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Evaluation Report of ETA-16/0166 of 29/09/2022

Technical Assessment Body issuing the ETA:
Łukasiewicz Research Network – Institute of Ceramics and Building Materials

Trade name of the construction product	TYTAN ETICS MW
Product family to which the construction product belongs	04: External Thermal Insulation Composite Systems (ETICS) with renderings
Manufacturer	SELENA FM S.A. Legnicka 48A 54-202 Wrocław, POLAND *www.selena.com*
Manufacturing plants	Plant 1, Plant 2, Plant 3, Plant 4
This Evaluation Report contains	18 pages including 1 Annex which form an integral part of this Report.
This Evaluation Report replaces	Evaluation Report of ETA-16/0166, version 2, issued on 04/04/2018

1. Introduction

This Report describes the results of tests and verifications that have been performed to document the performance of the TYTAN ETICS MW External Thermal Insulation Composite System with renderings, introduced by SELENA FM SA, in accordance with the Basic Works Requirements, as specified in chapter 2 of the EAD 040083-00-0404 "External Thermal Insulation Composite Systems (ETICS) with renderings", edition of January 2019 and hereinafter referred to as EAD 040083-00-0404.

All information on the components, product as well as the factory production control are deposited at Łukasiewicz Research Network – Institute of Ceramics and Building Materials TAB. The data included in this Report is a part of the test reports listed in Annex No 1.

This Evaluation Report covers the tests to version 2 of ETA-16/0166 (issued on 04/04/2018), and the tests performed within amendment process.

2. Description of the TYTAN ETICS MW

The components of TYTAN ETICS MW are described in Table 1 of the accompanying version of ETA. The ETA-applicant SELENA FM SA is a producer of all components except mineral wool insulation products, glass fibre meshes and ancillary materials.

According to the statement of ETA-applicant the following components of TYTAN ETICS MW have identical recipe:

- Tytan IS 22 = Tytan IS 23;
- Tytan IS 51 = Tytan IS 51N;
- Tytan IS 56 = Tytan IS 56N;
- Tytan IS 55 = Tytan IS 55N;
- Tytan IS 52 = Tytan IS 52N;
- Tytan IS 53 = Tytan IS 53N.

Above information must be treated as strictly confidential!

3. Results and assessment of performance

3.1. Safety in case of fire (BWR 2)

3.1.1. Reaction to fire

3.1.1.1. Reaction to fire of ETICS

The reaction to fire was tested in compliance with Annex B to EAD 040083-00-0404 (according to EN ISO 1716, EN ISO 11925-2 and EN 13823) and then classified according to EN 13501-1. The QPCS value of ETICS has be calculated in accordance with EN 16724, clause 5.3.6 and the provisions of Annex B of EAD have been taken into account.

Configuration of TYTAN ETICS MW for SBI test (Tab. 1) was chosen on the basis of heat of combustion and components combination envisaged by the manufacturer. The results of reaction to fire are given in Table 2.

Table 1.

Configuration of TYTAN ETICS MW	
Adhesive	Tytan IS 12 *(PCS: 0,33 MJ/kg)*
Insulation product	MW boards according to EN 13162 density: 120 kg/m^3, class A1 Thickness: 180 mm for EN 13823, 50 mm for EN ISO 11925-2
Base coat	Tytan IS 22 *(PCS: 0,39 MJ/kg)*
Reinforcement	TYTAN IS 165 (EUROWEK LUX 165) *(PCS: 9,48 MJ/kg)*
Key coat	Tytan IS 41 *(PCS: 6,29 MJ/kg)*
Finishing coat	Tytan IS 51, floated 2,5 mm *(PCS: 2,19 MJ/kg)*
Decorative coat	Farba elewacyjna silikatowa Tytan IS 74 *(PCS: 3,95 MJ/kg)*

Table 2.

Testing procedure	**Parameter**	**Average value** Tytan IS 51, floated 2,5 mm + Farba elewacyjna silikatowa Tytan IS 74
EN 13823	$FIGRA_{0,2\,MJ}$ (W/s)	48,81
	$FIGRA_{0,4\,MJ}$ (W/s)	55,91
	THR_{600s} (MJ)	3,59
	SMOGRA (m^2/s^2)	4,04
	TSP_{600s} (m^2)	56,98
	LFS < edge of the sample	yes
	Flaming droplets	no
Class acc. to EN 13501-1	**A2-s2, d0**	

3.1.1.2. Reaction to fire of the thermal insulation material

See Annex No 1 of ETA

3.1.1.3. Reaction to fire of the thermal insulation material

Annex No 1 of ETA

3.1.1.4. Reaction to fire of PU foam adhesive

Not relevant

3.1.2. Façade fire performance

Performance was not assessed.

