

European Technical Assessment



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European Technical Assessment

ETA-16/0978
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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	KLEIB
Product family to which the construction product belongs	04: External Thermal Insulation Composite Systems (ETICS) with renderings
Manufacturer	KLEIB Sp. z o.o. Pikutkowo 43, 87-880 Brześć Kujawski, POLAND
Manufacturing plants	Pikutkowo 43, 87-880 Brześć Kujawski, POLAND
This European Technical Assessment contains	34 pages including 3 Annexes which form an integral part of this assessment. Annex No 4 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-16/0978, version 4, issued on 22/08/2022

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Specific part

1. Technical description of the product

This product KLEIB 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 expanded polystyrene (EPS) to be bonded. 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 panels, without any air gap or disconnecting layer.

The ETICS may include special fittings (e.g. base profiles, corner profiles) to treat details of ETICS (connections, apertures, corners, parapets, sills). 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/m ²)	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	<ul style="list-style-type: none"> • Insulation product: Boards of expanded polystyrene (EPS) according to EN 13163 <i>Product characteristics - see Annex No 1</i> 	-	50 to 300
	<ul style="list-style-type: none"> • Adhesives: <ul style="list-style-type: none"> - KLEIB C1 Cement based powder requiring addition of 0,18-0,20 l/kg of water - KLEIB C2 Cement based powder requiring addition of 0,18-0,20 l/kg of water - KLEIB C2 EXTRA Cement based powder requiring addition of 0,18-0,20 l/kg of water - KLEIB C2B Cement based powder requiring addition of 0,18-0,20 l/kg of water - KLEIB C2W Cement based powder requiring addition of 0,21-0,23 l/kg of water 	4,0 to 5,0 (powder)	-
		3,0 to 4,0 (powder)	-
		3,0 to 4,0 (powder)	-
	<ul style="list-style-type: none"> • Supplementary mechanical fixings: Plastic anchors covered by relevant ETA 	-	-
Base coats	<ul style="list-style-type: none"> • KLEIB C2 Cement based powder requiring addition of 0,18-0,20 l/kg of water 	3,0 to 4,0 (powder)	3,0 to 5,0
	<ul style="list-style-type: none"> • KLEIB C2 EXTRA Cement based powder requiring addition of 0,18-0,20 l/kg of water 	3,0 to 4,0 (powder)	3,0 to 5,0
	<ul style="list-style-type: none"> • KLEIB C2B Cement based powder requiring addition of 0,18-0,20 l/kg of water 	3,0 to 4,0 (powder)	3,0 to 5,0
	<ul style="list-style-type: none"> • KLEIB C2W Cement based powder requiring addition of 0,21-0,23 l/kg of water 	3,0 to 4,0 (powder)	3,0 to 5,0

Table 1. cont.

	Components	Coverage (kg/m ²)	Thickness (mm)
Finishing coats	<ul style="list-style-type: none"> • Silicone finishing coat KLEIB C25 Ready to use paste – silicone binder modelled structure 1,0 ÷ 2,0 mm 	1,8 to 3,6	1,0 ÷ 2,0
	<ul style="list-style-type: none"> • Siloxane finishing coat KLIB C8 Ready to use paste – siloxane-acrylic binder floated structure max. particles size: 1,0 mm 1,5 mm 2,0 mm 	1,7 to 2,1 2,1 to 2,5 2,8 to 3,2	Regulated by particles size
	<ul style="list-style-type: none"> • Mosaic finishing coats Ready to use pastes – acrylic binder KLEIB M9 mosaic structure: 1,0 to 1,6 mm KLEIB M10 mosaic structure: 0,8 to 1,2 mm 1,0 to 1,6 mm 	3,1 to 3,5 3,1 to 3,5 3,3 to 3,6	Regulated by particles size
Decorative coats (paints)	<ul style="list-style-type: none"> • Acrylic paint KLEIB Q1 Ready to use pigmented liquid to be used optionally with acrylic finishing coats 	0,25 to 0,35	-
	<ul style="list-style-type: none"> • Silicone paint KLEIB Q3 Ready to use pigmented liquid to be used optionally with mineral or silicone finishing coats 	0,25 to 0,35	-
	<ul style="list-style-type: none"> • Siloxane paint KLEIB Q4 Ready to use pigmented liquid to be used optionally with mineral or siloxane finishing coats 	0,25 to 0,35	-
Ancillary materials	Remain under the manufacturer's responsibility		

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.

