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Imenovan in prijavljen skladno z 10. členom direktive Sveta z dne 21. decembra 1988 o približevanju zakonov, podzakonskih predpisov in drugih upravnih aktov držav članic, ki se nanašajo na gradbene proizvode (89/106/EGS)

ZAG LJUBLJANA

član EOTA
Member of EOTA

European Technical Approval ETA-07/0028

[English translation prepared by ZAG Ljubljana – Original version in Slovenian language]

Trade name: Komercialno ime:	**JUBIZOL XPS, Thermo coat,** **Thermo coat APOLON, Thermo coat DIANA**
Holder of approval: Imetnik soglasja:	**JUB d.o.o.** **Dol pri Ljubljani 28** **SI-1262 Dol pri Ljubljani** **Slovenija**
Generic type and use of construction product: Tip gradbenega proizvoda in njegova predvidena uporaba::	**External Thermal Insulation Composite Systems with rendering for the use as external insulation to the walls of buildings** Zunanji toplotnoizolacijski sestavljeni sistemi z ometom, namenjeni za izolacijo zunanjih zidov zgradb
Validity from / to: Veljavnost od / do:	**3. 2. 2012** **2. 2. 2016**
Manufacturing plant: Proizvodni obrat:	**Plant 1** **Plant 2** **Plant 3**
Issue Nr.: Izdaja št.:	**4**
This Approval replaces: To soglasje zamenjuje:	**ETA-07/0028 validity from 18. 8. 2008 to 2. 2. 2012** ETA-07/0028 veljavno od 18. 8. 2008 do 2. 2. 2012
This European Technical Approval contains: To Evropsko tehnično soglasje vsebuje:	**22 pages including 1 annex** 22 strani vključno z 1 prilogo

ZAVOD ZA GRADBENIŠTVO SLOVENIJE LJUBLJANA 17

I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by the Slovenian National Building and Civil Engineering Institute (ZAG Ljubljana) in accordance with:

   - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products[1], modified by the Council Directive 93/68/EEC[2] and Regulation (EC) no. 1882/2003 of the European Parliament and of the Council[3],
   - Zakon o gradbenih proizvodih (ZGPro)[4],
   - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC[5],
   - Guideline for European Technical Approval of "External Thermal Insulation Composite Systems with rendering", ETAG no. 004, edition March 2000, amended June 2008[6].

2. The Slovenian National Building and Civil Engineering Institute (ZAG Ljubljana) is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.

3. This European Technical Approval is not to be transferred to manufacturers or agents of manufacturer other than those indicated on page 1; or manufacturing plants other than those laid down in the context of this European Technical Approval.

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6. The European Technical Approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

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1 Official Journal of the European Communities no. L 40, 11.2.1989, p.12
2 Official Journal of the European Communities no. L 220, 30.8.1993, p.1
3 Official Journal of the European Union no. L 284, 31.10.2003, p.1
4 Official Gazette of the Republic of Slovenia, no. 52/00 and no. 110/02
5 Official Journal of the European Communities no. L 17, 20.1.1994, p.34
6 In this document reference to ETAG 004 or ETAG no. 004 includes the amendment form June 2008

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1. Definition of products and intended use

The External Thermal Insulation Composite System, "**JUBIZOL XPS**" called ETICS in the following text, is designed and installed in accordance with the ETA-holder's design and installation instructions, deposited with ZAG Ljubljana. The ETICS comprises the following components, which are factory-produced by the ETA-holder or a supplier.

This ETICS can be sold under the trade names "**JUBIZOL XPS**", "**Thermo coat**", "**Thermo coat APOLON**" and "**Thermo coat DIANA**". The Annex 1 gives the correspondence to trade names.

1.1. Definition of the construction product (kit)

	Components (see § 2.3 for further description, characteristics and performances of the components)	**Coverage (kg/m²)**	**Thickness (mm)**
Insulation materials with associated methods of fixing	**Bonded ETICS** • **Insulation product** XPS-EN 13164-T1-CS(10/Y)200-TR400- DS(TH)-WL(T)1.5	/	20 to 100
	• **Adhesive** **JUBIZOL ADHESIVE MORTAR** – dry mix cement based adhesive requiring addition of 20 % water	3.5 – 5.0 (powder)	/
	Bonded ETICS with supplementary mechanical fixings • **Insulation product** XPS-EN 13164-T1-CS(10/Y)200-TR400- DS(TH)-WL(T)1.5	/	50 to 200
	• **Adhesive** **JUBIZOL ADHESIVE MORTAR** – dry mix cement based adhesive requiring addition of 20 % water	3.5 - 5.0 (powder)	/
	• **Anchors** • EJOT **Ejoterm ST U*, Ejoterm STR-U#, SDM-T plus*, SDF-K plus*, Ejoterm NT-U*, Ejoterm NK-U*, Ejoterm NTK-U*** • Hilti **SX-FV*, SD-FV 8**, XI-FV*, D-FV *** and **D-FV T*** • Fischer **Termoz 8 U**, Termoz 8 N**, Termoz KS 8**, Termoz 8 SV*, Termoz 8 UZ#** • Leskovec **Plastično pritrdilo PP**** and **Pritrdilno sidro PSK**** • Ranit **IsoFux NDT8LZ*, ND8LZ*, ND8LZ K*, NDS8Z*, NDM8Z*, NDS90Z*, NDM90Z*** and **IsoFux*** • Bravoll **PTH-KZ 60/8-L_a**, PTH-KZL 60/8-L_a**, PTH 60/8-L_a*** and **PTH-L 60/8-L_a*** Anchors are used only where necessary to provide stability until adhesive has dried.	to be used with insulation product with thickness * ≥ 60 mm ** ≥ 50 mm # ≥ 80 mm	/ / /

