal loads (kN) in pull-through resistance of anchors – surface assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.701	0.700	0.672	0.645	0.661	0.67	0.64
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.574	0.621	0.563	0.606	0.612	0.59	0.56

- Countersunk assembly

Tested components of the system:

- Thermal insulation material **MW board (TR10)** – thickness 100 mm
TR measured in dry condition: 15.2 kPa
- Anchors **BRAVOLL PTH-60/8 + Bravoll ZT 100**

Table No. 13

Maximal loads (kN) in pull-through resistance of anchors – countersunk assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.819	0.840	0.825	0.718	0.861	0.81	0.71
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.652	0.796	0.766	0.679	0.813	0.74	0.65

Tested components of the system:

- Thermal insulation material **MW board (TR10)** – thickness 80 mm
TR measured in dry condition: 5.23 kPa
- Anchors **EJOT STR U 2G + VT 2G**

Table No. 14

Maximal loads (kN) in pull-through resistance of anchors – countersunk assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.961	0.898	0.997	0.935	0.780	0.91	0.78
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.613	0.727	0.722	0.837	0.602	0.70	0.60

Tested components of the system:

- Thermal insulation material **MW board (TR10)** – thickness 100 mm
TR measured in dry condition: 14.44 kPa
- Anchors **Klimas Wkret-met screw-in plug eco-drive W**

Table No. 15

Maximal loads (kN) in pull-through resistance of anchors – countersunk assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.715	0.743	0.701	0.705	0.751	0.72	0.70
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.576	0.596	0.577	0.526	0.523	0.56	0.52

Tested components of the system:

- Thermal insulation material **MW Frontrock MAX E (TR10)** – thickness 100 mm
multi-layered board
TR measured in dry condition: 9.95 kPa
- Anchors **fischer Termoz CN 8**

Table No. 16

Maximal loads (kN) in pull-through resistance of anchors – surface assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.441	0.391	0.423	0.387	0.399	0.41	0.38
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.348	0.406	0.326	0.356	0.451	0.37	0.32

Tested components of the system:

- Thermal insulation material **MW Frontrock MAX E (TR10)** – thickness 100 mm
TR measured in dry condition: 15.9 kPa
multi-layered board
- Anchors **fischer Termoz CN 8**

Table No. 17

Maximal loads (kN) in pull-through resistance of anchors – surface assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.648	0.516	0.489	0.531	0.622	0.56	0.48
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.431	0.399	0.414	0.434	0.454	0.42	0.39

Tested components of the system:

- Thermal insulation material **MW Frontrock MAX E (TR10)** – thickness 100 mm
TR measured in dry condition: 15.6 kPa
multi-layered board
- Anchors **BRAVOLL PTH-60**
+ additional plate **BRAVOLL IT PTH 100**

Table No. 18

Maximal loads (kN) in pull-through resistance of anchors – surface assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.783	0.767	0.834	0.776	0.812	0.79	0.76
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.520	0.651	0.667	0.674	0.601	0.62	0.52

Tested components of the system:

- Thermal insulation material **MW Frontrock MAX E (TR10)** – thickness 100 mm
TR measured in dry condition: 15.6 kPa
multi-layered board
- Anchors **BRAVOLL PTH-60**
+ additional plate **BRAVOLL® IT PTH 140**

Table No. 19

Maximal loads (kN) in pull-through resistance of anchors – surface assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	1.041	0.951	0.918	0.985	0.900	0.95	0.90
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.808	0.694	0.785	0.940	0.850	0.81	0.69

Tested components of the system:

- Thermal insulation material **MW Frontrock MAX E (TR10)** – thickness 100 mm
TR measured in dry condition: 15.9 kPa
multi-layered board
- Anchors **BRAVOLL PTH-60**
+ additional plate **BRAVOLL® ZT 100**

Table No. 20

Maximal loads (kN) in pull-through resistance of anchors – countersunk assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.917	0.821	0.791	0.836	0.883	0.85	0.79
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.677	0.793	0.666	0.796	0.764	0.73	0.66

Tested components of the system:

- Thermal insulation material **MW Frontrock MAX E (TR10)** – thickness 100 mm
TR measured in dry condition: 15.6 kPa
multi-layered board
- Anchors **BRAVOLL PTH-60**
+ additional plate **BRAVOLL® ZP**