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 KLEIB 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 ÷ 3. 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. organic content / Max. heat of combustion	Flame retardant content	Class acc. to EN 13501-1
Adhesive	1,9 % / -	No flame retardant	B-s1, d0
EPS boards <i>density ≤ 25,0 kg/m³</i>	- / -		
Base coat	1,9 % / -		
Glass fibre mesh	- / 8,19 MJ/kg		
Key coat	10,9 % / -		
Finishing coat <i>excluding:</i> <i>- KLEIB M9,</i> <i>- KLEIB M10</i>	8,3 % / -		
Decorative coat	16,2 % / -	No flame retardant	C-s1, d0
Remaining configurations	-		

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)

Not relevant

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 KLEIB C2:
 - Water absorption after 1 hour = 0,1 kg/m²;
 - Water absorption after 24 hours = 0,3 kg/m².
- Base coat KLEIB C2 EXTRA:
 - Water absorption after 1 hour = 0,1 kg/m²;
 - Water absorption after 24 hours = 0,4 kg/m².
- Base coat KLEIB C2B:
 - Water absorption after 1 hour = 0,1 kg/m²;
 - Water absorption after 24 hours = 0,3 kg/m².
- Base coat KLEIB C2W:
 - Water absorption after 1 hour = 0,0 kg/m²;
 - Water absorption after 24 hours = 0,3 kg/m².
- Rendering systems: Table 3.

Table 3.

		Water absorption after 1 hour	Water absorption after 24 hours
		mean value (kg/m ²)	
Rendering system: Base coat <u>KLEIB C2</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4	0,2	0,7
	KLEIB C5	0,1	0,4
	KLEIB C6	0,1	0,4
	KLEIB C7	0,1	0,3
	KLEIB C8	0,1	0,4
	KLEIB C25	0,1	0,3
	KLEIB M9	0,1	0,4
	KLEIB M10	0,1	0,3
Rendering system: Base coat <u>KLEIB C2 EXTRA</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4	0,3	0,7
	KLEIB C5	0,1	0,4
	KLEIB C6	0,1	0,4
	KLEIB C7	0,1	0,4
	KLEIB C8	0,2	0,4
	KLEIB C25	0,1	0,3
	KLEIB M9	0,1	0,2
	KLEIB M10	0,1	0,3

Table 3. cont.

		Water absorption after 1 hour	Water absorption after 24 hours
		mean value (kg/m ²)	
Rendering system: Base coat <u>KLEIB C2B</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4	0,2	0,6
	KLEIB C5	0,1	0,3
	KLEIB C6	0,2	0,4
	KLEIB C7	0,1	0,4
	KLEIB C8	0,1	0,4
	KLEIB C25	0,1	0,2
	KLEIB M9	0,1	0,2
	KLEIB M10	0,1	0,3
Rendering system: Base coat <u>KLEIB C2W</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4	0,1	0,4
	KLEIB C5	0,1	0,4
	KLEIB C6	0,1	0,4
	KLEIB C7	0,1	0,4
	KLEIB C8	0,1	0,4
	KLEIB C25	0,1	0,2
	KLEIB M9	0,0	0,3
	KLEIB M10	0,0	0,2

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 occurred 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 rendering systems after 24 hours was lower than 0,5 kg/m² (Tab. 3) therefore KLEIB can be considered as freeze/thaw resistant without any further testing (EAD 040083-00-0404, clause 2.2.7).

However, exceptions occurred to the above in case of:

- finishing coat KLEIB C4 applied with: base coat KLEIB C2, for which water absorption after 24 hours was 0,71 kg/m²; base coat KLEIB C2 EXTRA, for which water absorption after 24 hours was 0,70 kg/m² and with base coat KLEIB C2B, for which water absorption after 24 hours was 0,57 kg/m².

These rendering systems were examined in accordance with clause 2.2.7 of EAD 040083-00-0404.

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

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

Based on the bond strength tests of the rendering system, the cohesive rupture in insulation was determined and the results are given in Table 4.

Table 4.

