European Technical Assessment

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European Technical Assessment

ETA-15/0069 of 19/09/2022

General Part

Technical Assessment Body issuing the European Technical Assessment: Łukasiewicz Research Network – Institute of Ceramics and Building Materials	
Trade name of the construction product	BOLIX S-XPS
Product family to which the construction product belongs	04: External Thermal Insulation Composite Systems (ETICS) with renderings
Manufacturer	BOLIX SA Stolarska 8 34-300 Żywiec, POLAND
Manufacturing plants	Stolarska 8 34-300 Żywiec, POLAND
This European Technical Assessment contains	31 pages including 4 Annexes which form an integral part of this assessment. Annex No 5 Control Plan contains confidential information and is not included in the European Technical Assessment when that assessment is publicly disseminated.
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	EAD 040083-00-0404 ed. January 2019 – External Thermal Insulation Composite Systems (ETICS) with renderings
This European Technical Assessment replaces	ETA-15/0069, version 1, issued on 10/03/2015

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Specific part

1. Technical description of the product

This product BOLIX S-XPS is an External Thermal Insulation Composite System (ETICS) with renderings - a kit comprising components which are factory-produced by the manufacturer or component suppliers. The ETICS manufacturer is ultimately responsible for all components of the ETICS specified in this ETA.

The ETICS kit comprises a prefabricated insulation product of extruded polystyrene foam (XPS) to be bonded or mechanically fixed onto a wall. The method of fixing and the relevant components are specified in Table 1. The insulation product is faced with a rendering system consisting of one or more layers (site applied), one of which contains reinforcement. The rendering is applied directly to the insulating board, without any air gap or disconnecting layer.

The ETICS may include special fittings (e.g. base profiles, corner profiles, expansion strips, tapes and sealing strips) to treat details of ETICS (connections, apertures, corners, parapets, sills) and reinforcement elements (e.g. prefabricated mesh elements). Assessment and performance of these components is not addressed in this ETA, however the ETICS manufacturer is responsible for adequate compatibility and performance within the ETICS when the components are delivered as a part of the kit.

Table 1.

	Components	Coverage (kg/m²)	Thickness (mm)
	Bonded ETICS or bonded ETICS with supplementary mechanical fixings. National application documents shall be taken into account.		
Insulation materials with associated methods of fixing	• **Insulation product:** board of extruded polystyrene (XPS) according to EN 13164 *Product characteristics - see Annex No 1*	-	50 to 500
	• **Adhesives:**		
	- **BOLIX Z** cement based powder requiring addition of 0,19-0,21 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX ALFA** cement based powder requiring addition of 0,20-0,22 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX UWM** cement based powder requiring addition of 0,20-0,24 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX U** cement based powder requiring addition of 0,20-0,22 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX UZ** cement based powder requiring addition of 0,21-0,23 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX US** cement based powder requiring addition of 0,22-0,24 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX ZP** ready to use polyurethane foam	about 90 ml/m²	-
	• **Supplementary mechanical fixings:** Plastic anchors covered by relevant ETA	-	-

Table 1. cont.

	Components	Coverage (kg/m²)	Thickness (mm)
	Mechanically fixed ETICS (through insulation product) with supplementary adhesive. National application documents shall be taken into account.		
Insulation materials with associated methods of fixing	• **Insulation product:** board of extruded polystyrene (XPS) according to EN 13164 *Product characteristics - see Annex No 1*	-	50 to 500
	• **Anchors** *Products characteristics - see Annex No 2*	-	-
	• **Supplementary adhesives:**		
	- **BOLIX Z** cement based powder requiring addition of 0,19-0,21 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX ALFA** cement based powder requiring addition of 0,20-0,22 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX UWM** cement based powder requiring addition of 0,20-0,24 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX U** cement based powder requiring addition of 0,20-0,22 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX UZ** cement based powder requiring addition of 0,21-0,23 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX US** cement based powder requiring addition of 0,22-0,24 l/kg of water	4,0 to 8,0 (powder)	-
	- **BOLIX ZP** ready to use polyurethane foam	about 90 ml/m²	-
Base coat	- **BOLIX U** cement based powder requiring addition of 0,20-0,22 l/kg of water	about 4,0 or about 6,0* (powder)	3,0 to 5,0 or 4,0 to 6,0*

*depending on number of layers of glass fibre meshes

Table 1. cont.

	Components	Coverage (kg/m²)	Thickness (mm)
Reinforce-ment	• **Standard glass fibre meshes:** applied in one or two layers - **BOLIX HD 145/S** - **BOLIX HD 158/S** - **BOLIX HD 160/S** - **BOLIX HD 174/S** *Products characteristics - see Annex No 4*	- - - -	- - - -
Key coats	• **BOLIX OP** ready to use liquid to be used obligatory with finishing coats BOLIX MP, BOLIX TM, BOLIX DECO, BOLIX TM DECO and BOLIX BQB + BOLIX BQS • **BOLIX SIG kolor** ready to use liquid to be used obligatory with finishing coats BOLIX SIT / BOLIX SIT Complex, BOLIX SIT-P, BOLIX ULTRACLEAN and BOLIX SI-SIT / BOLIX SI-SIT Complex	0,25 to 0,40 0,25 to 0,40	- -
Finishing coats	• Mineral finishing coat **BOLIX MP** cement based powder requiring addition of 0,17-0,24 l/kg of water floated structure max. particles size: 1,5; 2,0; 3,0 mm ribbed structure max. particles size: 2,5 mm • Acrylic finishing coats **BOLIX TM** ready to use paste – acrylic binder mosaic structure max. particles size: 0,8; 1,6 mm **BOLIX DECO** ready to use paste – acrylic binder mosaic or modelled structure max. particles size: 0,5 ÷ 1,0; 0,5 ÷ 2,0 mm **BOLIX TM DECO** ready to use paste – acrylic binder spread structure max. particles size: 0,8 mm	2,2 to 4,0 (powder) 2,0 to 4,0 2,5 to 3,5 2,9 to 3,5	Regulated by particles size 1,5 to 3,0 2,0 to 3,0

Table 1. cont.

