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European Technical Assessment

ETA-06/0221
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General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

villerit EcoTherm EPS

Product family
to which the construction product belongs

Product area code: 4
External Thermal Insulation Composite system with
rendering on expanded polystyrene for the use as
external insulation to walls of buildings

Manufacturer

villerit Putzsysteme GmbH
Unterer Dammweg 24-26
78050 Villingen-Schwenningen
GERMANY

Manufacturing plant

villerit Putzsysteme GmbH
Unterer Dammweg 24-26
78050 Villingen-Schwenningen

This European Technical Assessment
contains

24 pages including 6 annexes which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

040083-00-0404

This version replaces

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Specific Part

1 Technical description of the product

This product is an External Thermal Insulation Composite System (ETICS) with rendering - a kit comprising components which are factory-produced by the manufacturer or component suppliers. It's made up on site from these. 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 and if it necessary additional mechanically fixed onto a wall. The methods of fixing and the relevant components are specified in annex 1. The insulation product is faced with a rendering system consisting of one base coat and finishing coat (site applied), in which the base coat 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 ...) for connection to adjacent building elements (apertures, corners, parapets ...). Assessment and performance of these components are 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.

2 Specification of the intended use in accordance with the applicable European assessment Document

The performances in Section 3 can only be assumed if the ETICS is used in accordance with the specifications and under the boundary conditions specified in Annexes 2 to 5.

The verifications and assessment methods on which this ETA is based lead to the assumption of a working life of the ETICS "villerit EcoTherm EPS" of at least 25 years. 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 assumed economically reasonable working life of the works.

For use, maintenance and repair, the finishing coat shall be maintained in order to fully preserve the ETICS performance. Maintenance includes at least:

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

Necessary repairs are to be carried out as soon as the need has been identified.

The information on use, maintenance and repair is given in the manufacturer's technical documentation.

It is the responsibility of the manufacturer to ensure that this information is made known to the concerned people.

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

3.1 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire of the ETICS	(see annex 2) Class according to EN 13501-1
Reaction to fire of the EPS-insulation product – Apparent density of the EPS-insulation product according to EN 1602	(see annex 2) Class E according EN 13501-1 Value [kg/m ³]
Reaction to fire of the PU-foam adhesive	not applicable
Facade fire performance	no performance assessed
Propensity to undergo continuous smouldering of ETICS	not applicable

3.2 Hygiene, health and environment (BWR 3)

Essential characteristic	Performance
Release of dangerous substances	no performance assessed
Water absorption Base coat after 1 hour after 24 hours	(see annex 3.1) Mean [kg/m ²] Mean [kg/m ²]
Rendering system after 1 hour after 24 hours	 Mean [kg/m ²] Mean [kg/m ²]
EPS-insulation after 24 hours	maximum value 0.5 kg/m ²
Water-tightness of the ETICS: Hygrothermal behaviour on the test wall	Passed without defects
Water-tightness of the ETICS: freeze/thaw behaviour	The water absorption of the base coats as well as the rendering systems for the base coat "villerit Baukleber VWS 850 grau/weiß" or "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coats "villerit Rustikalputz", "villerit Rauhputz", "villerit Stockputz", "villerit activedry Mineralputz M/K/R" or "villerit Edelkratzputz variant WDVS" is less than 0.5 kg/m ² after 24 hours. The ETICS has been assessed as free/thaw resistant. The ETICS with the base coat "villerit Baukleber VWS 850 grau/weiß" or "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coats "villerit Deko", "villerit Siliconit", "villerit activedry Siliconit", "villerit Silan", "villerit activedry Silan", "villerit Stockputz SLC" or "villerit Rauhputz SLC" is assessed as free/thaw resistant according the simulation method.