Table No. 21

Maximal loads (kN) in pull-through resistance of anchors – countersunk assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	0.324	0.329	0.330	0.333	0.340	0.36	0.33
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.340	0.341	0.350	0.382	0.385	0.41	0.35

Tested components of the system:

- Thermal insulation material **MW Frontrock MAX E (TR10)** – thickness 100 mm
TR measured in dry condition: 13.63 kPa
multi-layered board
- Anchors **Klimas Wkret-met screw-in plug eco-drive W**

Table No. 22

Maximal loads (kN) in pull-through resistance of anchors – countersunk assembly								
Test conditions		Particularly					Mean value	Lowest value
At the body of insulation product, ETAG 004, fig. 7 - scheme 1a	Dry condition	1.400	1.435	1.551	1.393	1.450	1.44	1.39
At the panel joints ETAG 004, fig. 7 - scheme 2a	Dry condition	0.892	1.104	1.036	1.134	0.988	1.031	0.89

4.1.9.2 Foam block test (ETAG 004, Cl. 5.1.4.3.2)

The results of the pull-through resistance of anchors on MW board according to ETAG 004, Cl. 5.1.4.3.2:

- Surface assembly

Tested components of the system:

- Thermal insulation material **MW board (TR10)** – thickness 60 mm
TR measured in dry condition: 13 kPa
TR measured in wet condition: 6 kPa
- Anchors **BRAVOLL PTH-KZ 60/8 ***

Table No. 23

Description of the test sample	Load (kN)						
	Particularly					Mean value	Lowest value
8 psc anchors, Bravoll PTH 60/8-La block 1350 x 870 mm from boards MW (ETAG 004, fig. 7 – 2b)	2.98	3.06	2.62	2.87	2.91	2.89	2.62

* this anchor proved to have plate stiffness of 0.30 kN/mm during the time of testing (2010)

4.1.10 Identification tests (ETAG 004, Annex C)

The tests were carried out in accordance with ETAG 004, Annex C. The results of the test are deposited with the TZÚS Prague. They are sent to other bodies of EOTA only if requested. In such a case, they are treated as strictly confidential!

4.1.11 Thermal resistance (ETAG 004, Cl. 5.1.6.1)

See the relevant ETA, Clause 3.5.1.

4.1.12 Bond strength after ageing (ETAG 004, Cl. 5.1.7.1.1)

Composition of the tested system:

- Insulation product: **MW board (TR10)**, thickness 100 mm
- Base coat: **SILETERM ST**, thickness 4 mm
- Reinforcement: **MASTERNET CLASSIC 160**
- Key coat: **KOLOR KONTAKT**
- Finishing coat defined directly in the table

Table No. 24

Bond strength of rendering system after hygrothermal cycles (MPa), ETAG 004, Cl. 5.1.7.1.1				
Finishing coat	Particularly	Mean value	Required value	Failure type
Si&Si 1.5K grain structure max. particle size 1.5 mm	0.010 0.010 0.008 0.008 0.009	0.009	≥ 0.08 or failure in insulation product	C

C – cohesive failure in insulation product.

4.2 Thermal insulation product (ETAG 004, Clause 5.2)

4.2.1 Fire resistance performance (EN 13501-1+A1:2010)

Reaction to fire of the thermal insulation product:

Table No. 25

	Maximal density	Maximal thickness	Reaction-to-fire class
MW board, single density (TR10)	100 kg/m ³	100 mm	A1
MW board multi-layered (TR10)			

4.2.2 Water absorption (EN 1609)

Average water absorption value is < 1.0 kg/m² after 24 hours of partial immersion.

4.2.3 Water vapour permeability (EN 12086)

Value of diffusion resistance factor was determined in accordance with EN 12086, table D.2 in EN 13162 as a substitute to diffusion resistance test.

Table No. 26

	Diffusion resistance factor μ (-)
MW board, single density (TR10)	1.0
MW board multi-layered (TR10)	

4.2.4 Tensile strength perpendicular to the faces (EN 1607)

Min. values of tensile strength perpendicular to faces of insulation product in accordance with EN 13162 and ETAG 004.