3.1.3. Propensity to undergo continuous smouldering of ETICS

Performance was not assessed.

3.2. Hygiene, health and environment (BWR 3)

3.2.1. Content, emission and/or release of dangerous substances – leachable substances

Performance was not assessed.

3.2.2. Water absorption

3.2.2.1. Water absorption of the base coat and the rendering system

The tests were performed according to clause 2.2.5.1 of EAD 040083-00-0404. Results are presented in Table 3.

Table 3.

		Average water absorption (kg/m²) after	
		1 hour	24 hours
MW board (TR10)			
Base coat Tytan IS 22		0,03	0,14
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter + decorative coat (if used):	Tytan IS 54, floated 2,5 mm + Farba elewacyjna silikatowa Tytan IS 74	0,30	0,45
	Tytan IS 51, floated 2,5 mm	0,05	0,25
	Tytan IS 56, 1,5 mm	0,14	0,48
	Tytan IS 55, floated 2,5 mm	0,16	0,44
	Tytan IS 52, floated 2,5 mm	0,05	0,26
	Tytan IS 53, floated 2,5 mm	0,04	0,20

Table 3. cont.

		Average water absorption (kg/m²) after	
		1 hour	24 hours
MW lamella (TR80)			
Base coat Tytan IS 22		0,16	0,41
Rendering system:	Tytan IS 54, floated 2,5 mm + Farba elewacyjna silikatowa Tytan IS 74	0,27	0,41
Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter + decorative coat (if used):	Tytan IS 51, floated 2,5 mm	0,12	0,40
	Tytan IS 56, 1,5 mm	0,08	0,28
	Tytan IS 55, floated 2,5 mm	0,11	0,39
	Tytan IS 52, floated 2,5 mm	0,15	0,39
	Tytan IS 53, floated 2,5 mm	0,07	0,32

3.2.3. Water absorption of the thermal insulation product

See Annex No 1 of ETA

3.2.4. Water-tightness of the ETICS: Hygrothermal behaviour

The tests were performed according to clause 2.2.6 of EAD 040083-00-0404.
Compositions of the tested rigs prepared by the manufacturer are given in Table 4

Table 4.

<table>
<tr><th></th><th>Rig 1</th><th>Rig 2</th></tr>
<tr><td>Insulation product</td><td>MW boards acc. to EN 13162, TR10</td><td>MW lamella acc. to EN 13162, TR80</td></tr>
<tr><td>Base coat</td><td colspan="2">Tytan Klej z włóknami do siatki Tytan IS 22</td></tr>
<tr><td>Glass fibre mesh</td><td colspan="2">TYTAN IS 165 (EUROWEK LUX)</td></tr>
<tr><td>Key coat</td><td colspan="2">Tytan IS 41</td></tr>
<tr><td rowspan="4">Finishing coat</td><td colspan="2">Tytan IS 55, ribbed 1,5 mm</td></tr>
<tr><td colspan="2">Tytan IS 51, ribbed 1,5 mm</td></tr>
<tr><td>Tytan IS 54,
floated 1,5 mm +
Farba elewacyjna silikatowa
Tytan IS 74</td><td>Tytan IS 52,
ribbed 1,5 mm</td></tr>
<tr><td>Tytan IS 56,
1,0 mm</td><td>Tytan IS 53,
ribbed 1,5 mm</td></tr>
</table>

None of the following defects occured during and after the testing:

- blistering or peeling of of any part of rendering system;
- failure or cracking associated with joints between thermal insulation product boards;
- detachment of the rendering system;
- cracking allowing water penetration to the thermal insulation layer.

3.2.5. Water-tightness: Freeze-thaw behaviour

Water absorption of rendering systems after 24 hours was lower than 0,5 kg/m^2 (Tab. 3) therefore TYTAN ETICS MW can be considered as freeze/thaw resistant without any further testing (EAD 040083-00-0404, clause 2.2.7).

3.2.6. Impact resistance tested on the rig

The tests were performed on the rig after heat-rain and heat-cold cycles according to clause 2.2.8 of EAD 040083-00-0404. Obtained categories are presented in Table 5.

Table 5.