Essential characteristic	Performance
Water-tightness of the ETICS: freeze/thaw behaviour	The water absorption of the base coats as well as the rendering systems for the base coat "villerit InnoTherm" or "villerit activedry Klebe- und Armierungsmörtel" with all finishing coats is more than 0.5 kg/m ² after 24 hours. The ETICS has been assessed as not freeze/thaw resistant. For all other configurations is no performance assessed.
Impact resistance	(see annex 3.2) Category
Water vapour permeability - Rendering system - EPS-insulation	(see annex 3.3) s _d value [m] μ = 20 - 70 Thickness of the insulation product 400 [mm]

3.3 Safety and accessibility in use (BWR 4)

Essential characteristic	Performance
Bond strength between base coat and EPS insulation between adhesive and substrate between adhesive and EPS insulation	(see annex 4.1) - Minimal value/Mean value [kPa], rupture type: Initial state (28 d immersion) - Minimal value/Mean value [kPa], rupture type: after hygrothermal cycles (see annex 4.2) - Thickness [mm] of the used adhesives - Minimal value/ Mean value [kPa], rupture type: Initial state (dry conditions) - Minimal value/Mean value [kPa], rupture type: after 2 d immersion in water, 2 h drying - Minimal value/Mean value [kPa], rupture type: after 2 d immersion in water, 7 d drying (see annex 4.3) - Thickness [mm] of the used adhesives - Minimal value [kPa], rupture type: Initial state (dry conditions) - Minimal value/Mean value [kPa], rupture type: after 2 d immersion in water, 2 h drying - Minimal value/Mean value [kPa], rupture type: after 2 d immersion in water, 7 d drying
Fixing strength (displacement test)	Test not required therefore no limitation of ETICS length required
Wind load resistance of ETICS pull-through test of fixing static foam block test dynamic wind uplift test	(see annex 4.4) - R _{panel} [N/fixing], - R _{joint} [N/fixing], - Plate diameter of anchor ≥ 60 mm, ≥ 90 mm - plate stiffness ≥ 0.3 kN/mm ² - load resistance of the anchor plate ≥ 1.0 kN not applicable

Essential characteristic	Performance
Tensile strength perpendicular to the faces in dry conditions standard EPS	$\sigma_{mt} \geq 80$ kPa (bonded ETICS) $\sigma_{mt} \geq 100$ kPa (bonded ETICS with anchors) $\sigma_{mt} \geq 150$ kPa (bonded ETICS with profiles)
Shear modulus of the ETCS standard EPS	$1,0 \leq G_m \leq 3,8$ [MPa]
Pull-through resistance of fixings from profiles	≥ 0.5 kN
Render strip tensile test	(see annex 4.5) crack width w_{rk} [mm]
Bond strength after ageing finishing coat tested on the rig finishing coat not tested on the rig	(see annex 4.6) Minimal value/ Mean value[kPa], rupture type Minimal value/ Mean value [kPa], rupture type
Tensile strength of the glass fibre mesh in the as-delivered state	(see annex 4.7) Mean value [N/mm]
Residual tensile strength of the glass fibre mesh after aging	(see annex 4.7) Mean value [N/mm]
Relative residual tensile strength of the glass fibre mesh after aging	(see annex 4.7) Mean value [%]
Elongation of the glass fibre mesh in the as-delivered state	(see annex 4.7) Mean value [%]
Elongation of the glass fibre mesh after aging	(see annex 4.7) Mean value [%]

3.4 Protection against noise (BWR 5)

Essential characteristic	Performance
Airborne sound insulation of ETICS	no performance assessed
Dynamic stiffness of the EPS insulation product	no performance assessed
Air flow resistance of the EPS insulation product	no performance assessed

3.5 Energy economy and heat retention (BWR 6)

Essential characteristic	Performance
Thermal resistance of ETICS	(see annex 5) Calculated value or measurement value R [(m ² · K)/W]
thermal transmittance of ETICS	(see annex 5) Calculated value or measurement value U [W/(m ² · K)]

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

In accordance with EAD No. 040083-00-0404 the applicable European legal act is: 97/556/EC changed by 2001/596/EC

The systems to be applied are:

Product	Intended use	Levels or classes (Reaction to fire)	Systems
"villerit EcoTherm EPS"	ETICS in external wall subject to fire regulations	A1 ⁽¹⁾ , A2 ⁽¹⁾ , B ⁽¹⁾ , C ⁽¹⁾	1
		A1 ⁽²⁾ , A2 ⁽²⁾ , B ⁽²⁾ , C ⁽²⁾ , D, E, (A1 to E) ⁽³⁾ , F	2+
	ETICS in external wall not subject to fire regulations	any	2+
<p>⁽¹⁾ Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e. g. an addition of fire retardants or a limiting of organic material)</p> <p>⁽²⁾ Products/materials not covered by footnote (1)</p> <p>⁽³⁾ Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of Classes A1 according to Commission Decision 96/603/EC)</p>			