	Components	Coverage (kg/m²)	Thickness (mm)
Finishing coats	• Silicone finishing coats **BOLIX SIT / BOLIX SIT Complex** ready to use paste – silicone and acrylic binder floated structure max. particles size: 1,5; 2,0 mm	2,2 to 3,5	Regulated by particles size
	BOLIX SIT-P ready to use paste – silicone and acrylic binder floated structure max. particles size: 1,5; 2,0 mm	2,2 to 3,5	
	BOLIX ULTRACLEAN ready to use paste – silicone and acrylic binder floated structure max. particles size: 1,5 mm	2,2 to 2,6	
	• Silicone-silicate finishing coat **BOLIX SI-SIT / BOLIX SI-SIT Complex** ready to use paste – silicate, silicone and acrylic binder floated structure max. particles size: 1,5; 2,0 mm	2,2 to 3,4	
	• Polymer finishing coat - **BOLIX BQB** ready to use paste on polymer binder used with synthetic mineral briquettes	2,4 to 3,2	1,5 to 2,5
	BOLIX BQS synthetic mineral briquettes ready to use with filler mass BOLIX BQS Mass	4,0 to 5,0	3,0 to 6,0
Primer	• **BOLIX SIG / BOLIX SIG Complex** ready to use liquid to be used with silicone decorative coats	0,10 to 0,20	-

Table 1. cont.

	Components	Coverage (kg/m²)	Thickness (mm)
Decorative coats (paints)	• **BOLIX SIL / BOLIX SIL Complex** ready to use pigmented liquid to be used obligatory with finishing coat BOLIX MP and optionally with following finishing coats: - BOLIX SIT / BOLIX SIT Complex - BOLIX SI-SIT / BOLIX SI-SIT Complex	0,18 to 0,40	-
	• **BOLIX SIL-P** ready to use pigmented liquid to be used optionally with finishing coats: - BOLIX SIT / BOLIX SIT Complex - BOLIX SIT-P	0,18 to 0,40	
	• **BOLIX SIL ULTRACLEAN** ready to use pigmented liquid to be used optionally with finishing coat BOLIX ULTRACLEAN	0,18 to 0,40	
Ancillary materials	• Setting accelerator **BOLIX PW-S EXPRESS**, ready to use powder to be used optionally with adhesive BOLIX U and BOLIX UWM; coverage: 10 g/kg of adhesive • Setting accelerator **BOLIX PW EXPRESS**, ready to use liquid to be used optionally with finishing coats BOLIX SIT/ BOLIX SIT Complex and BOLIX SI-SIT / BOLIX SI-SIT, coverage: 7 ml/kg of finishing coat • Other according to EAD 040083-00-0404 Remain under the manufacturer's responsibilities		

2. Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

This ETICS is intended to be used on new or existing (retrofit) vertical building walls. The ETICS may also be used on horizontal or inclined surfaces which are not exposed to precipitation.

The ETICS gives the building wall to which it is applied additional thermal insulation and protection from effects of weathering. ETICS are non-load-bearing construction elements. They do not contribute directly to the stability of the building wall on which they are installed.

ETICS are not intended to ensure the air tightness of the building structure.

Due to the very smooth surface of the XPS boards, it is recommended to mechanically tarnish and dust them before gluing and making the reinforced layer. This does not apply to XPS boards with a factory-textured surface.

Concerning product packaging, transport and storage it is the responsibility of the manufacturer to undertake the appropriate measures and to advise his clients on the transport and storage, as he considers necessary in order to reach the declared performances.

The information about installation is provided with the technical documentation from the Manufacturer and it is assumed that the product will be installed according to it or (in absence of such instructions) according to the usual practice of the building professionals.

The performances assessed in this European Technical Assessment, according to the applicable EAD, are based on an assumed intended working life of at least 25 years, provided that the conditions for the packaging, transport, storage, installation as well as appropriate use, maintenance and repair are met. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

The ETICS belongs to Category S/W2 according to EOTA Technical Report No 034.

3. Performance of the product and references to the methods used for its assessment

The tests for performance assessment of BOLIX S-XPS were carried out in compliance with EAD 040083-00-0404 according to the test methods reported herein, as well for what concerns sampling, conditioning and testing provisions. The performances of the kit as described in this chapter are valid provided that the components of the kit comply with Section 1 of the ETA and the relative Annexes 1 ÷ 4. The numbering in the following tables corresponds to the numbering of Table 1 of EAD 040083-00-0404.

3.1. Safety in case of fire (BWR 2)

3.1.1. Reaction to fire (EAD 040083-00-0404: clause 2.2.1, EN 13501-1)

3.1.1.1. Reaction to fire of ETICS (EAD 040083-00-0404: clause 2.2.1.1)

Table 2.

Configuration	Max. heat of combustion [MJ/kg]	Flame retardant content	Class acc. to EN 13501-1
Adhesive	24,95	No flame retardant	B-s1, d0
XPS board *density ≤ 50,0 kg/m³*	-		
Base coat	0,20		
Glass fibre mesh *(double layer)*	2 x 8,61		
Key coat	4,86		
Finishing coat	4,99		
Key coat	31,06		
Decorative coat	12,40		

3.1.1.2. Reaction to fire of the thermal insulation material (EAD 040083-00-0404: clause 2.2.1.2)

See Annex No 1

3.1.1.3. Reaction to fire of PU foam adhesive (EAD 040083-00-0404: clause 2.2.1.3)

Table 3.

PU foam adhesive	Reaction to fire class acc. to EN 13501-1
BOLIX ZP	F

3.1.2. Façade fire performance (EAD 040083-00-0404: clause 2.2.2)

No performance assessed

3.1.3. Propensity to undergo continuous smouldering of ETICS (EAD 040083-00-0404: clause 2.2.3)

No performance assessed

3.2. Hygiene, health and environment (BWR 3)

3.2.1. Content, emission and/or release of dangerous substances – leachable substances (EAD 040083-00-0404: clause 2.2.4, EOTA TR034)

No performance assessed.