	Components (see § 2.3 for further description, characteristics and performances of the components)	**Coverage (kg/m²)**	**Thickness (mm)**
Insulation materials with associated methods of fixing	**Mechanically fixed ETICS with anchors and supplementary adhesive (see § 2.2.8.3.a) for possible associations XPS/anchors)** • **Insulation product** XPS-EN 13164-T1-CS(10/Y)200-TR400- DS(TH)-WL(T)1.5 • **Adhesive** **JUBIZOL ADHESIVE MORTAR** – dry mix cement based adhesive requiring addition of 20 % water • **Anchors** • EJOT **Ejoterm ST U *, Ejoterm STR-U#, SDM-T plus*, SDF-K plus*, Ejoterm NT-U*, Ejoterm NK-U*, Ejoterm NTK-U*** • Hilti **SX-FV*, SD-FV 8**, XI-FV*, D-FV *** and **D-FV T*** • Fischer **Termoz 8 U**, Termoz 8 N**, Termoz KS 8**, Termoz 8 SV*, Termoz 8 UZ#** • Leskovec **Plastično pritrdilo PP**** and **Pritrdilno sidro PSK**** • Ranit **IsoFux NDT8LZ*, ND8LZ*, ND8LZ K*, NDS8Z*, NDM8Z*, NDS90Z*, NDM90Z*** and **IsoFux*** • Bravoll **PTH-KZ 60/8-L_a**, PTH-KZL 60/8-L_a**, PTH 60/8-L_a*** and **PTH-L 60/8-L_a*** • Ranit **IsoFux NDT8LZ*, ND8LZ*, ND8LZ K*, NDS8Z*, NDM8Z*, NDS90Z*, NDM90Z*** and **IsoFux*** • Bravoll **PTH-KZ 60/8-L_a**, PTH-KZL 60/8-L_a**, PTH 60/8-L_a*** and **PTH-L 60/8-L_a***	/ 3.5 - 5.0 (powder) to be used with insulation product with thickness * ≥ 60 mm ** ≥ 50 mm # ≥ 80 mm	50 to 200 / / /
Base coat	**JUBIZOL ADHESIVE MORTAR** – dry mix cement based base coat powder requiring addition of 20 % water. JUBIZOL ADHESIVE MORTAR consists of aggregates, cement, dispersion powder, special additives	4.2 – 5.6 (powder)	maximal (dry): 4 minimal (dry): 3
Glass fibres meshes	**JUBIZOL GLASS FIBRE MESH** **Standard meshes** (glass fibres meshes with mesh size between 3.5 and 4.7 mm) where: JUBIZOL GLASS FIBRE MESH = ETA- holder own designation	/	/
Key coat	• **UNIGRUND** – liquid, water based acrylic slurry primer intended as a key coat for all finishing coats (except mineral based finishing coats Mineral Trowelled Render, Mineral Smooth Render and Nivellin D + Revitalcolor AG) • **AKRIL EMULSION** - liquid, water based acrylic primer intended as a key coat for the acrylic and mineral based finishing coats • **ACRYLCOLOR** - liquid exterior acrylic waterborne facade paint as a key coat for the acrylic and mineral based finishing coats • **JUBOSIL GX** - liquid, water based silicate primer intended as a key coat for the silicate based finishing coats • **JUBOSIL G** - liquid, water based silicone primer intended as a key coat for the silicone based finishing coats	0.15 - 0.20 kg / m² about 0.1 kg / m² about 0.1 l / m² about 0.1 l / m² about 0.1 l / m²	/ / / /

	Components (see § 2.3 for further description, characteristics and performances of the components)	Coverage (kg/m²)	Thickness (mm)
Finishing coats	• **Mineral Trowelled Render 2.0 / 2.5** – ready-mixed lime-cement based mortar requiring addition of water 20-23 %, based on lime, cement, aggregates, additives	2.6 to 3.1 (powder)	Regulated by particles size
	• **Mineral Smooth Render 1.5 / 2.5** – ready-mixed lime-cement based mortar requiring addition of water 20-23 %, based on lime, cement, aggregates, additives	2.6 to 3.6 (powder)	
	• Ready to use paste – **Silicate Trowelled Render 2.0 / 2.5** - based on potassium silicate and water-based acrylic binder, aggregates, additives	2.5 to 3.2 (paste)	
	• Ready to use paste – **Silicate Smooth Render 1.5 / 2.0 / 2.5** - based on potassium silicate and water-based acrylic binder, aggregates, additives	3.0 to 5.5 (paste)	
	• Ready to use paste – **Silicone Trowelled Render 2.0 / 2.5** - based on silicone emulsion and water-based acrylic binder, aggregates, additives	2.8 to 3.5 (paste)	
	• Ready to use paste – **Silicone Smooth Render 1.5 / 2.0 / 2.5** - based on silicone emulsion and water-based acrylic binder, aggregates, additives	2.4 to 4.7 (paste)	
	• Ready to use paste – **Acrylic Trowelled Render 2.0 / 2.5** - based on water-based acrylic binder, aggregates, additives	2.5 to 3.2 (paste)	
	• Ready to use paste – **Acrylic Smooth Render 1.5 / 2.0 / 2.5** - based on water-based acrylic binder, aggregates, additives	2.5 to 5.0 (paste)	
	• **Nivellin D + Revitalcolor AG** – ready-mixed polymer based mortar requiring addition of water ~ 30 %, based on polymer, lime, cement, aggregates, additives + liquid exterior microfibre reinforced waterborne anti-mildew acrylic paint	~ 4.5 kg/m²+ ~ 0.5 l/m² (powder + liquid)	
	• Ready to use paste – **Jubolit 1.5 / 2.5,** acrylic spray render; based on water-based acrylic binder, aggregates, additives	2.5 to 3.5 (paste)	
	• Ready to use paste – **Unixil G - Siloxanised Acrylic Smooth Render 1.5 / 2.0 / 2.5** - based on water-based acrylic binders, mineral fillers, special additives	2.5 to 5.0 (paste)	
	• Ready to use paste – **Unixil Z - Siloxanised Acrylic Trowelled Render 2.0 / 2.5** - based on water-based acrylic binders, mineral fillers, special additives	2.5 to 3.2 (paste)	
	• Ready to use paste – **Nanoxil G - Self-cleaning Silicone Smooth Render 1.5 / 2.0 / 2.5** - based on water-based silicone and acrylic binders, nano structures, mineral fillers and special additives	2.6 to 4.7 (paste)	
	• Ready to use paste – **Nanoxil Z - Self-cleaning Silicone Trowelled Render 2.0 / 2.5** - based on water-based silicone and acrylic binders, nano structures, mineral filling and special additives	2.8 to 3.5 (paste)	
Ancillary materials	Descriptions in accordance with § 3.2.2.5 of the ETAG 004. Remain under the ETA-holder responsibilities		