Table No. 27

	Min. tensile strength perpendicular to the faces (MPa)	
	In dry condition (MPa)	After thermal/ humid load (MPa)
MW board, single density (TR10)	0.010	0.005
MW board multi-layered (TR10)		

4.2.5 Shear strength and shear modulus of elasticity (EN 12090)

For bonded system with additional mechanical fixing:

Characteristic value of shear strength $f_{Tk} \geq 0.02$ MPa (MPa)

Shear modulus of elasticity $G_m \geq 1.0$ MPa

4.2.6 Thermal resistance (EN 12667, EN 12939)

The thermal resistance is calculated using the equation:

$$R_{ins} = d_{ins}/\lambda_{ins}$$

R_{ins} = nominal thermal resistance of the thermal insulation product

d_{ins} = thickness of the thermal insulation product in m

λ_{ins} = according to the declaration in compliance with EN 13162 in W/mK

4.3 Anchors

4.3.1 Pull-through strength of anchor

The characteristic value of the pull-through resistance of the anchors is given in the relevant ETA.

4.4 Base coat

4.4.1 Render strip tensile test (ETAG 004, cl. 5.5.4.1)

Test results:

- Base coat: **SILETERM ST**

Table No. 28

		Glass fibre mesh: MASTERNET CLASSIC 160 (manufacturer: MASTERPLAST d.o.o.)				
		Crack width W_{typ} [mm]/ number of cracks at relative elongation ϵ				
Load direction		$\epsilon = 0.3 \%$	$\epsilon = 0.5 \%$	$\epsilon = 0.8 \%$	$\epsilon = 1.0 \%$	$\epsilon = 1.5 \%$
Plane side of the test specimen						
Warp	Sample No. 1	$\leq 0.05/6$	$\leq 0.05/9$	$\leq 0.05/14$	$\leq 0.05/18$	$\leq 0.05/25$ $\leq 0.10/1$
	Sample No. 2	$\leq 0.05/5$	$\leq 0.05/7$	$\leq 0.05/12$	$\leq 0.05/17$	$\leq 0.05/24$ $\leq 0.10/2$
	Sample No. 3	$\leq 0.05/5$	$\leq 0.05/9$	$\leq 0.05/15$	$\leq 0.05/18$	$\leq 0.05/26$
Weft	Sample No. 1	$\leq 0.05/8$	$\leq 0.05/11$	$\leq 0.05/16$	$\leq 0.05/19$	$\leq 0.05/26$ $\leq 0.10/1$
	Sample No. 2	$\leq 0.05/6$	$\leq 0.05/9$	$\leq 0.05/14$	$\leq 0.05/17$ $\leq 0.10/1$	$\leq 0.05/24$ $\leq 0.10/4$
	Sample No. 3	$\leq 0.05/8$	$\leq 0.05/10$	$\leq 0.05/14$	$\leq 0.05/18$	$\leq 0.05/24$ $\leq 0.10/3$
Coarse side of the test specimen						
Warp	Sample No. 1	$\leq 0.05/4$	$\leq 0.05/7$	$\leq 0.05/11$	$\leq 0.05/10$ $\leq 0.10/2$	$\leq 0.05/9$ $\leq 0.10/10$ $\leq 0.15/1$
	Sample No. 2	$\leq 0.05/2$	$\leq 0.05/5$	$\leq 0.05/9$	$\leq 0.05/9$ $\leq 0.10/4$	$\leq 0.05/9$ $\leq 0.10/11$
	Sample No. 3	$\leq 0.05/2$	$\leq 0.05/6$	$\leq 0.05/11$	$\leq 0.05/11$ $\leq 0.10/2$	$\leq 0.05/8$ $\leq 0.10/10$ $\leq 0.15/4$
Weft	Sample No. 1	$\leq 0.05/5$	$\leq 0.05/9$	$\leq 0.05/13$	$\leq 0.05/12$ $\leq 0.10/3$	$\leq 0.05/11$ $\leq 0.10/8$ $\leq 0.15/3$
	Sample No. 2	$\leq 0.05/4$	$\leq 0.05/8$	$\leq 0.05/11$	$\leq 0.05/11$ $\leq 0.10/3$	$\leq 0.05/12$ $\leq 0.10/9$ $\leq 0.15/2$
	Sample No. 3	$\leq 0.05/4$	$\leq 0.05/8$	$\leq 0.05/12$	$\leq 0.05/10$ $\leq 0.10/4$	$\leq 0.05/11$ $\leq 0.10/9$ $\leq 0.15/2$

Based on the test results displacement test is not required whilst the use of system is not limited by length of wall or distance between expansion joints.