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 19 November 2025 by Deutsches Institut für Bautechnik

Dirk Brandenburger
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beglaubigt:
Klette

Annex 1

Composition of the ETICS

	Components National application documents shall be taken into account	Coverage [kg/m ²]	Thickness [mm]
Insulation material with associated method of fixing	Bonded ETICS: <ul style="list-style-type: none"> • Insulation product factory-prefabricated expanded polystyrene (EPS) <ul style="list-style-type: none"> - standard EPS • Adhesives (cement based powder requiring addition of about 25 % of water) <ul style="list-style-type: none"> - villerit Baukleber VWS 850 grau - villerit Baukleber VWS 850 weiß - villerit InnoTherm - villerit activedry Klebe- und Armierungsmörtel - villerit KA-Basic Klebe- und Armierungsmörtel 	–	≤ 400
	Mechanically fixed ETICS with profiles and supplementary adhesive: <ul style="list-style-type: none"> • Insulation product factory-prefabricated expanded polystyrene (EPS) <ul style="list-style-type: none"> - standard EPS • Supplementary adhesive (equal to bonded ETICS) • Profiles <ul style="list-style-type: none"> - villerit Halteschiene - villerit Verbindungsschiene • Anchors for profiles <ul style="list-style-type: none"> - WS 8 L, WS 8 N - ejothem SDK U, ejothem NK U - SDF-K plus 	–	60 to 200
	Mechanically fixed ETICS with anchors and supplementary adhesive: <ul style="list-style-type: none"> • Insulation product factory-prefabricated expanded polystyrene (EPS) <ul style="list-style-type: none"> - standard EPS • Supplementary adhesive (equal to bonded ETICS) • Anchors for insulation product all anchors with ETA according to EAD 330196-00-0604¹ 	–	60 to 400
Base coat	villerit InnoTherm villerit activedry Klebe- und Armierungsmörtel villerit Baukleber VWS 850 grau villerit Baukleber VWS 850 weiß villerit KA-Basic Klebe- und Armierungsmörtel Identical with the equally named adhesives given above.	4.0 – 7.0 4.0 – 7.0 4.0 – 6.0 4.0 – 6.0 4.0 – 6.0	4.0 to 10.0 4.0 to 10.0 3.0 to 5.0 3.0 to 5.0 3.0 to 5.0
Glass fibre mesh	villerit Armierungsgewebe fein Alkali- and slide-resistant glass fibre mesh with mass per unit area of about 160 g/m ² and mesh size of about 4.0 mm x 4.0 mm	–	–

¹ EAD 330196-00-0604

Plastic anchors for fixing of external thermal insulation composite systems (ETICS) with rendering

	Components National application documents shall be taken into account	Coverage [kg/m ²]	Thickness [mm]
Key coat	villerit Quarzbrücke Ready to use pigmented liquid – acrylic binder For the compatibility with the finishing coats see below.	about 0.3 l/m ²	– –
Finishing coats	<p>To use with key coat "villerit Quarzbrücke"™:</p> <ul style="list-style-type: none"> Ready to use pastes – acrylic-resin binder: <ul style="list-style-type: none"> villerit Deko K* (Particle size 1 – 1.5 – 2 – 3 and 4 mm) villerit Deko R* (Particle size 1 – 1.5 – 2 – 3 and 4 mm) Ready to use pastes – acryliosiloxane binder: <ul style="list-style-type: none"> villerit Siliconit K* (Particle size 1.5 – 2 – 3 and 4 mm) villerit Siliconit R* (Particle size 1.5 – 2 – 3 and 4 mm) villerit activedry Siliconit K* (Particle size 1.5 – 2 – 3 and 4 mm) villerit activedry Siliconit R* (Particle size 1.5 – 2 – 3 and 4 mm) <p>To use without key coat:</p> <ul style="list-style-type: none"> Ready to use pastes – silicate binder: <ul style="list-style-type: none"> villerit Silan K* (Particle size 1.5 – 2 and 3 mm) villerit Silan R* (Particle size 1.5 – 2 – 3 and 4 mm) villerit activedry Silan K* (Particle size 1.5 – 2 and 3 mm) villerit activedry Silan R* (Particle size 1.5 – 2 – 3 and 4 mm) Thin layered cement based powder requiring addition of about 27 % of water: <ul style="list-style-type: none"> villerit Rustikalputz (Particle size 1.5 – 2 and 3 mm) villerit Rauhputz (Particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm) villerit Stockputz (Particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm) villerit activedry Mineralputz M (Particle size 1.5 – 2 and 3 mm) 	 2.2 – 5.0 2.2 – 5.0 2.2 – 5.0 2.2 – 5.0 2.2 – 5.0 2.2 – 5.0 2.2 – 4.0 2.2 – 5.0 2.2 – 4.0 2.2 – 5.0 2.5 – 3.5 (prepared) 2.2 – 6.6 (prepared) 2.2 – 6.6 (prepared) 2.5 – 3.5 (prepared)	 1.0 to 4.0 1.0 to 4.0 1.5 to 4.0 1.5 to 4.0 1.5 to 4.0 1.5 to 4.0 1.5 to 3.0 1.5 to 4.0 1.5 to 3.0 1.5 to 4.0 1.5 to 3.0 1.5 to 6.0 1.5 to 6.0 1.5 to 3.0