1.2. Intended use

This ETICS is intended for use as external insulation of buildings' walls. The walls are made of masonry (bricks, blocks, stones ...) or concrete (cast on site or as prefabricated panels) with a reaction to fire classification A1 or A2-s1,d0 according to SIST EN 13501-1 and a minimum density of 820 kg/m^3 or A1 according to the EC decision 96/603/EC as

amended. The ETICS is designed to give the wall to which it is applied satisfactory thermal insulation.

The ETICS is made of non load-bearing construction elements. It does not contribute directly to the stability of the wall on which it is installed, but it can contribute to durability by providing enhanced protection from the effect of weathering.

The ETICS can be used on new or existing (retrofit) vertical walls. It can also be used on horizontal or inclined surfaces which are not exposed to precipitation.

The ETICS is not intended to ensure the air-tightness of the building structure.

The choice of the method of fixing depends on the characteristics of the substrate, which could need preparation (see § 7.2.1 of the ETAG no. 004) and shall be done in accordance with the national instructions.

The provisions made in this European Technical Approval (ETA) are based on an assumed intended working life of at least 25 years, provided that the conditions laid down in sections 4.2, 5.1 and 5.2 for the packaging, transport, storage and installation as well as appropriate use, maintenance and repair are met. The indications given as to the working life cannot be interpreted as a guarantee given by the manufacturer or the Approval Body, but should only be regarded as a means for choosing the appropriate products in relation to the expected economically reasonable working life of the works.

2. Characteristics of product and methods of verification

2.1. General

The identification tests and the assessment of the fitness for use of this ETICS according to the Essential Requirements were carried out in compliance with the "ETA Guideline no. 004" concerning External Thermal Insulation Composite Systems with rendering – edition March 2000, amended June 2008 (called ETAG no. 004 in this ETA).

2.2. ETICS characteristics

2.2.1. Reaction to fire

Configuration	Maximum declared organic content of the finishing coat	Declared flame retardant content of the rendering system	Thickness (mm)	Euroclass according to SIST EN 13501-1
ETICS JUBIZOL XPS - all finishing coats and XPS described in this ETA	14 %	0 %	≤ 100	B - s1, d0
			> 100	F (no performance determined)

Note: an European reference fire scenario has not been laid down for facades. In some Member States, the classification of ETICS according to EN 13501-1 might not be sufficient for the use in facades. An additional assessment of ETICS according to national provisions (e.g. on the basis of a large scale test) might be necessary to comply with Member State regulations, until the existing European classification system has been completed.

2.2.2. **Water absorption** (capillarity test)

- Base coat **JUBIZOL ADHESIVE MORTAR**:
  - Water absorption after 1 hour < 1 kg/m²
  - Water absorption after 24 hours < 0.5 kg/m²
- Rendering systems:

		Water absorption after 24 hours	
		< 0.5 kg/m²	≥ 0.5 kg/m²
Base coat **JUBIZOL ADHESIVE MORTAR** + finishing coats indicated hereafter (including key coat acc. to clause 1.1):	MINERAL TROWELLED RENDER	X	
	MINERAL SMOOTH RENDER		
	SILICATE TROWELLED RENDER	X	
	SILICATE SMOOTH RENDER		
	SILICONE TROWELLED RENDER	X	
	SILICONE SMOOTH RENDER,		
	ACRYLIC TROWELLED RENDER	X	
	ACRYLIC SMOOTH RENDER		
	JUBOLIT	X	
	NIVELIN D + REVITALCOLOR AG	X	
	UNIXIL G	X	
	UNIXIL Z		
	NANOXIL G	X	
	NANOXIL Z		

2.2.3. **Hygrothermal behaviour**

Hygrothermal cycles have been performed on a rig in hygrothermal chamber.

None of the following defects occur during the testing:

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

The ETICS **is so assessed resistant to hygrothermal cycles**.

2.2.4. **Freeze / thaw behaviour**

The water absorption of base coat and the rendering systems are less than 0.5 kg/m² after 24 hours and **so the ETICS is assessed as freeze/thaw resistant.**

2.2.5. Impact resistance

The resistance to hard body impacts (3 Joules and 10 Joules) and the resistance to perforation (20 mm, 12 mm and 6 mm) lead to the following use categories:

		Single standard mesh	Double standard mesh
Rendering systems: base coats **JUBIZOL ADHESIVE MORTAR** + finishing coat indicated hereafter (including key coat acc. to clause 1.1):	**MINERAL RENDER**	**Category II**	**Category I**
	SILICATE RENDER	**Category I**	**Category I**
	SILICONE RENDER	**Category II**	**Category I**
	ACRYLIC RENDER	**Category I**	**Category I**
	JUBOLIT	**Category I**	**Category I**
	NIVELIN D + REVITALCOLOR AG	**Category III**	**Category II**
	UNIXIL	**Category II**	**Category II**
	NANOXIL	**Category II**	**Category II**