Note: There may be requirements applicable to the ETICS falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Regulation (EU) No 305/2011, these requirements need to be complied with, when and where they apply.

3.2.2. Water absorption (EAD 040083-00-0404: clause 2.2.5)

3.2.2.1. Water absorption of the base coat and the rendering system (EAD 040083-00-0404: clause 2.2.5.1)

- Base coat BOLIX U:
  - Water absorption after 1 hour = 0,05 kg/m^2;
  - Water absorption after 24 hours = 0,27 kg/m^2.
- Rendering systems: Table 4.

Table 4.

		Water absorption after 1 hour	Water absorption after 24 hours
		mean value (kg/m²)	
Rendering system: Base coat: BOLIX U + relevant key coat + finishing coat indicated hereafter + primer (if used) + decorative coat (if used):	BOLIX MP + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL / BOLIX SIL COMPLEX	0,10	0,49
	BOLIX TM	0,03	0,17
	BOLIX DECO	0,02	0,40
	BOLIX TM DECO	0,02	0,40
	BOLIX SIT / BOLIX SIT Complex	0,03	0,30
	BOLIX SIT-P	0,01	0,18
	BOLIX ULTRACLEAN	0,10	0,40
	BOLIX SI-SIT / BOLIX SI-SIT Complex	0,02	0,25
	BOLIX BQB + BOLIX BQS	0,02	0,30

3.2.2.2. Water absorption of the thermal insulation product (EAD 040083-00-0404: clause 2.2.5.2)

See Annex No 1

3.2.3. Water-tightness of the ETICS: Hygrothermal behaviour (EAD 040083-00-0404: clause 2.2.6)

Hygrothermal cycles have been performed on a rig in hygrothermal chamber. None of the following defects occured during the testing:

- blistering or peeling of any finishing coat,
- failure or cracking associated with joints between insulation product boards,
- detachment of render,
- cracking allowing water penetration to the insulation layer.

The ETICS is so assessed resistant to hygrothermal cycles.

3.2.4. Water-tightness: Freeze-thaw performance (EAD 040083-00-0404: clause 2.2.7)

Water absorption of both, base coat and the rendering systems after 24 hours was lower than 0,5 kg/m^2 (Tab. 4).

The ETICS is so assessed as freeze-thaw resistant.

3.2.5. Impact resistance tested on the rig (EAD 040083-00-0404: clause 2.2.8)

Table 5.

		Hard body impact		
		Impact energy 3 J	Impact energy 10 J	Impact resistance category
Single layer of standard mesh		Impact diameter (mm) / damages		
Rendering system: Base coat: BOLIX U + relevant key coat + finishing coat indicated hereafter:	Rig 1			
	BOLIX TM, 0,8 mm	0 / no damages	13 / superficial damages without cracks formation	I
	Rig 2			
	BOLIX DECO, 1,5 mm	13 / superficial damages without cracks formation	29 / cracks without reaching the thermal insulation product	II
	BOLIX TM DECO, 2,0 mm	10 / superficial damages without cracks formation	41 / cracks without reaching the thermal insulation product	II
	BOLIX ULTRACLEAN, floated 1,5 mm	15 / superficial damages without cracks formation	27 / cracks without reaching the thermal insulation product	II
	BOLIX BQB, 1,5 mm + BOLIX BQS, 3,0 mm	0 / no damages	10 / superficial damages without cracks formation	I

3.2.6. Impact resistance not tested on the rig (EAD 040083-00-0404: clause 2.2.8)

Table 6.

		Hard body impact		
		Impact energy 3 J	Impact energy 10 J	Impact resistance category
Single layer of standard mesh		**Impact diameter (mm) / damages**		
Rendering system: Base coat: BOLIX U + relevant key coat + finishing coat indicated hereafter + primer (if used) + decorative coat (if used):	BOLIX MP, floated 1,5 mm + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL / BOLIX SIL COMPLEX	18 / cracks reaching the thermal insulation product	31 / cracks reaching the thermal insulation product	III
	BOLIX SIT / BOLIX SIT Complex, floated 1,5 mm	0 / no damages	10 / superficial damages without cracks formation	I
	BOLIX SIT-P, floated 1,5 mm	0 / no damages	20 / superficial damages without cracks formation	I
	BOLIX SI-SIT / BOLIX SI-SIT Complex, floated 1,5 mm	0 / no damages	17 / superficial damages without cracks formation	I

Table 7.

		Hard body impact		
		Impact energy 3 J	Impact energy 10 J	Impact resistance category
Double layer of standard mesh		**Impact diameter (mm) / damages**		
Rendering system: Base coat: BOLIX U + relevant key coat + finishing coat indicated hereafter + primer (if used) + decorative coat (if used):	BOLIX MP, floated 1,5 mm + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL / BOLIX SIL COMPLEX	18 / cracks reaching the thermal insulation product	31 / cracks reaching the thermal insulation product	III
	BOLIX TM, 0,8 mm	0 / no damages	13 / superficial damages without cracks formation	I
	BOLIX DECO, 1,5 mm	5 / superficial damages without cracks formation	16 / superficial damages without cracks formation	I
	BOLIX TM DECO, 2,0 mm	0 / no damages	16 / superficial damages without cracks formation	I
	BOLIX SIT / BOLIX SIT Complex, floated 1,5 mm	0 / no damages	10 / superficial damages without cracks formation	I
	BOLIX SIT-P, floated 1,5 mm	0 / no damages	16 / superficial damages without cracks formation	I
	BOLIX ULTRACLEAN, floated 1,5 mm	0 / no damages	9 / superficial damages without cracks formation	I
	BOLIX SI-SIT / BOLIX SI-SIT Complex, floated 1,5 mm	0 / no damages	13 / superficial damages without cracks formation	I
	BOLIX BQB, 1,5 mm + BOLIX BQS, 3,0 mm	0 / no damages	0 / no damages	I

3.2.7. Water vapour permeability (EAD 040083-00-0404: clause 2.2.9)

3.2.7.1. Water vapour permeability of the rendering system (equivalent air thickness s_d) (EAD 040083-00-0404: clause 2.2.9.1)

Table 8.