	Components National application documents shall be taken into account	Coverage [kg/m ²]	Thickness [mm]
	<p>villerit activedry Mineralputz R* (Particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)</p> <p>villerit activedry Mineralputz K* (Particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)</p> <p>villerit Rauhputz SLC*** (Particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)</p> <p>villerit Stockputz SLC*** (Particle size 1.5 – 2 – 3 – 4 – 5 and 6 mm)</p> <ul style="list-style-type: none"> • Thick layered cement based powder requiring addition of about 21 % of water <p>villerit Edelkratzputz variant WDVS*** (Particle size 1 – 2 – 3 – 4 und 5 mm)</p>	<p>2.2 – 6.6 (prepared)</p> <p>2.2 – 6.6 (prepared)</p> <p>1.5 – 5.0 (prepared)</p> <p>1.5 – 5.0 (prepared)</p> <p>15 – 18 (prepared)</p>	<p>1.5 to 6.0</p> <p>1.5 to 6.0</p> <p>1.5 to 6.0</p> <p>1.5 to 6.0</p> <p>8 – 10</p>
Ancillary material	Remains the responsibility of the manufacturer.		
<p>* K/R refers to different structures of the finishing coats.</p> <p>** The manufacturer is responsible for informing the applicators about the use of a key coat.</p> <p>*** Only to be used with the base coats villerit Baukleber VWS 850 grau/weiß" and "villerit KA-Basic Klebe- und Armierungsmörtel"</p>			

Annex 2

Safety in case of fire (BWR 2)

2.1 Reaction to fire

Configurations	Organic content	Flame retardant content	Euroclass according to EN 13501-1
Base coat	max. 3.1 %	no flame retardant	
EPS - insulation product	In quantity ensuring Euroclass E according to EN 13501-1	In quantity ensuring Euroclass E according to EN 13501-1	
Profile	-	-	
Anchors	-	-	
Rendering system Base coat with finishing coat and compatible key coat indicated in annex 1			
villerit Stockputz / Rauputz / Rustikalputz villerit activedry Mineralputz K/R/M villerit Stockputz SLC / Rauhputz SLC villerit Edelkratzput variant WDVS	max. 2.5 %	no flame retardant	B - s1,d0
villerit Deko K/R villerit Siliconit K/R villerit activedry Siliconit K/R	max. 9.9 %	no flame retardant	B - s1,d0
villerit Silan K/R, villerit activedry Silan K/R	max. 4.8 %	no flame retardant	B - s2,d0

2.2 Apparent density of the EPS-insulation product according to EN 1602

$\rho_a \leq 30 \text{ kg/m}^3$

Annex 3

Hygiene, health and environment (BWR 3)

3.1 Water absorption

Base coat	Thickness [mm]	Mean water absorption [kg/m ²]	
		after 1 h	after 24 h
villerit InnoTherm	5	0.143	0.578
villerit activedry Klebe- und Armierungsmörtel	5	0.143	0.578
villerit Baukleber VWS 850 grau	5	0.080	0.389
villerit Baukleber VWS 850 weiß	5	0.080	0.389
villerit KA-Basic Klebe- und Armierungsmörtel	4	0.033	0.200