2.2.6. Water vapour permeability

		Equivalent air thickness s_d (m)
Rendering systems: base coat **JUBIZOL ADHESIVE MORTAR** + finishing coats indicated hereafter (including key coat acc. to clause 1.1):	**MINERAL TROWELLED RENDER**	**≤ 2.0** (Test result obtained with finishing coat MINERAL SMOOTH RENDER, particle size 1.5 mm: **0.1**)
	MINERAL SMOOTH RENDER	
	SILICATE TROWELLED RENDER	**≤ 2.0** (Test result obtained with finishing coat SILICATE SMOOTH RENDER, particle size 2 mm: **0.2**)
	SILICATE SMOOTH RENDER	
	SILICONE TROWELLED RENDER	**≤ 2.0** (Test result obtained with finishing coat SILICONE SMOOTH RENDER, particle size 2 mm: **0.3**)
	SILICONE SMOOTH RENDER	
	ACRYLIC TROWELLED RENDER	**≤ 2.0** (Test result obtained with finishing coat ACRYLIC SMOOTH RENDER, particle size 2 mm: **0.4**)
	ACRYLIC SMOOTH RENDER	
	JUBOLIT	**≤ 2.0** (Test result obtained with finishing coat JUBOLIT, particle size 2.5 mm: **0.1**)
	NIVELIN D + REVITALCOLOR AG	**≤ 2.0** (Test result obtained with finishing coat NIVELIN D + REVITALCOLOR AG: **0.1**)
	UNIXIL G	**≤ 2.0** (Test result obtained with finishing coat UNIXIL G, particle size 2 mm: **0.4**)
	UNIXIL Z	
	NANOXIL G	**≤ 2.0** (Test result obtained with finishing coat NANOXIL G, particle size 2 mm: **0.3**)
	NANOXIL Z	

2.2.7. Dangerous substances

A written declaration was submitted by the ETA-holder.

In addition to the specific clauses relating to dangerous substances contained in this ETA, there may be other 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 Construction Product Directive, these requirements need also to be complied with, when and where they apply.

2.2.8. Safety in use

2.2.8.1. Bond strength

- Base coat **JUBIZOL ADHESIVE MORTAR** onto expanded polystyrene:

Conditionings		
Initial state	**After the hygrothermal cycles (on the rig)**	**After the freeze/thaw cycles (on samples)**
≥ 0.08 MPa	≥ 0.08 MPa	Test not required because freeze/thaw cycles not necessary

- Adhesive **JUBIZOL ADHESIVE MORTAR** onto substrate and expanded polystyrene (safety in use of the bonded ETICS)

	Conditionings		
	Initial state	**48 h immersion in water + 2 h 23°C/50% RH**	**48 h immersion in water + 7 days 23°C/50% RH**
Concrete	≥ 0.25 MPa	≥ 0.08 MPa	≥ 0.25 MPa
Expanded polystyrene	≥ 0.08 MPa	≥ 0.03 MPa	≥ 0.08 MPa

The minimal bonded surface S, which must exceed 20%, is calculated as follows:

$$S\ (\%) = [0.03\ (MPa) \cdot 100] / B$$

Where:

- B: minimum mean failure resistance of the adhesive to the insulation product in dry conditions.
- 0.03 MPa correspond to the minimum requirements.

The ETICS can so be installed on the substrate with application of the adhesive on the **minimal surface of 20 %.**

2.2.8.2. Fixing strength (displacement test)

Test not required because the ETICS fulfils the following criteria: E·d < 50.000 N/mm.

(E: modulus of elasticity of the base coat without mesh - d: mean dried thickness of the base coat).

2.2.8.3. Wind load resistance

a) Safety in use of mechanically fixed ETICS **using anchors**.

The following values only apply for the combination (anchor's trade name) / (insulation panel's characteristics) mentioned in the first lines of each table.

Anchors for which the following failure loads apply	Trade name	EJOT Schraubdübel Ejotherm ST U (**ETA-02/0018**), EJOT SDM-T plus (**ETA-04/0064**), EJOT SDF-K plus (**ETA-04/0064**), EJOT Ejoterm NT-U (**ETA-05/0009**), EJOT Ejoterm NK-U (**ETA-05/0009**), EJOT Ejoterm NTK-U (**ETA-07/0026**), Hilti SX-FV (**ETA-03/0005**), Hilti Dämmstoffdübel SD-FV 8 (**ETA-03/0028**), Hilti Dämmstoff-Befestigungselement XI-FV (**ETA-03/0004**), Hilti WDVS-Schlagdübel D-FV, (**ETA-05/0039**), Hilti WDVS-Schlagdübel D-FV T (**ETA-05/0039**)		
	Plate diameter (mm)	60 or more		
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 60		
	Tensile strength perpendicular to the face (kPa)	≥ 100		
Failure loads (N)	Anchors not placed at the panel joints *(Static Foam Block Test)*		R_{panel}	Minimal: ≥ 510 Mean: ≥ 520
	Anchors placed at the panel joints *(Pull Through Test)*		R_{joint}	Minimal: ≥ 400 Mean: ≥ 430

Anchors for which the following failure loads apply	Trade name	EJOT Ejoterm STR-U (**ETA - 04/0023**)		
	Plate diameter (mm)	60 or more		
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 80		
	Tensile strength perpendicular to the face (kPa)	≥ 100		
Failure loads (N)	Anchors not placed at the panel joints *(Pull Through Test)*		R_{panel}	Minimal: ≥ 550 Mean: ≥ 560
	Anchors placed at the panel joints *(Pull Through Test)*		R_{joint}	Minimal: ≥ 480 Mean: ≥ 500

Anchors for which the following failure loads apply	Trade name	Fischer Schlagdübel TERMOZ 8 N (**ETA-03/0019**), Fischer TERMOZ 8 U (**ETA-02/0019**), Fischer TERMOZ KS 8 (**ETA - 04/0114**)		
	Plate diameter (mm)	60 or more		
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 50		
	Tensile strength perpendicular to the face (kPa)	≥ 150		
Failure loads (N)	Anchors not placed at the panel joints *(Static Foam Block Test)*		R_{panel}	Minimal: ≥ 440 Mean: ≥ 460
	Anchors placed at the panel joints *(Pull Through Test)*		R_{joint}	Minimal: ≥ 400 Mean: ≥ 410