		Hard body impact		
		Impact energy 3 J	Impact energy 10 J	Impact resistance category
Single layer of standard mesh TYTAN IS 165 (EUROWEK LUX)		**Impact diameter (mm) / damages**		
MW board (TR10)				
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter + decorative coat (if used):	Tytan IS 54, floated 1,5 mm + Farba elewacyjna silikatowa Tytan IS 74	9 / superficial damages without cracks formation	32 / cracks without reaching the insulation product	II
	Tytan IS 51, 1,0 mm	11 / superficial damages without cracks formation	33 / cracks without reaching the insulation product	II
	Tytan IS 56, 1,0 mm	13 / superficial damages without cracks formation	29 / cracks without reaching the insulation product	II
	Tytan IS 55, ribbed 1,5 mm	11 / superficial damages without cracks formation	29 / cracks without reaching the insulation product	II
MW lamella (TR80)				
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter:	Tytan IS 51, ribbed 1,5 mm	12 / superficial damages without cracks formation	35 / cracks without reaching the insulation product	II
	Tytan IS 55, ribbed 1,5 mm	15 / superficial damages without cracks formation	31 / cracks without reaching the insulation product	II
	Tytan IS 52, ribbed 1,5 mm	13 / superficial damages without cracks formation	31 / cracks without reaching the insulation product	II
	Tytan IS 53, ribbed 1,5 mm	14 / superficial damages without cracks formation	33 / cracks without reaching the insulation product	II

3.2.7. Impact resistance not tested on the rig

The tests were performed out of rig on small samples according to clause 2.2.8 of EAD 040083-00-0404. Obtained categories are presented in Tables 6.

Table 6.

		Hard body impact		
		Impact energy 3 J	Impact energy 10 J	Impact resistance category
Single layer of standard mesh TYTAN IS 165 (EUROWEK LUX)		**Impact diameter (mm) / damages**		
MW board (TR10)				
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter:	Tytan IS 52, ribbed 1,5 mm	0 / no damages	36 / cracks without reaching the insulation product	II
	Tytan IS 53, ribbed 1,5 mm	0 / no damages	16 / superficial damages without cracks formation	I
MW lamella (TR80)				
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter + decorative coat (if used):	Tytan IS 54, floated 1,5 mm + Farba elewacyjna silikatowa Tytan IS 74	0 / no damages	14 / superficial damages without cracks formation	I
	Tytan IS 56, 1,0 mm	0 / no damages	0 / no damages	I

3.2.8. Water vapour permeability

3.2.8.1. Water vapour permeability of the rendering system (equivalent air thickness s_d)

The water vapour permeability was tested according to clause 2.2.9.1 of EAD 040083-00-0404. The results are given in Table 7.

Table 7.

		Equivalent air thickness s_d (m)
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter + decorative coat (if used):	Tytan IS 54, floated 2,5 mm + Farba elewacyjna silikonowa Tytan IS 73 + Farba elewacyjna silikatowa Tytan IS 74 *thickness of rendering: 7,7 mm*	0,15 0,12
	Tytan IS 51, floated 2,5 mm + Farba elewacyjna silikonowa Tytan IS 73 *thickness of rendering: 7,7 mm*	0,18
	Tytan IS 56*, 1,5 mm *thickness of rendering: 6,5 mm*	0,22
	Tytan IS 55, floated 2,5 mm + Farba elewacyjna silikonowa Tytan IS 73 *thickness of rendering: 7,7 mm*	0,22
	Tytan IS 52, floated 2,5 mm + Farba elewacyjna silikonowa Tytan IS 73 *thickness of rendering: 7,7 mm*	0,21
	Tytan IS 53, floated 2,5 mm + Farba elewacyjna silikonowa Tytan IS 73 *thickness of rendering: 7,7 mm*	0,18

*decorative coat not used

3.2.8.2. Water vapour permeability of the thermal insulation product (water-vapour resistance factor)

See Annex No 1 of ETA

3.3. Safety and accessibility in use (BWR 4)

3.3.1. Bond strength

3.3.1.1. Bond strength between the base coat and the thermal insulation product

The test was performed in accordance with clause 2.2.11.1 of EAD 040083-00-0404. The results are presented in Table 8.

Table 8.

		Bond strength (kPa)	
		mean	min.
MW board (TR10)			
Tytan IS 22	initial state	12*	10
	hygrothermal cycles (from the rig)	11*	10
	freeze-thaw cycles	test not required	
MW lamella (TR80)			
Tytan IS 22	initial state	80*	80
	hygrothermal cycles (from the rig)	61*	56
	freeze-thaw cycles	test not required	

*cohesive rupture in insulation

3.3.1.2. Bond strength between the adhesive and the substrate

The tests were carried out according to clause 2.2.11.2 of EAD 040083-00-0404. The results are given in Table 9.