		Equivalent air thickness s_d (m)
Rendering system: Base coat: BOLIX U + relevant key coat + finishing coat indicated hereafter + primer (if used) + decorative coat (if used):	BOLIX MP, floated 3,0 mm + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL / BOLIX SIL Complex *thickness of rendering: 8,6 mm*	0,31
	BOLIX TM*, 1,6 mm *thickness of rendering: 8,6 mm*	0,29
	BOLIX DECO*, 3,0 mm *thickness of rendering: 8,2 mm*	0,20
	BOLIX TM DECO*, 3,0 mm *thickness of rendering: 8,2 mm*	0,20
	BOLIX SIT / BOLIX SIT Complex, floated 2,0 mm + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL / BOLIX SIL Complex *thickness of rendering: 7,6 mm*	0,17
	BOLIX SIT / BOLIX SIT Complex, floated 2,0 mm + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL-P *thickness of rendering: 7,6 mm*	0,20
	BOLIX SIT-P, floated 2,0 mm + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL-P *thickness of rendering: 7,6 mm*	0,61
	BOLIX ULTRACLEAN, floated 1,5 mm + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL ULTRACLEAN *thickness of rendering: 7,1 mm*	0,20
	BOLIX SI-SIT / BOLIX SI-SIT Complex, floated 2,0 mm + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL / BOLIX SIL Complex *thickness of rendering: 7,6 mm*	0,55
	BOLIX BQB* 2,5 mm + BOLIX BQS 6,0 mm *thickness of rendering: 13,7 mm*	0,30

*decorative coat not used

3.2.7.2. Water vapour permeability of the thermal insulation product (water-vapour resistance factor) (EAD 040083-00-0404: clause 2.2.9.2)

See Annex No 1

3.3. Safety in use (BWR 4)

3.3.1. Bond strength (EAD 040083-00-0404: clause 2.2.11)

3.3.1.1. Bond strength between the base coat and the thermal insulation product (EAD 040083-00-0404: clause 2.2.11.1)

Table 9.

		Bond strength (kPa)	
		mean	min.
BOLIX U	initial state	162*	136
	po cyklach cieplno-wilgotnościowych (na ściance)	262*	234
	freeze-thaw cycles	test not required	

*cohesive rupture in insulation

3.3.1.2. Bond strength between the adhesive and the substrate (EAD 040083-00-0404: clause 2.2.11.2)

Table 10.

		Bond strength (kPa)	
		mean	min.
BOLIX Z** minimal bonded surface area S: 25%	initial state	880*	840
	48 h immersion in water + 2 hours 23°C/50% RH	748*	700
	48 h immersion in water + 7 days 23°C/50% RH	926*	900
BOLIX ALFA** minimal bonded surface area S: 15%	initial state	954*	930
	48 h immersion in water + 2 hours 23°C/50% RH	834*	800
	48 h immersion in water + 7 days 23°C/50% RH	1160*	1100
BOLIX UWM ** minimal bonded surface area S: 19%	initial state	482*	408
	48 h immersion in water + 2 hours 23°C/50% RH	373*	335
	48 h immersion in water + 7 days 23°C/50% RH	1277*	1080
BOLIX U** minimal bonded surface area S: 27%	initial state	912*	870
	48 h immersion in water + 2 hours 23°C/50% RH	792*	770
	48 h immersion in water + 7 days 23°C/50% RH	1126*	1100
BOLIX UZ** minimal bonded surface area S: 22%	initial state	580*	555
	48 h immersion in water + 2 hours 23°C/50% RH	438*	415
	48 h immersion in water + 7 days 23°C/50% RH	1539*	1322
BOLIX US** minimal bonded surface area S: 20%	initial state	522*	432
	48 h immersion in water + 2 hours 23°C/50% RH	375*	335
	48 h immersion in water + 7 days 23°C/50% RH	1417*	1293

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

3.3.1.3. Bond strength between the adhesive and the thermal insulation product (EAD 040083-00-0404: clause 2.2.11.3)

Table 11.

		Bond strength (kPa)	
		mean	min.
BOLIX Z** minimal bonded surface area S: 25%	initial state	140*	120
	48 h immersion in water + 2 hours 23°C/50% RH	42*	40
	48 h immersion in water + 7 days 23°C/50% RH	176*	172
BOLIX ALFA** minimal bonded surface area S: 15%	initial state	220*	200
	48 h immersion in water + 2 hours 23°C/50% RH	141*	80
	48 h immersion in water + 7 days 23°C/50% RH	212*	180
BOLIX UWM ** minimal bonded surface area S: 19%	initial state	166*	154
	48 h immersion in water + 2 hours 23°C/50% RH	139*	122
	48 h immersion in water + 7 days 23°C/50% RH	179*	164
BOLIX U** minimal bonded surface area S: 27%	initial state	131*	112
	48 h immersion in water + 2 hours 23°C/50% RH	150*	128
	48 h immersion in water + 7 days 23°C/50% RH	254*	228
BOLIX UZ** minimal bonded surface area S: 22%	initial state	152*	137
	48 h immersion in water + 2 hours 23°C/50% RH	139*	122
	48 h immersion in water + 7 days 23°C/50% RH	187*	171
BOLIX US** minimal bonded surface area S: 20%	initial state	163*	148
	48 h immersion in water + 2 hours 23°C/50% RH	151*	144
	48 h immersion in water + 7 days 23°C/50% RH	185*	170

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

3.3.1.4. Bond strength of foam adhesive (EAD 040083-00-0404: clause 2.2.11.4)

Table 12.