Anchors for which the following failure loads apply	Trade name	Fischer TERMOZ 8 UZ (**ETA-02/0019**)	Fischer TERMOZ 8 SV (**ETA-06/0180**)
	Plate diameter (mm)	60 or more	
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 60	≥ 80
	Tensile strength perpendicular to the face (kPa)	≥ 100	
Failure loads (N)	Anchors not placed at the panel joints R_{panel} *(Pull Through Test)* - unsunk	Minimal: ≥ 490 Mean: ≥ 530	-
	Anchors not placed at the panel joints R_{panel} *(Pull Through Test)* - 15 mm sunk	-	Minimal: ≥ 550 Mean: ≥ 570

Anchors for which the following failure loads apply	Trade name	Leskovec PLASTIČNO PRITRDILO PP (**ETA-05/0149**)	
	Plate diameter (mm)	60 or more	
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 50	
	Tensile strength perpendicular to the face (kPa)	≥ 100	
Failure loads (N)	Anchors not placed at the panel joints *(Pull Through Test)*	R_{panel}	Minimal: ≥ 450 Mean: ≥ 465
	Anchors placed at the panel joints *(Pull Through Test)*	R_{joint}	Minimal: ≥ 377 Mean: ≥ 395

Anchors for which the following failure loads apply	Trade name	Leskovec PRITRDILNO SIDRO PSK (**ETA-05/0148**)		
	Plate diameter (mm)	60 or more		
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 50		
	Tensile strength perpendicular to the face (kPa)	≥ 100		
Failure loads (N)	Anchors not placed at the panel joints *(Pull Through Test)*		R_{panel}	Minimal: ≥ 561 Mean: ≥ 589
	Anchors placed at the panel joints *(Pull Through Test)*		R_{joint}	Minimal: ≥ 492 Mean: ≥ 520

Anchors for which the following failure loads apply	Trade name	Ranit IsoFux NDT8LZ, ND8LZ and ND8LZ K (**ETA - 05/0080**), Ranit IsoFux NDS8Z, NDM8Z, NDS90Z and NDM90Z (**ETA - 07/0129**), Ranit IsoFux (**ETA - 04/0032**)		
	Plate diameter (mm)	60 or more		
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 80		
	Tensile strength perpendicular to the face (kPa)	≥ 100		
Failure loads (N)	Anchors not placed at the panel joints *(Static Foam Block Test)*		R_{panel}	Minimal: ≥ 503 Mean: ≥ 513
	Anchors placed at the panel joints *(Pull Through Test)*		R_{joint}	Minimal: ≥ 520 Mean: ≥ 540

Anchors for which the following failure loads apply	Trade name	Bravoll PTH 60/8-L_a and PTH-L 60/8-L_a (**ETA - 05/0055**)		
	Plate diameter (mm)	60 or more		
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 60		
	Tensile strength perpendicular to the face (kPa)	≥ 90		
Failure loads (N)	Anchors not placed at the panel joints *(Pull Through Test)*		R_{panel}	Minimal: ≥ 502 Mean: ≥ 514

Anchors for which the following failure loads apply	Trade name	Bravoll PTH-KZ 60/8-L_a, PTH-KZL 60/8-L_a (**ETA - 05/0055**)		
	Plate diameter (mm)	60 or more		
Characteristics of the panels for which the following failure loads apply	Thickness (mm)	≥ 50		
	Tensile strength perpendicular to the face (kPa)	≥ 90		
Failure loads (N)	Anchors not placed at the panel joints *(Pull Through Test)*		R_{panel}	Minimal: ≥ 409 Mean: ≥ 415

**Note: according to results of various research activities head plate diameter is the most influential parameter (assuming similar plate stiffness). Failure loads for larger plates and for insulation with larger tensile strength are therefore expected to be higher, thus the given values are on the "safe side".*

The wind load resistance of the ETICS R_d is calculated as follows:

$$R_d = \frac{R_{panel} \times n_{panel} + R_{joint} \times n_{joint}}{\gamma}$$

n_{panel}: Number (per m²) of anchors not placed at the panel joints
n_{joint}: Number (per m²) of anchors placed at the panel joint
γ: National safety factor

2.2.9. Thermal resistance

The additional thermal resistance provided by the ETICS (R_{ETICS}) to the substrate wall is calculated from the thermal resistance of the insulation product (R_D) and from the tabulated R_{render} value of the render system (R_{render} is about 0.02 m²·K/W),

$$R_{ETICS} = R_D + R_{render} \ [(m^2 \cdot K)/W]$$

as described in:

- SIST EN ISO 6946 « Building components and building elements - Thermal resistance and thermal transmittance - Calculation method"
- EN 12524 "Building materials and products – Hygrothermal properties – Tabulated design values"

If the thermal resistance can not be calculated, it can be measured on the complete ETICS as described in:

SIST EN 1934 "Thermal performance of buildings - Determination of thermal resistance by hot box method using heat flow meter"

The thermal bridges caused by mechanical fixing devices influence the thermal teansmittance of the entire wall and shall be taken into account using the following calculation:

$$U_c = U + \Delta U \ [W/(m^2 \cdot K)] \ , \quad \text{where}$$

U_c corrected thermal transmittance of the entire wall, including thermal bridges

U thermal transmittance of the entire wall, including ETICS, without thermal bridges

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

$R_{substrate}$ thermal resistance of the substrate wall [(m².K)/W]

R_{se}: external surface thermal resistance [(m².K)/W]

R_{si}: internal surface thermal resistance [(m².K)/W]

ΔU correction term of the thermal transmittance for mechanical fixing devices = $\chi_p \cdot n$ (for anchors) + $\sum \psi_l \cdot \ell_i$ (for profiles)