		Bond strength after freeze cycles (kPa)	
		average	min.
Rendering system: Base coat <u>KLEIB C2</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4, floated 2,0 mm	104	99
Rendering system: Base coat <u>KLEIB C2 EXTRA</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4, floated 2,0 mm	102	95
Rendering system: Base coat <u>KLEIB C2B</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4, floated 2,0 mm	106	100

Performed examinations indicated frost resistance of the systems above.

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 122 (plant Slovakia)		Impact diameter (mm) / damages		
Rendering system: Base coat <u>KLEIB C2</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4, floated 1,5 mm	20 / cracks reaching the thermal insulation product	35 / cracks reaching the thermal insulation product	III
	KLEIB C5, floated 1,0 mm	20 / cracks reaching the thermal insulation product	35 / cracks reaching the thermal insulation product	III
Rendering system: Base coat <u>KLEIB C2 EXTRA</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C5, floated 1,0 mm	30 / cracks reaching the thermal insulation product	40 / cracks reaching the thermal insulation product	III
	KLEIB C7, floated 1,0 mm	25 / cracks reaching the thermal insulation product	35 / cracks reaching the thermal insulation product	III
	KLEIB C8, floated 1,0 mm	25 / cracks reaching the thermal insulation product	35 / cracks reaching the thermal insulation product	III
Rendering system: Base coat <u>KLEIB C2B</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C7, floated 1,0 mm	25 / cracks reaching the thermal insulation product	35 / cracks reaching the thermal insulation product	III
	KLEIB C8, floated 1,0 mm	30 / cracks reaching the thermal insulation product	40 / cracks reaching the thermal insulation product	III
	KLEIB M9, mosaic 1,0 + 1,6 mm	25 / cracks reaching the thermal insulation product	40 / cracks reaching the thermal insulation product	III
	KLEIB M10, mosaic 0,8 + 1,2 mm	25 / cracks reaching the thermal insulation product	40 / cracks reaching the thermal insulation product	III

Table 6.

		Hard body impact		
		Impact energy 3 J	Impact energy 10 J	Impact resistance category
Single layer of standard mesh 122 (plant Slovakia)		Impact diameter (mm) / damages		
Rendering system: Base coat <u>KLEIB C2W</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C7, floated 1,0 mm	26 / superficial damages without cracks formation	33 / superficial damages without cracks formation	I
	KLEIB C8, floated 1,0 mm	31 / superficial damages without cracks formation	43 / cracks without reaching the thermal insulation product	II
	KLEIB M9, mosaic 1,0 ÷ 1,6 mm	25 / superficial damages without cracks formation	31 / superficial damages without cracks formation	I
	KLEIB M10, mosaic 0,8 ÷ 1,2 mm	20 / cracks reaching the thermal insulation product	34 / cracks reaching the thermal insulation product	III

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

Table 7.

		Hard body impact		
		Impact energy 3 J	Impact energy 10 J	Impact resistance category
Single layer of standard mesh 122 (plant Slovakia)		Impact diameter (mm) / damages		
Rendering system: Base coat <u>KLEIB C2</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C6*, floated 1,5 mm	14 / superficial damages without cracks formation	26 / cracks without reaching the thermal insulation products	II
	KLEIB C7, floated 1,0 mm	0 / no damages	32 / cracks without reaching the thermal insulation product	II
	KLEIB C8, floated 1,0 mm	11 / superficial damages without cracks formation	32 / cracks without reaching the thermal insulation product	II
	KLEIB C25*, 1,0 ÷ 2,0 mm	21 / cracks without reaching the thermal insulation product	22 / cracks reaching the thermal insulation product	III
	KLEIB M9, mosaic 1,0 ÷ 1,6 mm	15 / superficial damages without cracks formation	24 / superficial damages without cracks formation	I
	KLEIB M10, mosaic 0,8 ÷ 1,2 mm	15 / superficial damages without cracks formation	27 / superficial damages without cracks formation	I
Rendering system: Base coat <u>KLEIB C2 EXTRA</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4, floated 1,5 mm	10 / superficial damages without cracks formation	48 / cracks without reaching the thermal insulation product	II
	KLEIB C6*, floated 1,5 mm	6 / superficial damages without cracks formation	15 / superficial damages without cracks formation	I
	KLEIB C25*, 1,0 ÷ 2,0 mm	10 / superficial damages without cracks formation	17 / superficial damages without cracks formation	I
	KLEIB M9, mosaic 1,0 ÷ 1,6 mm	0 / no damages	26 / superficial damages without cracks formation	I
	KLEIB M10, mosaic 0,8 ÷ 1,2 mm	0 / no damages	33 / superficial damages without cracks formation	I

*Single layer of standard mesh 122 (plant Macedonia)

Table 8.