		Bond strength (kPa)		
		mean	**min.**	**number of test results in range 60-80**
BOLIX ZP	standard application conditions	124*	109	0
	modification of foam thickness (15 mm)	80*	74	1
	modification of open time (3 minutes)	121*	110	0
	modification of temperature (0 °C)	91*	84	0
	modification of temperature (35 °C)	80*	77	1

*cohesive rupture in foam

3.3.2. Fixing strength (transverse displacement test) (EAD 040083-00-0404: clause 2.2.12)

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 (EAD 040083-00-0404: clause 2.2.13)

3.3.3.1. Pull-through test of fixings (EAD 040083-00-0404: clause 2.2.13.1)

Table 13.

Anchors (fixed through insulation product) for which the following failure loads apply		**Anchors according to Annex No 2***	
		Plate diameter (mm)	≥ 60
Characteristics of the **XPS board for** which the following failure loads apply		Thickness (mm)	≥ 50
		Tensile strength perpendicular to the faces under dry conditions (kPa)	≥ 206
Failure loads (kN)	Anchors not placed at the panel joints (*Pull-through test*) dry conditions	R_{panel}	individual values: 1,160; 1,365; 1,272; 1,073; 1,296
			mean: 1,233
	Anchors not placed at the panel joints (*Pull-through test*) wet conditions	R_{panel}	individual values: 1,217; 1,350; 0,953; 0,938; 0,991
			mean: 1,090
	Anchors placed at the panel joints (*Pull-through test*) dry conditions	R_{joint}	individual values: 1,076; 1,209; 1,148; 1,139; 1,197
			mean: 1,154
	Anchors placed at the panel joints (*Pull-through test*) wet conditions	R_{joint}	individual values: 1,132; 0,847; 1,028; 0,982; 0,978
			mean: 0,993

*plate stiffness of anchors shall be equal or higher than 0,6 kN/mm

Load / Displacement Graphs see Annex No 3.

3.3.3.2. Static foam block test (EAD 040083-00-0404: clause 2.2.13.2)

Not relevant

3.3.3.3. Dynamic wind uplift test (EAD 040083-00-0404: clause 2.2.13.3)

Not relevant

3.3.4. Tensile test perpendicular to the faces of thermal insulation product (EAD 040083-00-0404: clause 2.2.14)

See Annex No 1

3.3.5. Shear strength and shear modulus of elasticity test of ETICS (EAD 040083-00-0404: clause 2.2.15)

See Annex No 1

3.3.6. Render strip tensile test (EAD 040083-00-0404: clause 2.2.17)

No performance assessed

3.3.7. Shear strength and shear modulus of foam adhesive (EAD 040083-00-0404: clause 2.2.18)

Table 14.

	Shear strength (kPa)		Shear modulus (MPa)	
	mean	min.	mean	min.
BOLIX ZP	78,4	75,2	0,525	0,466

3.3.8. Post expansion behaviour of foam adhesive (EAD 040083-00-0404: clause 2.2.19)

Table 15.

	Expansion (mm) after -initial thickness 8 mm-		
	time	mean	max
BOLIX ZP	5 min.	0,80	0,88
	10 min.	0,46	0,67
	20 min.	0,14	0,22
	40 min.	0,12	0,30
	60 min.	0,17	0,37
	24 hours	0,26	0,40

3.3.9. Bond strength after ageing (EAD 040083-00-0404: clause 2.2.20)

3.3.9.1. Bond strength after ageing of finishing coat tested on the rig (EAD 040083-00-0404: clause 2.2.20.1)

Table 16.

		Bond strength after hygrothermal cycles (kN/m²)	
		mean	**individual values**
Rendering system: Base coat: BOLIX U + relevant key coat + finishing coat indicated hereafter:	BOLIX TM	259*	275; 284; 294; 197; 244
	BOLIX DECO	261*	300; 260; 256; 221; 267
	BOLIX TM DECO	214*	235; 159; 184; 236; 255
	BOLIX SIT / BOLIX SIT Complex	269*	235, 264, 282, 286, 276
	BOLIX SIT-P	277*	291; 253; 285; 304; 253
	BOLIX ULTRACLEAN	144*	116; 170; 137; 173; 124;
	BOLIX SI-SIT / BOLIX SI-SIT Complex	275*	257; 306; 259; 242; 313
	BOLIX BQB + BOLIX BQS	242*	285; 300; 204; 256; 164

*cohesive rupture in insulation

3.3.9.2. Bond strength after ageing of finishing coat not tested on the rig (EAD 040083-00-0404: clause 2.2.20.2)

Table 17.

		Bond strength after hygrothermal cycles (kN/m²)	
		mean	**individual values**
Rendering system: Base coat: BOLIX U + relevant key coat + finishing coat indicated hereafter + primer + decorative coat:	BOLIX MP + BOLIX SIG / BOLIX SIG Complex + BOLIX SIL / BOLIX SIL COMPLEX	249*	241, 251, 251, 263, 241

*cohesive rupture in insulation

3.3.10. Mechanical and physical characteristics of the mesh (EAD 040083-00-0404: clause 2.2.21)

3.3.10.1. Tensile strength and elongation of the glass fibre mesh in the as-delivered (EAD 040083-00-0404: clause 2.2.21.1)

Table 18.

	Average tensile strength in the as-delivered state (N/mm)		Average elongation in the as-delivered state (%)	
	warp	weft	warp	weft
BOLIX HD 145/S (R 117 A101)	45,0	47,0	3,70	4,20
BOLIX HD 145/S (SSA-1363-145)	49,0	50,0	3,80	3,70
BOLIX HD 158/S (ST 2924-100/7 KM)	50,1	34,0	3,80	3,30
BOLIX HD 158/S (R 131 A101)	48,0	50,0	3,90	4,00
BOLIX HD 160/S (SSA-1363-160)	43,0	45,0	3,60	3,90
BOLIX HD 174/S (ST 112-100/7 KM)	56,8	44,1	4,50	3,80

3.3.10.2. Tensile strength and elongation of the glass fibre mesh after ageing state (EAD 040083-00-0404: clause 2.2.21.2)

Table 19.