χ_p point thermal transmittance value of the anchor [W/K]. See Technical Report no. 25. If not specified in the anchor's ETA, the following values apply:
= 0.002 W/K for anchors with a stainless steel screw with the head covered by plastic material, and for anchors with an air gap at the head of the screw.
= 0.004 W/K for anchors with a galvanized steel screw with the head covered by a plastic material.
= 0.008 W/K for all other anchors (worst case)

n number of anchors per m²

ψ_l linear thermal transmittance value of the profile [W/(m·K)]

ℓ_i length of the profile per m²

The influence of thermal bridges can also be calculated as described in:

EN ISO 10211-1 "Thermal bridges in buildings – Heat flows and surface temperatures – Part 1: General calculation methods"

It should be calculated according to this standard if there are more than 16 anchors per m² foreseen. The χ_p values given by the manufacturer do not apply in this case.

2.2.10. Aspect of durability and serviceability

2.2.10.1. Bond strength after ageing

		After hygrothermal cycles (on the rig) or after 7 days immersion in water + 7 days 23 °C / 50 % RH (on samples)	After freeze / thaw cycles (on samples)
Rendering systems: base coat **JUBIZOL ADHESIVE MORTAR** + finishing coats indicated hereafter (including key coat acc. To clause 1.1):	**MINERAL TROWELLED RENDER**	≥ 0.08 MPa	Test not required because freeze / thaw cycles not necessary
	MINERAL SMOOTH RENDER		
	SILICATE TROWELLED RENDER	≥ 0.08 MPa	
	SILICATE SMOOTH RENDER		
	SILICONE TROWELLED RENDER	≥ 0.08 MPa	
	SILICONE SMOOTH RENDER		
	ACRYLIC TROWELLED RENDER	≥ 0.08 MPa	
	ACRYLIC SMOOTH RENDER		
	JUBOLIT	≥ 0.08 MPa	
	NIVELIN D + REVITALCOLOR AG	≥ 0.08 MPa	
	UNIXIL G	≥ 0.08 MPa	
	UNIXIL Z		
	NANOXIL G	≥ 0.08 MPa	
	NANOXIL Z		

2.3. Components' characteristics

2.3.1. Insulation product

Extruded polystyrene panels for bonded for bonded ETICS or mechanically fixed ETICS with anchors.

Factory–prefabricated, uncoated boards with right edges, made of extruded polystyrene (XPS) according to SIST EN 13164 and having the description and characteristics defined in the table below.

Description and characteristics	XPS panels
Designation code	XPS-EN 13164-T1-CS(10/Y)200-TR400- DS(TH)-WL(T)1.5
Reaction to fire / SIST EN 13501-1	**E**
Thermal resistance ((m².K)/W)	Defined in reference to EN 13164
Water absorption (partial immersion) / SIST EN 1609	**0.04 kg/m²** at tested density of approx. 28 kg/m²
Water vapour diffusion resistance factor (μ) / SIST EN 12086 – SIST EN 13164	**59** at tested density of approx. 28 kg/m²
Tensile strength perpendicular to the faces in dry conditions / SIST EN 1607	≥ **400 kPa** at tested density of approx. 28 kg/m²
Shear strength (N/mm²) / SIST EN 12090	≥ **0.02** at tested density of approx. 28 kg/m²
Shear modulus (N/mm²) / SIST EN 12090	≥ **1.0** at tested density of approx. 28 kg/m²

2.3.2. Anchors

Anchors for insulation product (used as an ancillary component without contribution to resistance to windload resistance or as a fixing device in mechanically fixed systems):

Trade name	Plate diameter (mm)	Characteristic pull-out strength of anchor
EJOT Schraubdübel **Ejoterm ST U**	60	See ETA - 02/0018
EJOT **Ejoterm STR-U**	60	See ETA - 04/0023
EJOT **SDM-T plus** and **SDF-K plus**	60	See ETA - 04/0064
EJOT **Ejoterm NT-U** and **Ejoterm NK-U**	60	See ETA - 05/0009
EJOT **Ejoterm NTK-U**	60	See ETA - 07/0026
Hilti **SX-FV**	60	See ETA - 03/0005
Hilti Dämmstoffdübel **SD-FV 8**	60	See ETA - 03/0028
Hilti Dämmstoff-befestigungselement **XI-FV**	60	See ETA - 03/0004
Hilti WDVS-Schraubdübel **D-FV** and **D-FV T**	60	See ETA - 05/0039
Fischer **TERMOZ 8 N, TERMOZ 8 U** and **TERMOZ 8 UZ**	60	See ETA - 03/0019
Fischer **TERMOZ KS 8**	60	See ETA - 04/0114
Fischer **TERMOZ 8 SV**	60	See ETA - 06/0180
Leskovec Plastično pritrdilo **PP**	60	See ETA - 05/0149
Leskovec Pritrdilno sidro **PSK**	60	See ETA - 05/0148
Ranit **IsoFux NDT8LZ, ND8LZ** and **ND8LZ K**	60	See ETA - 05/0080
Ranit **IsoFux NDS8Z, NDM8Z, NDS90Z** and **NDM90Z**	60	See ETA - 07/0129
Ranit **IsoFux**	60	See ETA - 04/0032
Bravoll **PTH-KZ 60/8-L_a, PTH-KZL 60/8-L_a, PTH 60/8-L_a** and **PTH-L 60/8-L_a**	60	See ETA - 05/0055

2.3.3. Render

The mean value of the crack width of the base coat with the glass fibre mesh in warp direction is about 0.2 mm, while in weft direction is about 0.1 mm measured at a render strain value of 0.8 %.

2.3.4. Glass fibre mesh

Glass fibre mesh with 3.5 mm to 4.7 mm wide grid of fibres.