		Hard body impact		
		Impact energy 3 J	Impact energy 10 J	Impact resistance category
Single layer of standard mesh 122 (plant Slovakia)		Impact diameter (mm) / damages		
Rendering system: Base coat <u>KLEIB C2B</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4, floated 1,5 mm	10 / superficial damages without cracks formation	40 / cracks without reaching the thermal insulation product	
	KLEIB C5, floated 1,0 mm	12 / superficial damages without cracks formation	35 / cracks without reaching the thermal insulation product	II
	KLEIB C6*, floated 1,5 mm	18 / cracks without reaching the thermal insulation product	21 / cracks without reaching the thermal insulation product	III
	KLEIB C25*, 1,0 ÷ 2,0 mm	21 / cracks without reaching the thermal insulation product	28 / cracks without reaching the thermal insulation product	III
Rendering system: Base coat <u>KLEIB C2W</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4, floated 1,5 mm	14 / superficial damages without cracks formation	27 / cracks without reaching the thermal insulation product	II
	KLEIB C5, floated 1,0 mm	11 / superficial damages without cracks formation	29 / cracks without reaching the thermal insulation product	II
	KLEIB C6*, floated 1,5 mm	8 / superficial damages without cracks formation	16 / superficial damages without cracks formation	I
	KLEIB C25*, 1,0 ÷ 2,0 mm	14 / superficial damages without cracks formation	19 / superficial damages without cracks formation	I

*Single layer of standard mesh 122 (plant Macedonia)

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 9.

		Equivalent air thickness s_d (m)
Rendering system: Base coat <u>KLEIB C2</u> + relevant key coat + finishing coat indicated hereafter + decorative coat:	KLEIB C4, floated 2,0 mm + KLEIB Q3 + KLEIB Q4 <i>thickness of rendering: 7,2 mm</i>	0,1 0,1
	KLEIB C5, floated 2,0 mm + KLEIB Q1 <i>thickness of rendering: 7,2 mm</i>	0,2
	KLEIB C6, floated 2,0 mm + KLEIB Q3 <i>thickness of rendering: 7,0 mm</i>	0,2
	KLEIB C7, floated 2,0 mm + KLEIB Q3 <i>thickness of rendering: 7,2 mm</i>	0,2
	KLEIB C8, floated 2,0 mm + KLEIB Q4 <i>thickness of rendering: 7,2 mm</i>	0,2
	KLEIB C25, 1,0 ÷ 2,0 mm + KLEIB Q3 <i>thickness of rendering: 7,0 mm</i>	0,2
	KLEIB M9*, mosaic 1,0 ÷ 1,6 mm <i>thickness of rendering: 6,6 mm</i>	0,3
	KLEIB M10*, mosaic 1,0 ÷ 1,6 mm <i>thickness of rendering: 6,6 mm</i>	0,2

*decorative coat not used

Table 9. cont.