The worst variant of reverse and obverse sides of samples was used to form outcomes stated in the abovementioned tables.

4.5 Glass fibre mesh (ETAG 004, Cl. 5.6.7.1)

Tensile strength of glass fibre mesh (test results):

Table No. 29

	Glass fibre mesh: MASTERNET CLASSIC 160 (manufacturer: MASTERPLAST d.o.o.)		Required value
	Warp	Weft	
Average value of the tensile strength in the as-delivered state	43 N/mm	48 N/mm	-
Average value of the tensile strength after artificial ageing	26 N/mm	29 N/mm	> 20 N/mm
Residual strength after artificial ageing	60.4 %	60.4 %	> 50 %

4.6 Airborne sound insulation (ETAG 004, Cl. 5.1.5.1)

No performance assessed.

Annex No. : 1 Test reports

Test report 020-042221 on test of water absorption (capillarity), issued by TZÚS Prague, České Budějovice Branch on 20/01/2020.

Test report 020-042222 on test of hygrothermal behaviour, issued by TZÚS Prague, České Budějovice Branch on 20/01/2020.

Test report 020-042223 on test of impact resistance, issued by TZÚS Prague, České Budějovice Branch on 20/01/2020.

Test report 020-042224 on tests on bond strength, issued by TZÚS Prague, České Budějovice Branch on 20/01/2020.

Test report 020-042225 on test of water vapour permeability, issued by TZÚS Prague, České Budějovice Branch on 20/01/2020.

Test report A020-042265 on render strip tensile strength with R131, issued by TZÚS Prague, České Budějovice Branch on 17/02/2020.

Test report No. A020–025051 on pull-through resistance of anchors issued by TZÚS Praha, s.p. České Budějovice branch on 06/12/2010.

Test report No. A060–038464 on pull-through resistance of anchors issued by TZÚS Praha, s.p. Brno branch on 05/11/2013.

Test report No. A060–038282 on pull-through resistance of anchors issued by TZÚS Praha, s.p. Brno branch on 19/09/2013.

Test report No. A060–036661 on pull-through resistance of anchors issued by TZÚS Praha, s.p. Brno branch on 31/10/2012.

Test report No. A060–041299 on pull-through resistance of anchors issued by TZÚS Praha, s.p. Brno branch on 24/06/2015.

Test report No. A060–036444 on pull-through resistance of anchors issued by TZÚS Praha, s.p. Brno branch on 12/09/2012.

Test report No. A060–038462 on pull-through resistance of anchors issued by TZÚS Praha, s.p. Brno branch on 05/11/2013.

Official statement of Rockwool LTD on top layer density and thickness of the insulation product, issued on 24/03/2015.

Test report No. A020–029428 on tensile strength perpendicular to the faces of insulation product issued by TZÚS Praha, s.p. České Budějovice branch on 20/05/2013.

European Technical Assessment ETA-16/0068 for product of MASTERNET CLASSIC 160 issued Masterplast Hungary of 30/04/2018.

Report on reaction-to-fire tests Pr-19-1.209-En, for product SILETERM, issued by PAVUS, a.s. Prague, Veselí nad Lužnicí Branch on 18/11/2019.

Report on reaction-to-fire tests Pr-19-1.210-En, for product Si&Si 1.5K, issued by PAVUS, a.s. Prague, Veselí nad Lužnicí Branch on 18/11/2019.

Report on reaction-to-fire tests Pr-19-1.211-En, for product KOLOR KONTAKT, issued by PAVUS, a.s. Prague, Veselí nad Lužnicí Branch on 18/11/2019.

Report on reaction-to-fire tests Pr-19-1.212-En, for product of mesh MASTERNET, issued by PAVUS, a.s. Prague, Veselí nad Lužnicí Branch on 18/11/2019.

Report on reaction-to-fire tests Pr-19-1.213-En of test by EN 13823+A1, issued by PAVUS, a.s. Prague, Veselí nad Lužnicí Branch on 05/03/2020.

Report on reaction-to-fire classification PK1-01-19-067-E-0 for system SILEX SILETERM Energy Saving System, issued by PAVUS, a.s. Prague, Veselí nad Lužnicí Branch on 12/03/2020.