Table 9.

		Bond strength (kPa)	
		mean	min.
Tytan IS 12**	initial state	406*	375
	48 h immersion in water + 2 hours 23°C/50% RH	425*	331
	48 h immersion in water + 7 days 23°C/50% RH	529*	420
Tytan IS 22**	initial state	493*	429
	48 h immersion in water + 2 hours 23°C/50% RH	374*	320
	48 h immersion in water + 7 days 23°C/50% RH	823*	652

*adhesive rupture; **thickness of adhesive – about 3 mm

3.3.1.3. Bond strength between adhesive and insulation product

The tests were carried out according to clause 2.2.11.3 of EAD 040083-00-0404. The results are given in Table 10.

Table 10.

		Bond strength (kPa	
		mean	min.
Tytan IS 12**	**MW board (TR10)**		
	initial state	10	10
	48 h immersion in water + 2 hours 23°C/50% RH	10	9
	48 h immersion in water + 7 days 23°C/50% RH	10	10
	MW lamella (TR80)		
	initial state	83*	80
	48 h immersion in water + 2 hours 23°C/50% RH	59*	57
	48 h immersion in water + 7 days 23°C/50% RH	83*	80
Tytan IS 22**	**MW board (TR10)**		
	initial state	10	10
	48 h immersion in water + 2 hours 23°C/50% RH	10	8
	48 h immersion in water + 7 days 23°C/50% RH	10	10
	MW lamella (TR80)		
	initial state	80*	79
	48 h immersion in water + 2 hours 23°C/50% RH	62*	57
	48 h immersion in water + 7 days 23°C/50% RH	81*	80

*cohesive rupture in insulation; ** thickness of adhesive – 3 mm

3.3.2. Fixing strength (transverse displacement test)

Test not required because the ETICS fulfils the following criteria: $E \cdot d < 50\,000$ N/mm.

3.3.3. Wind load resistance of ETICS

Pull-through tests of fixings were carried out according to clause 2.2.13.1 of EAD 040083-00-0404. The results are given in Table 11.

Table 11.

			Failure loads (kN)	
			mean	individual
HILTI SD-FV 8 (plate diameter – 60 mm) MW board (thickness – 60 mm, tensile strength perpendicular to the face 10 kPa)	Anchors not placed at the panel joints	dry conditions	0,228	0,227; 0,178; 0,223; 0,249; 0,265
	Anchors not placed at the panel joints	wet conditions	0,161	0,132; 0,162; 0,159; 0,186; 0,165
	Anchors placed at the panel joints	dry conditions	0,193	0,215; 0,162; 0,201; 0,180; 0,207
	Anchors placed at the panel joints	wet conditions	0,137	0,116; 0,149; 0,135; 0,141; 0,143

3.3.4. Tensile test perpendicular to the faces of thermal insulation product

Tensile strength perpendicular to the faces of mineral wool boards, tested in wet conditions in accordance with clause 2.2.14.2 of EAD 040083-00-0404, was lower than 80% of that determined in dry conditions (Table 12), thus pull-through tests were performed under wet conditions too.

Table 12.

		Tensile strength perpendicular to the faces (kPa)	
		mean	min.
MW board	under dry conditions	11	9
	under wet conditions 28 days	9	7

3.3.5. Shear strength and shear modulus of elasticity test of ETICS

See Annex No 1 of ETA.

3.3.6. Render strip tensile test

Performance was not assessed.

3.3.7. Bond strength after ageing

3.3.7.1. Bond strength after ageing of finishing coat tested on the rig

The tests were carried out according to clause 2.2.20.1 of EAD 040083-00-0404. The results are given in Table 13.

Table 13.