		Equivalent air thickness s_d (m)
Rendering system: Base coat <u>KLEIB C2 EXTRA</u> + relevant key coat + finishing coat indicated hereafter + decorative coat:	KLEIB C4, floated 2,0 mm + KLEIB Q3 + KLEIB Q4	0,1 0,1
	<i>thickness of rendering: 7,2 mm</i>	
	KLEIB C5, floated 2,0 mm + KLEIB Q1	0,2
	<i>thickness of rendering: 7,2 mm</i>	
	KLEIB C6, floated 2,0 mm + KLEIB Q3	0,2
	<i>thickness of rendering: 7,0 mm</i>	
	KLEIB C7, floated 2,0 mm + KLEIB Q3	0,2
	<i>thickness of rendering: 7,2 mm</i>	
	KLEIB C8, floated 2,0 mm + KLEIB Q4	0,2
	<i>thickness of rendering: 7,2 mm</i>	
	KLEIB C25, 1,0 ÷ 2,0 mm + KLEIB Q3	0,2
	<i>thickness of rendering: 7,0 mm</i>	
Rendering system: Base coat <u>KLEIB C2B</u> + relevant key coat + finishing coat indicated hereafter + decorative coat:	KLEIB M9*, mosaic 1,0 ÷ 1,6 mm	0,3
	<i>thickness of rendering: 6,6 mm</i>	
	KLEIB M10*, mosaic 1,0 ÷ 1,6 mm	0,2
	<i>thickness of rendering: 6,6 mm</i>	
	KLEIB C4, floated 2,0 mm + KLEIB Q3 + KLEIB Q4	0,1 0,1
	<i>thickness of rendering: 7,2 mm</i>	
	KLEIB C5, floated 2,0 mm + KLEIB Q1	0,2
	<i>thickness of rendering: 7,2 mm</i>	
	KLEIB C6, floated 2,0 mm + KLEIB Q3	0,2
	<i>thickness of rendering: 7,0 mm</i>	
	KLEIB C7, floated 2,0 mm + KLEIB Q3	0,2
	<i>thickness of rendering: 7,2 mm</i>	
KLEIB C8, floated 2,0 mm + KLEIB Q4	0,2	
<i>thickness of rendering: 7,2 mm</i>		
KLEIB C25, 1,0 ÷ 2,0 mm + KLEIB Q3	0,2	
<i>thickness of rendering: 7,0 mm</i>		
KLEIB M9*, mosaic 1,0 ÷ 1,6 mm	0,3	
<i>thickness of rendering: 6,6 mm</i>		
KLEIB M10*, mosaic 1,0 ÷ 1,6 mm	0,2	
<i>thickness of rendering: 6,6 mm</i>		

*decorative coat not used

Table 9. cont.

		Equivalent air thickness s_d (m)
Rendering system: Base coat <u>KLEIB C2W</u> + relevant key coat + finishing coat indicated hereafter + decorative coat:	KLEIB C4, floated 2,0 mm + KLEIB Q3 + KLEIB Q4 <i>thickness of rendering: 7,2 mm</i>	0,2 0,2
	KLEIB C5, floated 2,0 mm + KLEIB Q1 <i>thickness of rendering: 7,2 mm</i>	0,2
	KLEIB C6, floated 2,0 mm + KLEIB Q3 <i>thickness of rendering: 7,0 mm</i>	0,2
	KLEIB C7, floated 2,0 mm + KLEIB Q3 <i>thickness of rendering: 7,2 mm</i>	0,2
	KLEIB C8, floated 2,0 mm + KLEIB Q4 <i>thickness of rendering: 7,2 mm</i>	0,2
	KLEIB C25, 1,0 ÷ 2,0 mm + KLEIB Q3 <i>thickness of rendering: 7,0 mm</i>	0,2
	KLEIB M9*, mosaic 1,0 ÷ 1,6 mm <i>thickness of rendering: 6,6 mm</i>	0,2
	KLEIB M10*, mosaic 1,0 ÷ 1,6 mm <i>thickness of rendering: 6,6 mm</i>	0,2

*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 10.

		Bond strength (kPa)	
		mean	min.
KLEIB C2	initial state	108*	107
	hygrothermal cycles (from the rig)	101*	86
	freeze-thaw cycles	test not required	
KLEIB C2 EXTRA	initial state	112*	106
	hygrothermal cycles (from the rig)	114*	84
	freeze-thaw cycles	test not required	
KLEIB C2B	initial state	108*	103
	hygrothermal cycles (from the rig)	87*	79
	freeze-thaw cycles	test not required	
KLEIB C2W	initial state	110*	102
	hygrothermal cycles (from the rig)	113*	96
	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 11.