Rendering system Base coats "villerit InnoTherm" or "villerit activedry Klebe- und Armierungsmörtel" with finishing coat and without key coat indicated hereafter	Thickness [mm]	Mean water absorption [kg/m ²]	
		after 1 h	after 24 h
villerit Deko	9	0.091	0.645
villerit Siliconit	9	0.381	1.148
villerit activedry Siliconit	9	0.381	1.148
villerit Silan	9	0.539	1.223
villerit activedry Silan	9	0.539	1.223
villerit Rustikalputz	8	0.078	0.593
villerit Rauhputz	11	0.228	0.812
villerit Stockputz	11	0.299	0.803
villerit activedry Mineralputz K	11	0.299	0.803
villerit activedry Mineralputz R	11	0.228	0.812
villerit activedry Mineralputz M	8	0.078	0.593

Rendering system Base coats "villerit Baukleber VWS 850 grau/weiß" or "villerit KA-Basic Klebe- und Armierungsmörtele" with finishing coat and without key coat indicated hereafter	Thickness [mm]	Mean water absorption [kg/m ²]	
		after 1 h	after 24 h
villerit Deko	2	0.197	0.533
villerit Siliconit	2	0.266	0.635
villerit activedry Siliconit	2	0.266	0.635
villerit Silan	3	0.143	1.248
villerit activedry Silan	3	0.143	1.248
villerit Rustikalputz	6	0.094	0.485
villerit Rauhputz	6	0.094	0.485
villerit Stockputz	6	0.094	0.485
villerit activedry Mineralputz K	6	0.094	0.485
villerit activedry Mineralputz R	6	0.094	0.485
villerit activedry Mineralputz M	6	0.094	0.485
villerit Stockputz SLC	4	0.157	0.624
villerit Rauhputz SLC	4	0.266	0.698
villerit Edelkratzputz variant WDVS	10	0.077	0.359

No performance was assessed for all other configurations.

3.2 Impact resistance

Rendering system Base coat "villerit InnoTherm" or "villerit activedry Klebe- und Armierungsmörtel" with finishing coat and without key coat indicated hereafter	Single-layered glass fibre mesh "villerit Armierungsgewebe fein"
villerit Deko	Category II
villerit Siliconit	Category II
villerit activedry Siliconit	Category II
villerit Silan	Category II
villerit activedry Silan	Category II
villerit Rustikalputz	Category II
villerit Rauhputz	Category II
villerit Stockputz	Category II
villerit activedry Mineralputz K/R/M	Category II

Rendering system Base coat "villerit Baukleber VWS 850 grau/weiß" or "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coat and without key coat indicated hereafter	Single-layered glass fibre mesh "villerit Armierungsgewebe fein"
villerit Deko	Category I
villerit Siliconit	Category I
villerit activedry Siliconit	Category I
villerit Silan	Category I
villerit activedry Silan	Category I
villerit Rustikalputz	Category I
villerit Rauhputz	Category I
villerit Stockputz	Category I
villerit activedry Mineralputz K/R/M	Category I
villerit Stockputz SLC	Category II
villerit Rauhputz SLC	Category II
villerit Edelkratzputz variant WDVS	Category II

No performance was assessed for all other configurations.

3.3 Water vapour permeability

Rendering system Base coat "villerit InnoTherm" or "villerit activedry Klebe- und Armierungsmörtel" with finishing coat indicated hereafter	Equivalent air thickness s_d (Result determined with a layer thickness of 5 mm for the base coat)
villerit Deko	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.61 m)
villerit Siliconit	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.27 m)
villerit activedry Siliconit	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.27 m)
villerit Silan	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.13 m)
villerit activedry Silan	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.13 m)
villerit Rustikalputz	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.12 m)
villerit Rauhputz	≤ 1.0 m (Test result obtained with particle size 6 mm: 0.12 m)
villerit Stockputz	≤ 1.0 m (Test result obtained with particle size 6 mm: 0.11 m)
villerit activedry Mineralputz M	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit activedry Mineralputz K/R	≤ 1.0 m (Test result obtained with particle size 6 mm: 0.1 m)

Rendering system Base coat "villerit Baukleber VWS 850 grau/weiß" or "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coat indicated hereafter	Equivalent air thickness s_d (Result determined with a layer thickness of 4 mm for the base coat)
villerit Deko	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.3 m)
villerit Siliconit	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.3 m)
villerit activedry Siliconit	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.3 m)
villerit Silan	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit activedry Silan	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit Rustikalputz	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit Rauhputz	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit Stockputz	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit activedry Mineralputz M	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit activedry Mineralputz K/R	≤ 1.0 m (Test result obtained with particle size 3 mm: 0.1 m)
villerit Stockputz SLC	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.1 m)
villerit Rauhputz SLC	≤ 1.0 m (Test result obtained with particle size 4 mm: 0.1 m)

No performance was assessed for all other configurations.