	Average tensile strength after ageing (N/mm)		Residual strength after ageing (%)		Average elongation after ageing (%)	
	warp	weft	warp	weft	warp	weft
BOLIX HD 145/S (R 117 A101)	23,0	28,0	51,1	59,6	2,10	2,40
BOLIX HD 145/S (SSA-1363-145)	25,0	29,0	51,0	58,0	2,10	2,30
BOLIX HD 158/S (ST 2924-100/7 KM)	29,6	21,5	59,1	63,2	2,30	1,80
BOLIX HD 158/S (R 131 A101)	33,0	38,0	68,7	76,0	2,90	3,00
BOLIX HD 160/S (SSA-1363-160)	26,0	29,0	60,5	64,4	2,30	2,30
BOLIX HD 174/S (ST 112-100/7KM)	31,7	25,1	55,8	56,9	2,60	2,00

3.4. Protection against noise (BWR 5)

3.4.1. Airborne sound insulation of ETICS (EAD 040083-00-0404: clause 2.2.22)

3.4.1.1. Airborne sound insulation of ETICS (EAD 040083-00-0404: clause 2.2.22.1)

No performance assessed

3.4.1.2. Dynamic stiffness of the thermal insulation product (EAD 040083-00-0404: clause 2.2.22.2)

No performance assessed

3.4.1.3. Air flow resistance of the thermal insulation product (EAD 040083-00-0404: clause 2.2.22.3)

No performance assessed

3.5. Energy economy and heat retention (BWR 6)

3.5.1. Thermal resistance and thermal transmittance of ETICS (EAD 040083-00-0404: clause 2.2.23)

The additional thermal resistance provided by the ETICS (R_{ETICS}) to the substrate has been assessed by calculations 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 $(m^2 \cdot K)/W$].

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

as described in EN ISO 10456.

Table 20.

Thermal resistance R_{ETICS} with minimum thickness of XPS* $[(m^2 \cdot K)/W]$	Thermal resistance R_{ETICS} with maximum thickness of XPS* $[(m^2 \cdot K)/W]$
1,41	13,91

*at maximum value of thermal conductivity 0,036 W/(m · K)

The thermal transmittance of the substrate wall covered by the ETICS is calculated in accordance with the standard EN ISO 6946:

$$U_c = U + \chi_p \cdot n$$

where:

$\chi_p \cdot n$ has only to be taken into account if it is greater than 0,04 $W/(m^2 \cdot K)$

U_c: corrected thermal transmittance of the entire wall $(W/(m^2 \cdot K))$

n: number of anchors (through insulation product) per 1 m^2

χ_p: point thermal transmittance value of the anchor (W/K). The values listed below can be taken into account if not specified in the anchor's ETA:

- = 0,002 W/K for anchors with a plastic screw/nail, stainless steel screw/nail with the head covered by at least 15 mm plastic material, or with a minimum 15 mm air gap at the head of the screw/nail;
- = 0,004 W/K for anchors with a galvanized carbon steel screw/nail with the head covered by at least 15 mm plastic material, or with a minimum 15 mm air gap at the head of the screw/nail;
- = 0,008 W/K for all other anchors (worst case);

U: thermal transmittance of the current part of the covered wall (excluding thermal bridges) $(W/(m^2 \cdot K))$ determined as follows:

$$U = \frac{1}{R_{insulation} + R_{render} + R_{substrate} + R_{se} + R_{si}}$$

where:

$R_{insulation}$: thermal resistance of the insulation product (according to declaration in reference to EN 13164) in $(m^2 \cdot K)/W$
R_{render}: thermal resistance of the render (about 0,02 in $(m^2 \cdot K)/W$ or determined by test according to EN 12667 or EN 12664)
$R_{substrate}$: thermal resistance of the substrate wall in $(m^2 \cdot K)/W$
R_{se}: external surface thermal resistance in $(m^2 \cdot K)/W$
R_{si}: internal surface thermal resistance in $(m^2 \cdot K)/W$

The value of thermal resistance of each insulation product shall be given in the manufacturer's documentation along with the possible range of thicknesses. In addition, the point thermal conductivity of anchors shall be given when anchors are used in the ETICS.

3.5.2. Thermal resistance of the thermal insulation product (EAD 040083-00-0404: clause 2.2.23.1)

See Annex No 1

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

In accordance with the European Assessment Document EAD No. 040083-00-0404, the applicable European legal act is: Decision 97/556/EC. The system(s) of assessment and verification of constancy of performance (AVCP) is 2+.

In addition, with regard to reactionto fire for products, the applicable European legal act is Decision 97/556/EC, as amended by Decision 2001/596/EC. The system of assessment and verification of constancy of performance (AVCP) is 2+.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

The manufacturer shall perform a permanent internal factory production control based on the Control Plan.

The Control Plan for the manufacturer is specified in clause 3.2 of EAD 040083-00-0404 *External Thermal Insulation Composite Systems (ETICS) with renderings*.

The manufacturer and Łukasiewicz Research Network – Institute of Ceramics and Building Materials TAB have agreed a Control Plan which is deposited at Łukasiewicz Research Network – Institute of Ceramics and Building Materials TAB in documentation which accompanies ETA.