		Bond strength after hygrothermal cycles (kN/m²)	
		mean	**individual values**
MW board (TR10)			
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter + decorative coat (if used):	Tytan IS 54, floated 1,5 mm + Farba elewacyjna silikatowa Tytan IS 74	10*	9; 10; 10; 11; 11
	Tytan IS 51, ribbed 1,5 mm	10*	9; 10; 10; 10; 12
	Tytan IS 56, 1,0 mm	10*	11; 9; 10; 12; 9
	Tytan IS 55, ribbed 1,5 mm	10*	11; 10; 10; 11; 10
MW lamella (TR80)			
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter:	Tytan IS 51, ribbed 1,5 mm	70*	72; 78; 53; 73; 72
	Tytan IS 55, ribbed 1,5 mm	73*	69; 74; 76; 74; 72
	Tytan IS 52, ribbed 1,5 mm	72*	73; 73; 70; 72; 74
	Tytan IS 53, ribbed 1,5 mm	71*	70; 66; 72; 70; 75

*cohesive rupture in insulation

3.3.7.2. Bond strength after ageing of finishing coat not tested on the rig

The tests were carried out according to clause 2.2.20.2 of EAD 040083-00-0404. The results are given in Table 14.

Table 14.

		Bond strength after hygrothermal cycles (kN/m^2)	
		mean value	**individual values**
MW board (TR10)			
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter:	Tytan IS 52, ribbed 1,5 mm	11*	12; 12; 10; 11; 10
	Tytan IS 53, ribbed 1,5 mm	11*	12; 10; 10; 10; 11
MW lamella (TR80)			
Rendering system: Base coat: Tytan IS 22 + key coat + finishing coat indicated hereafter + decorative coat (if used):	Tytan IS 54, floated 1,5 mm + Farba elewacyjna silikatowa Tytan IS 74	83*	80, 81, 83, 86, 84
	Tytan IS 56, 1,0 mm	84*	80, 88, 86, 82, 83

*cohesive rupture in insulation

3.3.8. Mechanical and physical characteristics of the mesh

3.3.8.1. Tensile strength and elongation of the glass fibre mesh in the as-delivered state

The tests were carried out according to clause 2.2.21.1 of EAD 040083-00-0404. The results are given in Table 15.

Table 15.

	Average tensile strength in the as-delivered state (N/mm)		Average elongation in the as-delivered state (%)	
	warp	weft	warp	weft
122**	47,0	49,0	3,90	3,40
TYTAN IS 165 (EUROWEK LUX)	39,0	55,0	3,70	3,70
SSA-1363-160	43,0	45,0	3,60	3,90
TYTAN IS 165 A (HALICO A165)	43,2	45,1	4,83	4,81
122*	44,0	46,0	3,90	3,50

*plant Slovakia; **plan Macedonia

3.3.8.2. Tensile strength and elongation of the glass fibre mesh after ageing state

The tests were carried out according to clause 2.2.21.2 of EAD 040083-00-0404. The results are given in Table 16.

Table 16.

	Average tensile strength after ageing (N/mm)		Residual strength after ageing (%)		Average elongation after ageing (%)	
	warp	weft	warp	weft	warp	weft
122**	27,0	36,0	57,4	73,5	2,30	2,50
TYTAN IS 165 (EUROWEK LUX)	28,0	49,0	71,8	89,1	2,6	3,40
SSA-1363-160	26,0	29,0	60,5	64,4	2,30	2,30
TYTAN IS 165 A (HALICO A165)	37,8	37,0	87,5	82,0	3,86	3,56
122*	23,0	29,0	52,3	63,0	2,10	2,10

*plant Slovakia; **plan Macedonia

3.4. Protection against noise (BWR 5)

3.4.1. Airborne sound insulation of ETICS

Performance was not assessed.

3.4.1.1. Dynamic stiffness of the thermal insulation product

Performance was not assessed.

3.4.1.2. Air flow resistance of the thermal insulation product

Performance was not assessed.

3.5. Energy economy and heat retention (BWR 6)

3.5.1. Thermal resistance and thermal transmittance of ETICS

The additional thermal resistance provided by the ETICS (R_{ETICS}) to the substrate was calculated according to clause 2.2.23 of EAD 040083-00-0404 on the basis of the thermal resistance of the thermal insulation product ($R_{insulation}$) and from either the tabulated (R_{render}) value of the render system [about 0,02 in $(m^2 \cdot K)/W$]. The results are given in Table 17.

$$R_{ETICS} = R_{insulation} + R_{render}$$

as described in EN ISO 10456.

Table 17.