Annex 4

Safety and accessibility in use (BWR 4)

4.1 Bond strength between base coat and insulation product (EPS)

		Rupture type	Conditioning		
			Initial state [kPa]	After hygro-thermal cycles [kPa]	After freeze/thaw test
villerit InnoTherm	Mean value	insulation product	160	150	99
	Minimal value		120	120	96
villerit activedry Klebe- und Armierungsmörtel	Mean value	insulation product	160	150	99
	Minimal value		120	120	96
villerit Baukleber VWS 850 grau	Mean value	insulation product	69	77	Test not required because freeze/thaw cycles not necessary
	Minimal value		55	63	
villerit Baukleber VWS 850 weiß	Mean value	insulation product	69	77	
	Minimal value		55	63	
villerit KA-Basic Klebe- und Armierungsmörtel	Mean value	insulation product	171	172	
	Minimal value		135	160	

4.2 Bond strength between adhesive and substrate

		Rupture type	Conditioning		
			Initial state [kPa]	2 d immersion in water and 2 h drying [kPa]	2 d immersion in water and 7 d drying [kPa]
villerit InnoTherm	Mean value	in adhesive	439	129	974
	Minimal value		302	100	827
villerit activedry Klebe- und Armierungsmörtel	Mean value	in adhesive	439	129	974
	Minimal value		302	100	827
villerit Baukleber VWS 850 grau	Mean value	in adhesive	920	no performance assessed	940
	Minimal value		780		840
villerit Baukleber VWS 850 weiß	Mean value	in adhesive	920	no performance assessed	940
	Minimal value		780		840
villerit KA-Basic Klebe- und Armierungsmörtel	Mean value	in adhesive	423	316	446
	Minimal value		385	264	416

4.3 Bond strength between adhesive and insulation (EPS)

		Rupture type	Conditioning		
			Initial state [kPa]	2 d immersion in water and 2 h drying [kPa]	2 d immersion in water and 7 d drying [kPa]
villerit InnoTherm	Mean value	insulation product	160	no performance assessed	150
	Minimal value		120		120
villerit activedry Klebe- und Armierungsmörtel	Mean value	insulation product	160	no performance assessed	150
	Minimal value		120		120
villerit Baukleber VWS 850 grau	Mean value	insulation product	88	59	97
	Minimal value		78	34	92
villerit Baukleber VWS 850 weiß	Mean value	insulation product	88	59	97
	Minimal value		78	34	92
villerit KA-Basic Klebe- und Armierungsmörtel	Mean value	insulation product	157	77	131
	Minimal value		138	63	111

Bonded surface

$$S [\%] = 0.03 \text{ N/mm}^2 \times 100 / 0.08 \text{ N/mm}^2$$

$$S = 37.5 \%$$

For bonded ETICS the calculated minimal bonded surface area is 40 %.

4.4 Wind load resistance

The following failure loads only apply to the listed combination of component characteristics and the characteristics of the insulation product.

4.4.1 Safety in use of mechanically fixed ETICS using profiles

Characteristics of the EPS (standard EPS)	Dimensions	500 mm x 500 mm
	Thickness	≥ 60 mm
	Tensile strength perpendicular to the faces	≥ 150 kPa
	Shear modulus	≥ 1.0 N/mm ²
Failure loads [N / panel] (Static Foam Block Test)	Horizontal profiles fixed every 30 cm and 49.4 cm long vertical connection profiles	Minimal: 950 Mean: 1010