Issued in Krakow on 19.09.2022

By

Paweł PICHNIARCZYK

Director of Łukasiewicz Research Network – Institute of Ceramics and Building Materials

Annexes:

Annex No 1 – Insulation products characteristics

Annex No 2 – Anchors characteristics

Annex No 3 – Load-displacement graphs

Annex No 4 – Glass fibre meshes characteristics

Annex No 1 – Insulation products characteristics

	Board of extruded polystyrene foam XPS	
	Bonded ETICS or bonded ETICS with supplementary mechanical fixings	**Mechanically fixed ETICS with supplementary adhesive**
Reaction to fire / EN 13501-1	Class E max. density: 50,0 kg/m^3	
Thermal resistance	Defined in the CE marking in reference to EN 13164 (m^2·K)/W	
Thermal conductivity (λ_D) / EN 12667 / EN 12939	≤ 0,036 W/(m · K)	
Thickness / EN 823	d_N - T1	
Dimensional stability under specified temperature and humidity conditions / EN 1604	EN 13164 - DS(70, 90)	
Compressive stress or compressive strength / EN 826	≥ 300 kPa EN 13164 - CS(10/Y)300	
Tensile strength perpendicular to the faces / EN 1607	≥ 100 kPa EN 13164 min. TR100	
Deformation under specified compressive load and temperature conditions / EN 1605	DLT(2)5	
Long term water absorption by total immersion / EN 12087	WL(T)0,7	
Long term water absorption by diffusion / EN 12088	WD(V)3	
Freeze-thaw resistance after long term water diffusion test / EN 12091 - EN 13164	FTCDi - 1	

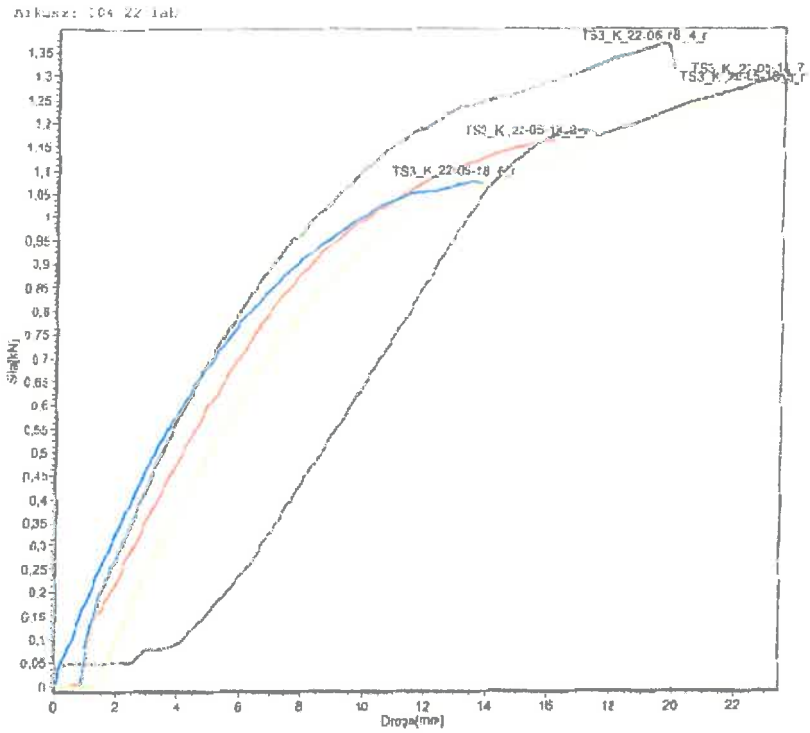
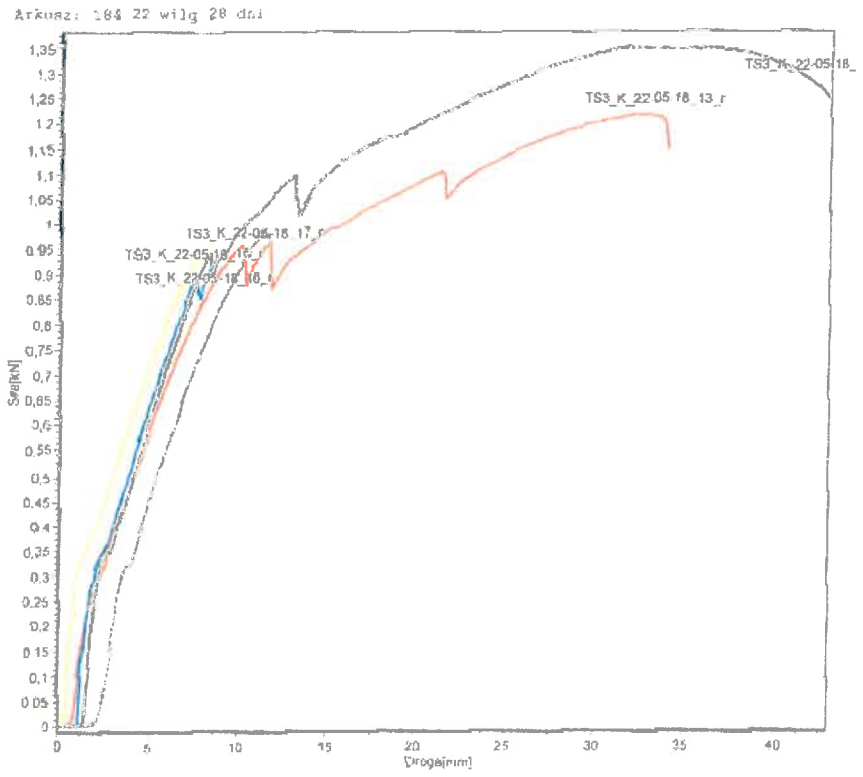
Annex No 2 – Anchors characteristics

Anchor trade name	Plate stiffness (kN/mm) / diameter (mm)	Characteristic resistance in the substrate
EJOT H1 eco EJOT H4 eco	0,6 / 60	ETA-11/0192
Ejotherm STR U 2G	0,6 / 60	ETA-04/0023
Insulation anchor Koelner TFIX-8S, Koelner TFIX-8ST	0,6 / 60	ETA-11/0144
Insulation suport TFIX-8M	1,0 / 60	ETA-07/0336
Rawlplug Facade Insulation Fixing R-TFIX-8M	1,0 / 60	ETA-17/0592
RAWLPLUG Insulation System R-TFIX-8S	0,6 / 60	ETA-17/0161
WKTHERMø8	0,6 / 60	ETA-11/0232
WKTHERM S	0,6 / 60	ETA-13/0724
fischer termoz CN 8 fischer termoz CN 8 R fischer termoz CNplus 8	0,6 / 60	ETA-09/0394
fischer termoz CS 8	0,6 / 60	ETA-14/0372
eco-drive	0,6 / 60	ETA-13/0107