Thermal resistance R_{ETICS} with EPS* thickness 60 mm $[(m^2 \cdot K)/W]$	Thermal resistance R_{ETICS} with EPS* thickness 300 mm $[(m^2 \cdot K)/W]$
1,135	6,687

*at maximum value of thermal conductivity 0,045 W/(m · K)

3.5.2. Thermal resistance of the thermal insulation product

See Annex No 1 of ETA

3.6. Tests on components

Test methods specified in Annex A of EAD 040083-00-0404 were used for establishing of input data for the verification of constancy of performance of TYTAN ETICS MW External Thermal Insulation Composite System with renderings and, where relevant, for the description of its components. The test results are deposited at Łukasiewicz Research Network – Institute of Ceramics and Building Materials TAB. The results may be sent to other TABs of EOTA only on request. In such case they are considered as strictly confidential

Krakow, 29.09.2022

Prepared by: Agnieszka BATOR

Kierownik Działu Oceny Technicznej
dr inż. Karolina Łączka

Annex No 1: Technical documentation

- ETA application with accompanying statements, Selena Industrial Technologies Sp. z o.o. on behalf of SELENA FM SA
- TYTAN ETICS MW instruction of use, Selena Industrial Technologies Sp. z o.o. on behalf of SELENA FM SA
- ETA 11/0109 of 08.04.2011, TZUS Prague
- Report on classification of reaction to fire No SG-65/16/N version 3, Łukasiewicz Research Network – Institute of Ceramics and Building Materials, Krakow, May 2022
- Reports on classification to fire PU No PK1-01-18-074-E-0 Pavus a.s., Prague, December 2018
- Test report No 105/16/SG/N on reaction to fire, ICiMB/Division in Krakow, June 2016
- Test report No 17/2011 on heat of combustion, PTEU MV SR, Bratislava, April 2011
- Test reports No: LP01-06035/14/R02NM and LP01-00716/15/Z00NP on heat of combustion, ITB, Warsaw, December 2014 and March 2015
- Test reports No: Pr-10-1.185 to Pr-10-1.189 and Pr-10-1.191 to Pr-10-1-194 on heat of combustion, Pavus a.s., Prague, December 2010
- Test report No PB 3.1/13-014-2 on heat of combustion, MFPA Leipzig GmbH, January 2013
- Test report No 217/15/BC/N on heat of combustion, ICiMB/Division in Krakow, December 2015
- Test report No 060-033 335 on water absorption, TZUS Prague/Division in Brno, December 2010
- Test reports No: 415/16/SG, 417/16/SG, 419/16/SG, 420/16/SG, 423/16/SG, 424/16/SG, 426/16/SG, 427/16/SG and 514/16/SG on water absorption, ICiMB/Division in Krakow, June 2016
- Test reports No: 208/16/SG, 209/16/SG, 210/16/SG, 289/16/SG, 290/16/SG, 291/16/SG and 292/16/SG on water vapour permeability, ICiMB/Division in Krakow, March 2016
- Test reports No: 309/22/KG and 310/22/KG on hygrothermal behaviour, Łukasiewicz Research Network – Institute of Ceramics and Building Materials, Krakow, May 2022
- Test reports No: 418/16/SG, 421/16/SG, 422/16/SG and 425/16/SG on impact resistance, ICiMB/Division in Krakow, June 2016
- Test reports No: 309/22/KG and 310/22/KG on impact resistance, Łukasiewicz Research Network – Institute of Ceramics and Building Materials, Krakow, May 2022
- Test reports No: 205/16/SG, 414/16/SG, 415/16/SG, 416/16/SG, 418/16/SG, 421/16/SG, 422/16/SG, 425/16/SG and 563/17/SG on bond strength, ICiMB/Division in Krakow, March and June 2016, July 2017
- Test reports No: 309/22/KG and 310/22/KG on bond strength, Łukasiewicz Research Network – Institute of Ceramics and Building Materials, Krakow, May 2022
- Test report No 060-033375 on identification of TYTAN ETICS MW components, TZUS Prague/ Division in Brno, January 2011
- Test reports No: 206/16/SG, 307/16/SG, 691/16/SK, 692/16/SK, 693/16/SK and 694/16/SK on identification of TYTAN ETICS MW components, ICiMB/Division in Krakow, March and April 2016
- Test reports No: KBP/ETICS/01 ÷ KBP/ETICS/07 on identification of TYTAN ETICS MW components, SELENA FM SA, May 2021 and December 2021
- Test report of glass fibre mesh HALICO A165 No 610/18/SG, ICiMB/Division in Krakow, June 2018
- European Technical Assessment for glass fibre mesh SSA-1363-160, ETA 16/0526, TZÚS, September 2021
- European Technical Assessment for glass fibre mesh EUROWEK LUX, ETA 16/0765, TZUS, Prague, June 2017
- European Technical Assessment for glass fibre mesh 122, ETA 16/0546, TZUS, Prague, April 2020