		Bond strength (kPa)	
		mean	min.
KLEIB C1** Minimal bonded surface area S: 34,9 %	initial state	484*	319
	48 h immersion in water + 2 hours 23°C/50% RH	216*	200
	48 h immersion in water + 7 days 23°C/50% RH	1176*	917
KLEIB C2** Minimal bonded surface area S: 37,5 %	initial state	804*	500
	48 h immersion in water + 2 hours 23°C/50% RH	273*	238
	48 h immersion in water + 7 days 23°C/50% RH	1148*	917
KLEIB C2 EXTRA** Minimal bonded surface area S: 32,3 %	initial state	552*	504
	48 h immersion in water + 2 hours 23°C/50% RH	308*	241
	48 h immersion in water + 7 days 23°C/50% RH	1406*	1192
KLEIB C2B** Minimal bonded surface area S: 32,6 %	initial state	603*	506
	48 h immersion in water + 2 hours 23°C/50% RH	739*	630
	48 h immersion in water + 7 days 23°C/50% RH	1477*	1192
KLEIB C2W** Minimal bonded surface area S: 34,5 %	initial state	512*	417
	48 h immersion in water + 2 hours 23°C/50% RH	398*	358
	48 h immersion in water + 7 days 23°C/50% RH	875*	800

*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 12.

		Bond strength (kPa)	
		mean	min.
KLEIB C1*** Minimal bonded surface area S: 34,9 %	initial state	100*	86
	48 h immersion in water + 2 hours 23°C/50% RH	70**	49
	48 h immersion in water + 7 days 23°C/50% RH	105*	92
KLEIB C2*** Minimal bonded surface area S: 37,5 %	initial state	93*	80
	48 h immersion in water + 2 hours 23°C/50% RH	62**	42
	48 h immersion in water + 7 days 23°C/50% RH	105*	83
KLEIB C2 EXTRA*** Minimal bonded surface area S: 32,3 %	initial state	105*	93
	48 h immersion in water + 2 hours 23°C/50% RH	60**	46
	48 h immersion in water + 7 days 23°C/50% RH	100*	86
KLEIB C2B*** Minimal bonded surface area S: 32,6 %	initial state	103*	92
	48 h immersion in water + 2 hours 23°C/50% RH	61**	50
	48 h immersion in water + 7 days 23°C/50% RH	104*	96
KLEIB C2W*** Minimal bonded surface area S: 34,5 %	initial state	108*/**	87
	48 h immersion in water + 2 hours 23°C/50% RH	85**	75
	48 h immersion in water + 7 days 23°C/50% RH	116**	96

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

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)

The KLEIB is not foreseen to be mechanically fixed in any way (neither using anchors, nor using profiles). Supplementary mechanical fixings are foreseen to be used only where necessary to provide stability until adhesive has dried and as an ancillary component without any contribution to wind-load resistance.

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

Not relevant

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

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

Table 13.

		Bond strength after hygrothermal cycles (kPa)	
		mean	individual values
Rendering system: Base coat <u>KLEIB C2</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4	112*	116; 113; 110; 110; 113
	KLEIB C5	103*	94; 89; 89; 114; 127
Rendering system: Base coat <u>KLEIB C2 EXTRA</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C5	101*	111; 126; 75; 95; 99
	KLEIB C7	93*	101; 84; 81; 95; 105
	KLEIB C8	101*	129; 123; 86; 84; 81
Rendering system: Base coat <u>KLEIB C2B</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C7	83*	79; 79; 92; 82; 82
	KLEIB C8	93*	91; 88; 86; 101; 98
	KLEIB M9	92*	83; 103; 94; 102; 79
	KLEIB M10	92*	90; 82; 92; 98; 100
Rendering system: Base coat <u>KLEIB C2W</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C7	128*	146; 140; 125; 120; 107
	KLEIB C8	127*	132; 90; 111; 145; 156
	KLEIB M9	118*	90; 142; 144; 126; 87
	KLEIB M10	130*	86; 153; 150; 125; 134

*cohesive rupture in insulation

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

Table 14.

		Bond strength after hygrothermal cycles (kPa)	
		mean	individual values
Rendering system: Base coat <u>KLEIB C2</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C6	86**	83; 84; 81; 87; 88
	KLEIB C7	110*	110; 104; 112; 112; 114
	KLEIB C8	100*	80; 118; 113; 82; 109
	KLEIB C25	86**	87; 89; 80; 90; 83
	KLEIB M9	114*	113; 113; 116; 117; 110
	KLEIB M10	98*	112; 112; 81; 104; 80
Rendering system: Base coat <u>KLEIB C2 EXTRA</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4	101*	114; 94; 100; 98; 99
	KLEIB C6	84**	84; 88; 85; 82; 80
	KLEIB C25	82**	80; 82; 80; 80; 87
	KLEIB M9	104*	101; 102; 117; 102; 97
	KLEIB M10	111*	80; 108; 120; 132; 116

*cohesive rupture in insulation; **adhesive rupture

Table 14. cont.