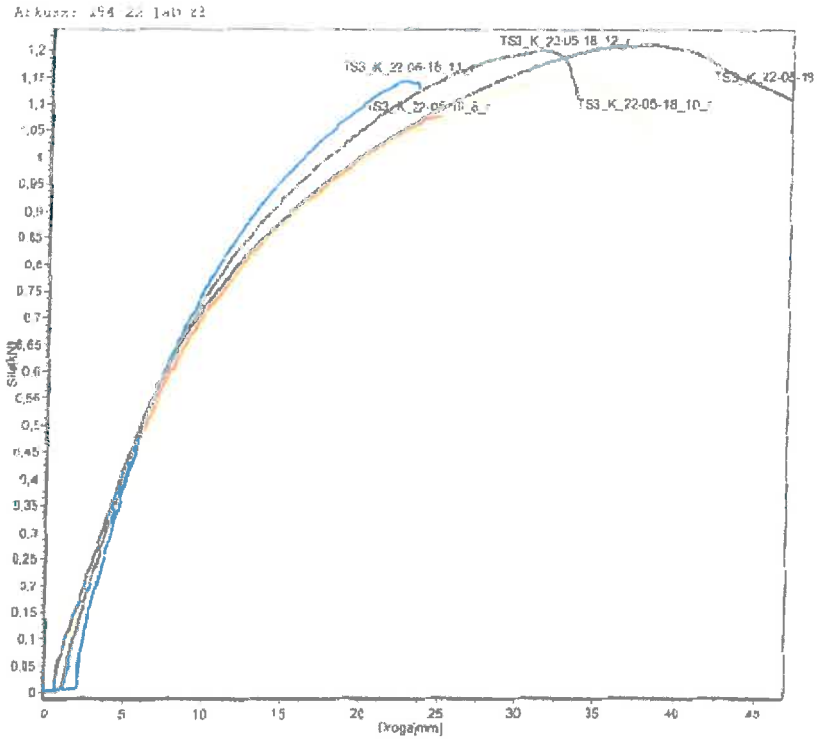
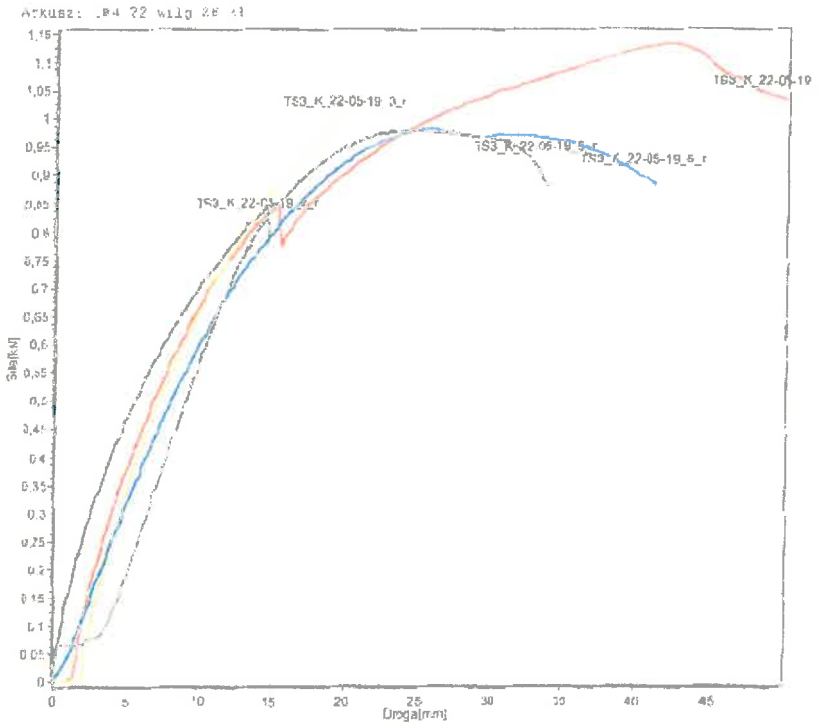
Additionally, other anchors covered by relevant ETA can be used, provided that they meet the following requirements:

	Requirement
	Anchors fixed through insulation product
Plate diameter	≥ 60 mm
Plate stiffness	≥ 0,6 kN/mm

Annex No 3 – Load-displacement graphs

Anchors not placed at the panel joints (Pull-through test) dry conditions
Graph 1

Anchors not placed at the panel joints (Pull-through test) wet conditions
Graph 2


Annex No 3 – Load-displacement graphs cont.

Anchors placed at the panel joints (Pull-through test) dry conditions
Graph 3

Anchors placed at the panel joints (Pull-through test) wet conditions
Graph 4


Annex No 4 – Glass fibre meshes characteristics

Mesh trade name		Description	Alkalis resistance	
			Residual resistance after ageing (N/mm)	Relative residual resistance: % (after ageing) of the strength in the as delivered state
BOLIX HD 145/S	R 117 A101	Mass per unit area: 152 g/m² Mesh size: 4,0 x 4,5 mm	≥ 20	≥ 50
	SSA-1363-145	Mass per unit area: 151 g/m² Mesh size: 4,5 x 3,8 mm		
BOLIX HD 158/S	ST 2924-100/7 KM	Mass per unit area: 145 g/m² Mesh size: 4,0 x 3,7 mm	≥ 20	≥ 50
	R 131 A101	Mass per unit area: 167 g/m² Mesh size: 4,0 x 4,6 mm		
BOLIX HD 160/S	SSA-1363-160	Mass per unit area: 165 g/m² Mesh size: 4,0 x 3,9 mm	≥ 20	≥ 50
BOLIX HD 174/S	ST 112-100/7KM	Mass per unit area: 165 g/m² Mesh size: 3,3 x 3,6 mm	≥ 20	≥ 50