	Alkalis resistance	
	JUBIZOL GLASS FIBRE MESH	
	Warp	Weft
Residual strength after ageing (N/mm) - mean value	≥ **21**	≥ **25**
Relative residual resistance after ageing of the strength in the as delivered state (%)	≥ **54**	≥ **53**

3. Evaluation and Attestation of Conformity and CE marking

3.1. System of Attestation of conformity

According to the decision 97/556/EC of the European Commision for the ETICS in question, the systems 2+ of attestation of conformity applies.

In addition, according to the decision 2001/596/EC of the European Commision for the ETICS in question,, the systems 2+ of attestation of conformity apply with regard to reaction to fire.

Considering the Euroclass B for the reaction to fire, the system of attestation of conformity is system **2+**. This system is described in the Council Directive 89/106/EEC Annex III, 2 (ii), First possibility as follows:

Declaration of the conformity of the ETICS by the manufacturer on the basis of:

(a) Tasks for the manufacturer:

1. Initial type-testing of the ETICS and the components,
2. Factory Production Control,
3. Testing of samples taken at the factory in accordance with a prescribed Control Plan[7].

(b) Tasks for the Notified Body:

4. Certification of factory production control based on the basis of:
   - Initial inspection of factory and of factory production control,
   - Continuous surveillance, assessment and approval of factory production control.

3.2. Responsibilities

3.2.1. Tasks of the manufacturer

3.2.1.1. Factory production control

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the production is in conformity with this European Technical Approval.

The manufacturer may only use components stated in the technical documentation of this European Technical Approval including Control plan[7].

For the components of the ETICS which the ETA-holder does not manufacture by himself, he shall make sure that factory production control carried out by the other manufacturers gives the guaranty of the components compliance with the European Technical Approval.

[7] The "Control Plan" is a confidential part of the European Technical Approval and only handed over to the notified body or bodies involved in the procedure of attestation of conformity. See section 3.2.2.

The factory production control and the provisions taken by the ETA-holder for components not produced by himself shall be in accordance with the "Control Plan relating to this European Technical Approval" which is part of the technical documentation of this European Technical Approval. The Control Plan[7] is laid down in the context of the factory production control system operated by the manufacturer and deposited at ZAG Ljubljana.

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the Control Plan[7].

3.2.1.2. Other tasks of manufacturer

The manufacturer shall, on the basis of a contract, involve a body (bodies) which is (are) notified for the tasks referred to in section 3.1 in the field of ETICS in order to undertake the actions laid down in section 3.3. For this purpose, the "Control Plan"[7] referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the Notified Body or Bodies involved.

For initial type testing, the results of the tests performed as part of the assessment for the European Technical Approval can be used unless there are changes in the production line or plant. In such cases, the necessary initial type testing has to be agreed between ZAG Ljubljana and the Notified Bodies involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of the European Technical Approval. The initial type-testing mentioned above could be taken over by the manufacturer for this declaration.

3.2.2. Tasks of the Notified Bodies

The Notified Body (Bodies) shall perform the:

- initial inspection of factory and factory production control

  The Notified Body (Bodies) shall ascertain that, in accordance with the Control Plan[7], the factory (in particular the employees and the equipment) and the factory production control are suitable to ensure continuous and orderly manufacturing of the components according to the specifications mentioned in clause 2 of this ETA.

- continuous surveillance, assessment and approval of factory production control

  The Notified Body (Bodies) shall visit the factory:

  * at least twice a year for surveillance. Further agreement between ZAG Ljubljana and the Notified Body involved, this frequency can be reduced to one a year after a probative period,

  or

  * at least one a year for surveillance of this manufacturer having a FPC system complying with SIST EN ISO 9001 covering the manufacturing of the ETICS components.
    It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking into account the Control Plan[7].

These tasks shall be performed in accordance with the provisions laid down in the "Control Plan[7] of this European Technical Approval".

The Notified Body (Bodies) shall retain the essential points of its (their) actions referred to above and state the results obtained and conclusions drawn in (a) written report (reports).

The Notified Body (Bodies) involved by the manufacturer shall issue an EC certificate of conformity of the factory product control stating the conformity with the provisions of this European Technical Approval.

In cases where the provisions of the European Technical Approval and its "Control Plan" are no longer fulfilled, the Notified Body shall withdraw the certificate of conformity and inform ZAG Ljubljana without delay.

3.3. CE marking

The CE marking shall be affixed either on the product itself, on a label attached to it, on its packaging or on the commercial documents accompanying the components of the ETICS. The letters «CE» shall be followed by the identification number of the Notified Body involved and be accompanied by the following information:

- the name or identifying mark and address of the ETA-holder,
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity of Factory Production Control (system 2+),
- the number of the European Technical Approval,
- the ETICS trade name,
- the number of the ETAG.

Example of CE marking and accompanying information for ETICS "JUBIZOL XPS".

CE *xxxx*	**"CE" symbol** *Identification number of approved certification body*
JUB d.o.o. Dol pri Ljubljani 28, SI - 1262 Dol pri Ljubljani Slovenija *07* *xxxx-CPD-yyyy*	Name and the address of the manufacturer *Two last digits of the year of affixing the CE marking* *Number of the EC certificate of conformity for factory production control*
ETA-07/0028 ETAG 004 JUBIZOL XPS	Number of European Technical Approval Number of Guideline for European Technical Approvals ETICS trade name

4. Assumptions under which the fitness of the product for the intended use was favourably assessed

4.1. Manufacturing

The European Technical Approval is issued for the ETICS on the basis of agreed data/information, deposited with the ZAG Ljubljana, which identifies the ETICS that has been assessed and judged. Changes to the ETICS or production process, which could result in the deposited data/information being incorrect should be notified to the ZAG

Ljubljana before the changes are introduced. The ZAG Ljubljana will decide whether or not such changes affect the ETA and consequently the validity of the CE marking on the basis of the ETA and if so whether further assessment or alterations to the ETA, shall be necessary.