		Bond strength after hygrothermal cycles (kPa)	
		mean	individual values
Rendering system: Base coat <u>KLEIB C2B</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4	105*	100; 109; 101; 110; 104
	KLEIB C5	120*	117; 118; 122; 117; 126
	KLEIB C6	90*/**	82; 80; 89; 104; 94
	KLEIB C25	90*/**	101; 86; 98; 80; 85
Rendering system: Base coat <u>KLEIB C2W</u> + relevant key coat + finishing coat indicated hereafter:	KLEIB C4	80*	80; 82; 78; 80; 80
	KLEIB C5	124*	113; 139; 132; 109; 128
	KLEIB C6	82**	82; 82; 80; 84; 81
	KLEIB C25	84**	96; 81; 82; 82; 80

*cohesive rupture in insulation; **adhesive rupture

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

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

Table 15.

	Average tensile strength in the as-delivered state (N/mm)		Average elongation in the as-delivered state (%)	
	warp	weft	warp	weft
122 (plan Macedonia)	47,0	49,0	3,90	3,40
122 (plant Slovakia)	44,0	46,0	3,90	3,50
SSA-1363-160	43,0	45,0	3,60	3,90

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

Table 16.

	Average tensile strength after ageing (N/mm)		Residual strength after ageing (%)		Average elongation after ageing (%)	
	warp	weft	warp	weft	warp	weft
122 (plan Macedonia)	27,0	36,0	57,4	73,5	2,30	2,50
122 (plant Slovakia)	23,0	29,0	52,3	63,0	2,10	2,10
SSA-1363-160	26,0	29,0	60,5	64,4	2,30	2,30

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 17.

Thermal resistance R_{ETICS} with minimum thickness of EPS* [[$m^2 \cdot K$]/W]	Thermal resistance R_{ETICS} with maximum thickness of EPS* [[$m^2 \cdot K$]/W]
1,131	6,687

*at maximum value of thermal conductivity 0,045 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/(m²·K)
- U_c: corrected thermal transmittance of the entire wall (W/ (m²·K))
- n: number of anchors (through insulation product) per 1 m²
- 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/ (m²·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 13163) in (m²·K)/W
- R_{render}: thermal resistance of the render (about 0,02 in (m²·K)/W or determined by test according to EN 12667 or EN 12664)
- R_{substrate}: thermal resistance of the substrate wall in (m²·K)/W
- R_{se}: external surface thermal resistance in (m²·K)/W
- R_{si}: internal surface thermal resistance in (m²·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 reaction to 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

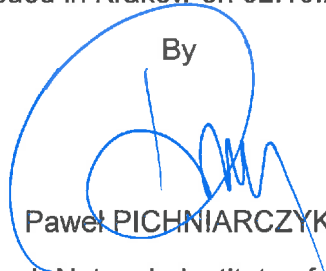
The manufacturer shall perform a permanent internal factory production control based on the Control Plan.

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 02.10.2023

By



Paweł PICHNIARCZYK

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

Annexes:

Annex No 1 – Insulation products characteristics

Annex No 2 – Glass fibre meshes characteristics

Annex No 3 – Alternative trade names of KLEIB system components

Annex No 1 – Insulation products characteristics

		Boards of expanded polystyrene EPS
Reaction to fire / EN 13501-1		Euroclass – E max. density: 25,0 kg/m ³
Thermal resistance		Defined in the CE marking in reference to EN 13163 (m ² ·K)/W
Thermal conductivity (λ_D) / EN 12667 / EN 12939		$\leq 0,045$ W/(m·K)
Thickness / EN 823		± 2 mm [EN 13163 – T(2)]
Length / EN 822		± 2 mm [EN 13163 – L(2)]
Width / EN 822		± 2 mm [EN 13163 – W(2)]
Squareness / EN 824		± 5 mm/m [EN 13163 – S(5)]
Flatness / EN 825		5 mm [EN 13163 – P(5)]
Dimensional stability under specified conditions	EN 1603	$\pm 0,2$ % [EN 13163 – DS(N)2]
	EN 1604	2 % [EN 13163 – DS(70,-)2]
Bending strength / EN 12089		≥ 75 kPa [EN 13163 – BS75]
Water vapour permeability, diffusion factor (μ) / EN 12086 - EN 13163		20 to 40
Water absorption / EN 1609/Method A		$\leq 1,0$ kg/m ²
Tensile strength perpendicular to the EN 1607		≥ 80 kPa [EN 13163 – TR80]
Shear strength / EN 12090 – EN 13163		≥ 20 kPa
Shear modulus / EN 12090 – EN 13163		≥ 1000 kPa