4.4.2 Safety in use of mechanically fixed ETICS using anchors

Apply to all anchors listed in the annex 1 mounted on the insulation panels surface				
Characteristics of the EPS (standard EPS)	Thickness		≥ 60 mm	
	Tensile strength perpendicular to the faces		≥ 100 kPa	
	Shear modulus		≥ 1.0 N/mm ²	
Plate diameter of anchor			Ø 60 mm	Ø 90 mm
Failure loads [N]	Anchors not placed at the panel joints (Static Foam Block Test)	R _{panel}	Minimal: 510 Mean: 520	Minimal: 720 Mean: 730
	Anchors placed at the panel joints (Pull-through test)	R _{joint}	Minimal: 400 Mean: 430	Minimal: 430 Mean: 470

The failure loads specified above for a plate diameter of anchor of 60 mm apply to the following anchors with deep mounting but only on the following conditions of installation:

Anchor	Thickness of the EPS	Conditions of installation*
ejotherm STR U, ejotherm STR U 2G (ETA-04/0023)	≥ 80 mm	– Maximum installation depth of the anchor plate: 15 mm (≅ thickness of insulation cover) – Incision depth: 20 mm
	≥ 100 mm	– Maximum installation depth of the anchor plate: 15 mm (≅ thickness of insulation cover) – Incision depth: 35 mm
* according to the appropriate ETA of anchor		

English translation prepared by DIBt

4.5 Render strip tensile test

The mean value of crack width of the base coat reinforced with the glass fibre mesh measured at a render strain value of 1 % is:

Rendering system Base coat "villerit Baukleber VWS 850 grau/weiß" or "villerit KA-Basic Klebe- und Armierungsmörtel" with glass fibre mesh indicated hereafter	Mean value of crack width $w_{m(1\%)}$
"villerit Armierungsgewebe fein"	0.18 mm

For the base coats "villerit InnoTherm" and "villerit KA-Basic Klebe- und Armierungsmörtel" reinforced with the glass fibre mesh is no performance assessed.

4.6 Bond strength after ageing

Rendering system Base coat "villerit Baukleber VWS 850 grau/weiß" or "villerit KA-Basic Klebe- und Armierungsmörtel" with finishing coat indicated hereafter		Rupture Type	after hygro-thermal cycles [kPa]	7 d immersion in water and 7 d drying [kPa]	after freeze/thaw cycles [kPa]
villerit Deko	Mean value	insulation product	100	-	90
	Minimal value		80		83
villerit Siliconit	Mean value	insulation product	87	-	152
	Minimal value		84		150
villerit activedry Siliconit	Mean value	insulation product	-	-	152
	Minimal value		150		
villerit Silan	Mean value	insulation product	-	-	140
	Minimal value		133		
villerit activedry Silan	Mean value	insulation product	-	-	140
	Minimal value		133		
villerit Rustikalputz	Mean value	no performance assessed			
	Minimal value				
villerit Rauhputz	Mean value	no performance assessed			
	Minimal value				
villerit Stockputz	Mean value	insulation product	100	-	-
	Minimal value		82		
villerit activedry Mineralputz M	Mean value	no performance assessed			
	Minimal value				
villerit activedry Mineralputz K	Mean value	insulation product	100	-	-
	Minimal value		82		
villerit activedry Mineralputz R	Mean value	no performance assessed			
	Minimal value				
villerit Stockputz SLC	Mean value	insulation product	-	102	-
	Minimal value		90		
villerit Rauhputz SLC	Mean value	insulation product	-	96	-
	Minimal value		81		
villerit Edelkratzputz variant WDVS	Mean value	insulation product	-	120	-
	Minimal value		109		

Rendering system Base coat "villerit InnoTherm" oder "villerit activedry Klebe- und Armierungsmörtel" with finishing coat indicated hereafter		Rupture Type	after hygro- thermal cycles [kPa]	7 d immersio n in water and 7 d drying [kPa]	after freeze/thaw cycles [kPa]
villerit Deko	Mean value	insulation product	86	-	110
	Minimal value		80		103
villerit Siliconit	Mean value	insulation product	110	-	130
	Minimal value		100		125
villerit activedry Siliconit	Mean value	insulation product	-	-	130
	Minimal value		-		125
villerit Silan	Mean value	insulation product	-	-	90
	Minimal value		-		88
villerit activedry Silan	Mean value	insulation product	-	-	90
	Minimal value		-		88
villerit Rustikalputz	Mean value	insulation product	-	-	120
	Minimal value		-		116
villerit Rauhputz	Mean value	insulation product	-	-	100
	Minimal value		-		95
villerit Stockputz	Mean value	insulation product	-	-	110
	Minimal value		-		106
villerit activedry Mineralputz M	Mean value	insulation product	-	-	120
	Minimal value		-		116
villerit activedry Mineralputz K	Mean value	insulation product	-	-	110
	Minimal value		-		106
villerit activedry Mineralputz R	Mean value	insulation product	-	-	100
	Minimal value		-		95
villerit Stockputz SLC	Mean value	no performance assessed			
	Minimal value				
villerit Rauhputz SLC	Mean value	no performance assessed			
	Minimal value				
villerit Edelkratzputz variant WDVS	Mean value	no performance assessed			
	Minimal value				