4.2. Installation

4.2.1. General

It is the responsibility of the ETA-holder to guarantee that the information about design and installation of the ETICS are easily accessible to the concerned people. This information can be given using reproductions of the respective parts of the European Technical Approval. Besides, all the data concerning the execution shall be clearly indicated on the packaging and/or the enclosed instruction sheets using one or several illustrations.

In any case, the user shall comply with the national regulations and particularly concerning fires and wind load resistance.

Only the components described in clause 1.1 with characteristics according to clause 2 of this ETA can be used for the ETICS.

The requirements given in ETAG 004, chapter 7, as well as the information of paragraphs 4.2.2 and 4.2.3, have to be considered.

4.2.2. Design

- To bond the ETICS, the minimal bonded surface and the method of bonding shall comply with characteristics of the ETICS (see § 2.2.8.1 of this ETA) as well as the national regulations. In any case, the minimal bonded surface shall at least be 20%.
- To mechanically fix the ETICS, the choice and the rate of the fixings shall be determined considering:
  - the design wind load suction and the national regulations (taking into account the national safety factors, the design rules, ...),
  - the characteristic resistance of the anchors into the considered substrate (see installation parameters – effective anchorage depth, characteristic resistance ... – in the ETA of the anchor),
  - the safety in use of the ETICS (cf. § 2.2.8), according to the method of fixing.

4.2.3. Execution

The recognition and preparation of the substrate as well as the generalities about the execution of the ETICS shall be carried out in compliance with:

- chapter 7 of the ETAG no. 004 with, in case of bonded ETICS, imperative removal of any existing organic finishes,
- national regulations in effect.

The particularities in execution linked to the different methods of fixing and the application of the rendering system shall be handled in accordance with ETA-holder prescriptions. In particular it is suitable to comply with the quantities of rendering applied, the thickness regularity and the drying periods between two layers.

5. Indications to the manufacturers

5.1. Packaging, transport and storage

Packaging of the components has to be such that the products are protected from moisture during transport and storage, unless other measures are foreseen by the manufacturer for this purpose.

The components have to be protected against damage.

It is the responsibility of the manufacturer(s) to ensure that these provisions are easily accessible to the concerned people.

5.2. Use, maintenance and repair

It is accepted that the finishing coat shall normally be maintained in order to fully preserve the ETICS's performances.

Maintenance includes at least:

- the repairing of localised damaged areas due to accidents,
- the aspect maintenance with products adapted and compatible with the ETICS (possibly after washing or ad hoc preparation).

Necessary repairs should be done rapidly.

It is important to be able to carry out maintenance as far as possible using readily available products and equipment, without spoiling appearance.

It is the responsibility of the manufacturer(s) to ensure that these provisions are easily accessible to the concerned people.

The original version is signed by:

Leading expert:
Andrijana Sever Škapin, Ph.D.

Head of Service for Technical Approvals:
Franc Capuder, M.Sc.

ZAVOD ZA GRADBENIŠTVO SLOVENIJE
LJUBLJANA
17

Use ETICS
Adhesive JUBIZOL ADHESIVE MORTAR
XPS See Clause 1.1
Base coat JUBIZOL ADHESIVE MORTAR
Glass fibre mesh JUBIZOL GLASS FIBRE MESH
***Keycoat* + Finishing coat** *ACRYLCOLOR or AKRIL EMULSION* + MINERAL TROWELLED RENDER 2.0 / 2.5 *ACRYLCOLOR or AKRIL EMULSION* + MINERAL SMOOTH RENDER 1.5 / 2.5 *UNIGRUND or JUBOSIL GX* + SILICATE TROWELLED RENDER 2.0 / 2.5 *UNIGRUND or JUBOSIL GX* + SILICATE SMOOTH RENDER 1.5 / 2.0 / 2.5 *UNIGRUND or JUBOSIL G* + SILICONE TROWELLED RENDER 2.0 / 2.5 *UNIGRUND or JUBOSIL G* + SILICONE SMOOTH RENDER 1.5 / 2.0 / 2.5 *UNIGRUND, ACRYLCOLOR or AKRIL EMULSION* + ACRYLIC TROWELLED RENDER 2.0 / 2.5 *UNIGRUND, ACRYLCOLOR or AKRIL EMULSION* + ACRYLIC SMOOTH RENDER 1.5 / 2.0 / 2.5 *NIVELIN D + REVITALCOLOR AG* *UNIGRUND, ACRYLCOLOR or AKRIL EMULSION* + JUBOLIT 1.5 / 2.5 *UNIGRUND, ACRYLCOLOR or AKRIL EMULSION* + UNIXIL G 1.5 / 2.0 / 2.5 *UNIGRUND, ACRYLCOLOR or AKRIL EMULSION* + UNIXIL Z 2.0 / 2.5 *UNIGRUND or JUBOSIL GX* + NANOXIL G 1.5 / 2.0 / 2.5 *UNIGRUND or JUBOSIL GX* + NANOXIL Z 2.0 / 2.5
Anchors EJOT EJOTERM ST U, STR-U, NT-U, NK-U, NTK-U, SDM-T plus, SDF-K plus or HILTI SX-FV, SD-FV 8, XI-FV, D-FV AND D-FV T or FISCHER TERMOZ 8 U, 8 N, KS 8, 8 UZ, 8 SV or LESKOVEC PLASTIČNO PRITRDILO PP, PRITRDILNO SIDRO PSK or RANIT ISOFUX, ISOFUX NDT8LZ, ND8LZ, ND8LZ K, NDS8Z, NDM8Z, NDS90Z, NDM90Z BRAVOLL PTH-KZ 60/8-L_a, PTH-KZL 60/8-L_a, PTH 60/8-L_a, PTH-L 60/8-L_a

ETICS »JUBIZOL XPS«, »Thermo coat«,»Thermo coat APOLON« and »Thermo coat DIANA«	**Annex 1** of the European Technical Approval **ETA–07/0028**
Trade names of the components	