Annex No 2 – 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
122 (plan Macedonia)	Mass per unit area: 160 g/m ² Mesh size: 3,5 x 3,9 mm	≥ 20	≥ 50
122 (plant Slovakia)	Mass per unit area: 165 g/m ² Mesh size: 3,5 x 3,9 mm	≥ 20	≥ 50
SSA-1363-160	Mass per unit area: 165 g/m ² Mesh size: 4,0 x 3,9 mm	≥ 20	≥ 50

Annex No 3 – Alternative trade names of KLEIB system components

Component	Trade name	Alternative trade name
Adhesives	KLEIB C1	<ul style="list-style-type: none"> - FASAKOL F1 - KLM-10 - MAJSTER C1 - CZAMANINEK Cz1
	KLEIB C2	<ul style="list-style-type: none"> - FASAKOL F2 - REMBET R2 - PROFIT - KLM-20 - MAJSTER C2 - CZAMANINEK Cz2
	KLEIB C2 EXTRA	<ul style="list-style-type: none"> - FASAKOL F2 EXTRA - KLM-23 - MAJSTER C2 EXTRA
	KLEIB C2B	<ul style="list-style-type: none"> - FASAKOL F2B - PROFIT B - KLM-20W - MAJSTER C2B - CZAMANINEK Cz2B
	KLEIB C2W	<ul style="list-style-type: none"> - FASAKOL F2W - KLM-22
Base coats	KLEIB C2	<ul style="list-style-type: none"> - FASAKOL F2 - REMBET R2 - PROFIT - KLM-20 - MAJSTER C2 - CZAMANINEK Cz2
	KLEIB C2 EXTRA	<ul style="list-style-type: none"> - FASAKOL F2 EXTRA - KLM-23 - MAJSTER C2 EXTRA
	KLEIB C2B	<ul style="list-style-type: none"> - FASAKOL F2B - PROFIT B - KLM-20W - MAJSTER C2B - CZAMANINEK Cz2B
	KLEIB C2W	<ul style="list-style-type: none"> - FASAKOL F2W - KLM-22
Key coats	KLEIB C3	<ul style="list-style-type: none"> - FASAKOL F3 - GP-30 - MAJSTER C3 - CZAMANINEK Cz3
	KLEIB C3SIL	<ul style="list-style-type: none"> - FASAKOL F3SIL - GP-30SIL - MAJSTER C3SIL - CZAMANINEK Cz3SIL

Annex No 3 – Alternative trade names of KLEIB system components cont.

Component	Trade name	Alternative trade name
Finishing coats	KLEIB C4	- FASAKOL F4 - MP-40W - MAJSTER C4
	KLEIB C5	- FASAKOL F5 - AP-50 - MAJSTER C5
	KLEIB C6	- FASAKOL F6 - SP-60 - MAJSTER C6 - CZAMANINEK Cz6
	KLEIB C7	- FASAKOL F7 - SP-70 - MAJSTER C7 - CZAMANINEK Cz7
	KLEIB C8	- FASAKOL F8 - SP-80 - MAJSTER C8 - CZAMANINEK Cz8
	KLEIB C25	- FASAKOL F25 - SP-90 - MAJSTER C25
	KLEIB M9	- FASAKOL M9 - DPM-900 - MAJSTER M9
	KLEIB M10	- FASAKOL M10 - DPM-1000 - MAJSTER M10
Decorative coats	KLEIB Q1	- FASAKOL Q1 - AF-10 - MAJSTER Q1
	KLEIB Q3	- FASAKOL Q3 - SF-30 - MAJSTER Q3
	KLEIB Q4	- FASAKOL Q4 - SF-40 - MAJSTER Q4

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