4.7 Reinforcement (glass fibre mesh)

"villerit Armierungsgewebe fein"	Mean warp	Mean weft
Tensile strength in as-delivered state	≥ 41 N/mm	≥ 37 N/mm
Residual tensile strength after aging	≥ 24 N/mm	≥ 24 N/mm
Relative residual tensile strength after aging	≥ 50 %	≥ 50 %
Elongation in as-delivered state	4.0 %	3.7 %
Elongation after aging	2.9 %	2.5 %

Annex 5

Energy economy and heat retention (BWR 6)

5.1 Thermal resistance

The nominal value of the additional thermal resistance R provided by the ETICS to the substrate wall is calculated in accordance with EN ISO 6946 from the nominal value of the insulation product's thermal resistance R_D given accompanied to the CE marking and from the thermal resistance of the rendering system R_{render} which is about $0.02 \text{ (m}^2 \cdot \text{K)/W}$.

$$R = R_D + R_{render}$$

The thermal bridges caused by mechanical fixing (anchors, profiles) increases the thermal transmittance U . This influence had to take into account according to EN ISO 6946.

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

Where:	U_c :	corrected thermal transmittance [$\text{W}/(\text{m}^2 \cdot \text{K})$]
	n :	number of anchors per m^2
	χ_p :	local influence of thermal bridge caused by an anchor. The values listed below can be taken into account if not specified in the anchor's ETA:
	$\chi_p = 0.004 \text{ W/K}$	for anchors with a galvanized steel screw with the head covered by a plastic material
	$\chi_p = 0.002 \text{ W/K}$	for anchors with a stainless steel screw covered by plastic anchors and for anchors with an air gap at the head of the screw

The thermal bridges caused by profiles are negligible.

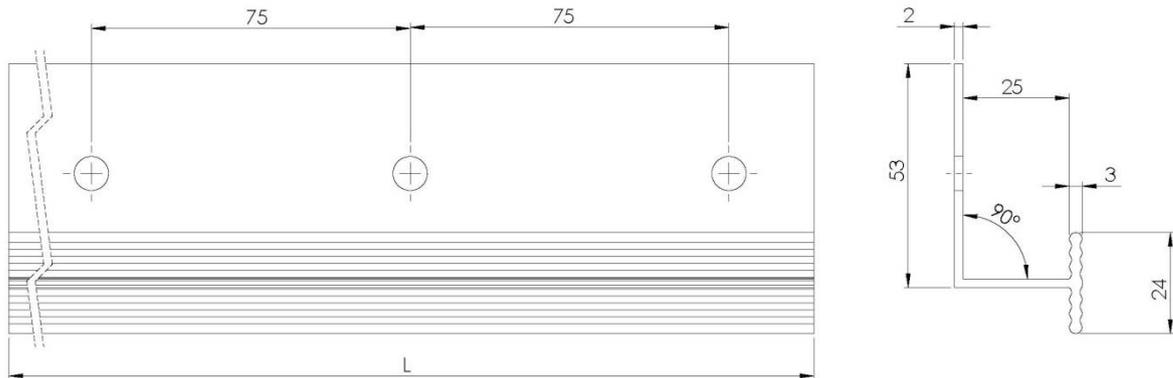
Annex 6

Profiles

Polyvinyl chloride (PVC) profiles, PVC-U, EGL, 082-05-T33 to EN ISO 1163-1 are to be used in the mechanically fixed ETICS with profiles.

The Pull-through resistance of fixings from profiles is ≥ 0.5 kN.

Horizontal profile – "villerit Halteschiene" (dimensions in millimetres)



Vertical connection profile – "villerit Verbindungsschiene" (dimensions in millimetres)

